

# Studio Sound

THE INTERNATIONAL PROFESSIONAL AUDIO MAGAZINE  
FOR RECORDING, POSTPRODUCTION AND BROADCAST



## EXCLUSIVES

Fairlight Merlin  
AES NY Previews:  
Tascam; Mackie;  
Euphonix and Yamaha

Tascam TM-D 4000  
EAR-Yoshino 660  
Soundtracs DS-M  
Jünger Accent2  
Joemeek JM47  
CEDAR NR-3  
ADAM S2A

# Yellow Submarine

Beatles' polyphony scores



The  
**ANDY  
JOHNS**  
Interview

WIN FAB GENELEC AND CEDAR GEAR  
THE REAL STORY OF RECORDERS  
BROADWAY IN THE ARCTIC  
ATM IN ACTION





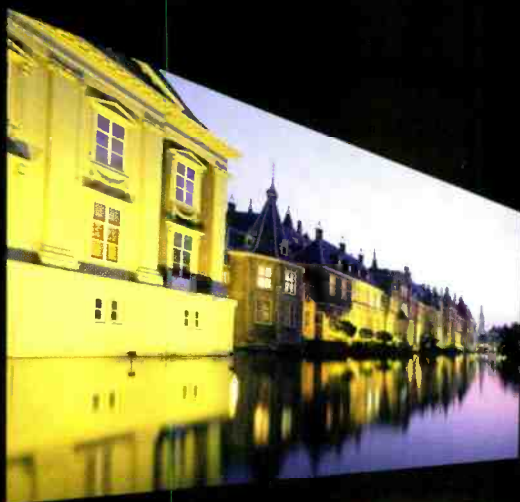
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**AMS  
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**HEAD OFFICE** – AMS Neve plc · Billington Road · Burnley · Lancs BB11 5UB · England · Tel: +44 (0) 1282 457011  
Fax: +44 (0) 1282 417282 · **LONDON** – Tel: 0171 916 2828 · Fax: 0171 916 2827

**GERMANY** – Tel: 61 31 9 42 520 · Fax: 61 31 9 42 5210 · **NEW YORK** – Tel: (212) 965 1400 · Fax: (212) 965 3739

**HOLLYWOOD** – Tel: (818) 753 8789 · Fax: (818) 623 4839 · **TORONTO** – Tel: (416) 365 3363 · Fax: (416) 365 1044

e-mail: [enquiry@ams-neve.com](mailto:enquiry@ams-neve.com) – <http://www.ams-neve.com>

issue 24

# Solid State Logic



'The MT is tremendous'

## MT on a roll

The digital multi-track that feels familiar

## SL 9000 J

The SuperAnalogue™ Sensation

## Aysis Air

New custom mobile version announced

## Avant

Digital console proves perfect for post

New York

+1 (1)212 315 1111

Los Angeles

+1 (1)323 463 4444

Tokyo

+81 (0)3 5474 1144

Paris

+33 (0)1 3460 4666

Milan

+39 02 2622 4956

Toronto

+1 (1)416 431 9151

Singapore

+65 (0)38 2872

International HQ

+44 (0)1865 842300



# column editorial

The success of the Axiom-MT, with over 30 orders since its launch at the May 1998 AES in Amsterdam, is an overwhelming endorsement of SSL's strategy of combining proven, stable digital technology with a familiar control surface. With its superb-sounding EQ, dynamics and converters, and a stunning automation system, the MT is proving to be the digital music console that the industry has been waiting for.

SSL's strategy, however, is not restricted to digital technology. Solid State Logic is the only mixer manufacturer offering a choice between analogue and digital at the very highest level. For those customers who are not yet ready for the transition to digital, the SL 9000 J SuperAnalogue™ console, with its latest V4 software, is the analogue console of choice for most of the world's top studios, several of whom have recently ordered their third SL 9000 J.

If you're wondering whether to stay with analogue or make the transition to digital, the choice is clear. Ultimate Analogue or Definitive Digital - it's an SSL!

*John Andrews, Marketing Director*

*Front cover: Skip and Lynn Saylor, co-owners, Skip Saylor Recording.*

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Digital console posts perfect results

## Solid State Logic



## MG Sound in pole position

MG Sound Studios of Vienna has installed a 96-channel MT digital multi-track console to complement the studio's existing SL 9000 J Series console fitted with Total Recall™ and Ultimotion™.

Located in the heart of historic Vienna, this leading four-studio complex frequently plays host to chart-topping international artists from both the pop and classical genres. Additionally, the experienced production team is regularly involved in complex multi-media, film scoring and commercials work.

A relaxing atmosphere is assured as MG Sound's residential facility boasts a penthouse and roof garden. Nearby are some of Europe's finest hotels, restaurants and concert halls.

According to MG Sound's Eva Böhm, "We are all impressed with the sonic quality of the MT and its ease of operation. The new console will ensure that MG Sound maintains its pole position as one of the world's premier recording and mixing studios."

MG Sound,  
Vienna.  
(left to right)  
Martin Böhm,  
Eva Böhm  
and  
Stevie Coss





# MT digital multi-track console surges ahead in U.S.

With over thirty MT consoles either installed or on order throughout the world to date, sales continue to surge in the U.S. as high-end studios prepare for all-digital work environments.

In Los Angeles, Skip Saylor Recording has installed the first MT on the West Coast. In addition, Avatar Studios and Kampo Audio/Video in New York and Transcontinental Studios of Orlando, Florida all recently ordered an MT, following the first console which went to New York's Quad Recording.

As a part of the Hollywood music recording scene for more than 20 years, Skip Saylor explains his decision to move into digital. "The installation of Axiom-MT separates us from the pack by being the first on the West Coast to offer high-level digital mixing capabilities for music," says Saylor. "I have been waiting 20 years for a console like the MT. SSL is the first to combine the great sound and ease of operation from the analogue world with the capabilities of the digital world. The MT is tremendous."

Legendary Avatar Studios of New York is set to install an MT console in its re-designed Digital 1 room. This leading four-room music recording facility recently installed an SL 9000 J Series SuperAnalogue™ console, and now wants to lead the industry into the digital domain with a superior digital console. "In the high-end studio business, it is necessary that a facility should not merely service its client base, but also offer them new technology as it becomes available," says Zoe Thrall, president and general manager of Avatar Studios. "Working in an all-digital environment allows incredible new freedoms, especially with mixes. SSL has made the MT very user-friendly and familiar to help artists and engineers make

the transition into this domain. The MT will keep us at the cutting edge of the industry."

Also in New York, Kampo Audio/Video, a four-room facility and part of downtown Manhattan's growing studio presence, is installing an MT in Studio C this fall. The facility is responsible for tracking the blockbuster motion picture "Austin Powers: The Spy Who Shagged Me" and music tracks for the upcoming film "Mission: Impossible II."

"We see the MT as bringing our current client base into the digital domain by offering them the advantage of state-of-the-art digital workflow with the familiar and trusted interface of an analogue board," says Alex Abrash, studio manager for Kampo. "While the interface of the other large frame digital consoles became less and less appealing to us, every time we sat down in front of the MT we liked it more and more."

In Orlando, Fla, premier recording facility Transcontinental Studios is set to install a 48-fader, 96-channel MT as the centrepiece of its expansion. The all-new fourth room housing the MT will be 5.1 ready to address increasing market needs for surround mixing. "The way everything is going in the industry, it's just a matter of time before everything goes digital, so we wanted to make the move to the MT now to be at the very forefront of the business," says Joe Smith, vice president of Transcontinental Studios. "The MT is the only digital console that will make engineers feel at ease because of the intrinsic design of the board replicates the familiar SSL analogue model. Any engineer who has worked on a 9000 will be immediately comfortable behind the MT."

▲ Skip Saylor Recording.

Another recent MT installation:

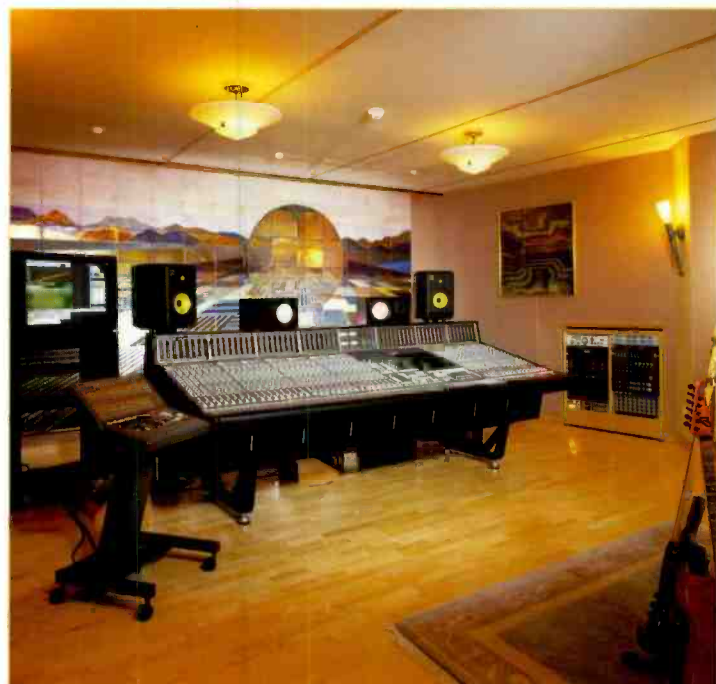
▼ The new MT equipped studio for Mutt Lange.

## Hot console for Hot Line Studios

When Hot Line Studios of France relocated from Courbevoie to Levallois, their primary concern was to create a larger and more prestigious facility - adding a second studio and editing suite. They also wanted to offer their clients more performance using the latest technology and consequently examined the range of digital consoles on offer.

As recording engineer Louis Limpalaer explains, "We wanted a digital console capable of surround sound and 5.1 monitoring. As we offer music recording and mixing in addition to post-production, the MT attracted our attention."

Hot Line Studios' activity includes sound-track, music creation and post-production, in addition to work for longer format TV and feature films.



# Larrabee Sound opens fifth SSL room



◀ Studio 3 at Larrabee North (left to right) Kevin Mills, owner with Kevin "KD" Davis, engineer.

Larrabee Sound of Los Angeles recently opened a fifth room based around an 80-channel Solid State Logic SL 9000 J Series console. Built from the ground up, Studio 3's total surround-sound capability is assured with the comprehensive facilities provided by the SL 959 Surround Sound Monitor Panel. The console joins two other SL 9080 J Series in Larrabee Sound North and two SSL 4000 E/G Series in Larrabee Sound West.

"We built our fifth studio room at Larrabee Sound North to serve our clients because we are fully booked all the time," says Kevin Mills, owner of Larrabee Sound. "We have always been an all-SSL facility. Couple that with our clients' love of the 9000 and its ease-of-use, making the decision to go with a third SL 9000 J was an easy one."

Larrabee Sound has been catering for the needs of top musicians, producers and engineers for more than 30 years. Larrabee Sound North recently expanded with over 16,000 square feet of studios and lounges and is over twice its original size. Studio 3 has been built for surround to meet the growing demand for 5.1 mixing and features five identical Augspurger monitors each with double 15-inch drivers. Since its recent grand opening, Studio 3 has enjoyed a full booking schedule.

"The surround sound capabilities of Studio 3 make us ready for the future, as we see demand for 5.1 mixing on the rise," explains Mills. "Though we have done many projects with the likes of Michael Jackson and Madonna, we specialize in new pop, R&B and alternative modern rock groups that will be on the top of the charts in five or six months. There is a great demand for the SL 9000 J Series because it is simply the analogue console of choice."

## The best gets better .....

New Version 4 software has been introduced for the landmark SL 9000 J Series SuperAnalogue™ console and according to SSL's Analogue Product Manager, Bruce Davies, "The best just got better."

"The SL 9000 J has been in service with many of the world's most prestigious music recording and film scoring facilities for five years now and we have an ongoing dialogue with customers to ensure they get the very best from our consoles. Consequently, software releases are provided from time to time with new features that further enhance console operation."



SL 9000 J Series in SSL's Product Demonstration Area.

Among the new features in V4 software is extended machine control, with revisions to parallel machine control and automatic identification and configuration for controlling serial machines.

Additional project management tools are incorporated, including automatic file version handling and a simplified user interface.

Other useful operational features incorporated in the new software release include additional automation functions, timecode masking and offsetting, and increased grouping flexibility, which enhances 4-channel panning - extending the creative control of 5.1 mixes.

## Aysis airs in Austria

Aysis Air at ORF's Vienna studio. ▶

It was recently announced that Osterreichischer Rundfunk (ORF) the Austrian State Broadcaster, is to re-equip its TV production studios in eight regional facilities with Aysis Air, the digital broadcast console from SSL.

Over a three year period the new consoles are to be installed at the broadcaster's stations in Linz, Graz, Innsbruck, Salzburg, Eisenstadt, Dornbirn, St. Polten and Vienna. ORF took delivery of their first console in May.

A further Aysis Air has also already been installed by ORF at the broadcaster's Vienna sports studio, which has seen a recent extension of channel capability.

According to Peter Ganner, Head of the Audio Projects Group at ORF, "We have installed Aysis Air in our new production facility for sporting events. We had considered several consoles but after careful evaluation we discovered that Aysis Air met all our requirements for live productions and offered the best value for our purposes."



# Avant proves perfect for post

Christopher Sound and Vision-David Pichè, chief engineer/audio post (seated) with Chris Cadieux, president. ▼



Photo: David Goggin.

▲ Crawford Communications visit SSL's NAB booth. (left to right) Eric Stark, chief engineer; Steve Davis, director of Crawford Audio; Jesse C Crawford, president and Paul Hansil, executive vice president.

Sales of Solid State Logic's Avant digital console for film and post continue to grow with nearly 40 units installed worldwide. In an era of audio-critical audiences, the Avant delivers state-of-the-art digital sound, from mono to 7.1 surround, and addresses a wide range of post production needs. Recent U.S. installations of the Avant include Christopher Sound and Vision, Inc. in Tulsa, Okla; Complete Sound in Hollywood, Calif.; Crawford Post in Atlanta; and Soundtrack in Boston.

Christopher Sound and Vision, Inc. (CS&V), a Midwest facility specializing in music and post production for television, film and DVD, recently installed a 48 fader, 96-input SSL Avant as part of a major studio upgrade.

"We love the automation power and the flexibility for instant resets that the Avant offers. We can now address any configuration from mono to 7.1 with the push of a button. It is easy, reliable and user friendly. The Avant is absolutely the best purchase we've ever made and confirms us as a state-of-the-art facility," says David Pichè, chief engineer, audio post at CS&V.

CS&V is currently remixing a made for TV movie, "Resurrection" in 5.1 surround

sound for DVD. In addition, "Chillicothe", shown at the Sundance Film Festival, is being transferred to DVD and will be remixed in 5.1 surround sound.

Complete Sound, the premiere post production sound facility operated by parent company Complete Post in Hollywood, Calif. has installed two Solid State Logic Avant Digital Film consoles. Avant's two-operator capabilities provide Complete Sound with greater flexibility, allowing the studio to address larger post production demands and to expand its business.

"The technological advance of Avant, with its 192 input channels and the built-in monitoring system, gives us all the power we need to address film and any other surround sound applications," says Jeff Minnich, director of engineering for Complete Sound. "The Avant can be set up as either a two-man or single operator console. This allows us to straddle the line between short-form sitcoms, long-form TV dramas and feature films. Complete's other reason for buying the Avant is that it sounds great."

Atlanta's premier audio post production facility, Crawford Communications, has installed a 24-fader Avant as part of a new 350,000-square-foot facility. Crawford's audio strategy includes large-scale networking and system integration with additional SSL consoles to take Crawford into the new millennium.

Steve Davis, director of audio for Crawford Communications, explains, "We chose the SSL Avant as the centerpiece console for the facility because of the system integration SSL has designed into all of its A Series consoles. The SSL gear allows us to have shared resources between studios, eliminating the necessity of purchasing redundant equipment and wiring."

Since the Avant's installation, Crawford Post has used it for projects including CNN's "Fantasy Football" and "My CNN," television ads for Bell South Mobility as well as corporate projects for Coca Cola.

Soundtrack Recording Studios, which has locations in New York and Boston, recently purchased two SSL Avant Digital Film consoles to meet the booming post production needs at its Boston location. The decision to go with the Avants was based not only on growing demand for surround sound mixing, but also on Soundtrack's considerable experience with SSL equipment and the excellent service provided.

"We wanted consoles that are able to handle today's format as well as take us into the future. Avant was the only choice," says Rob Cavicchio, owner of Soundtrack Recording Studios. "In particular, requests are coming in for surround mixes in various formats. We wanted to be ready to provide a digital system that not only sounds great, but can expand to meet the needs of future formats."





# techno**file**

In analogue technology, customising can be done on a per console basis, with - 'as installed' documentation for maintenance.

Custom modifications to digital consoles are viewed with horror by almost all manufacturers, as software support is only viable if all customers are using precisely the same version of operating software.

The classic response to requests for new features or questions about operational facilities is 'It's purely a matter of software, Sir!', which usually means that the requested changes might appear in the next update, but only if enough customers are happy to have them as standard features.

In contrast, SSL's Aysis Air Mobile is 'purely a matter of hardware' - this compact new version uses precisely the same software as the standard Aysis Air, and the changes have been achieved by a combination of a revised top panel layout and some internal repackaging. The result is an extremely useful option involving absolutely no additional software and with no software support implications.

**Niall Feldman, Marketing Development Manager.**

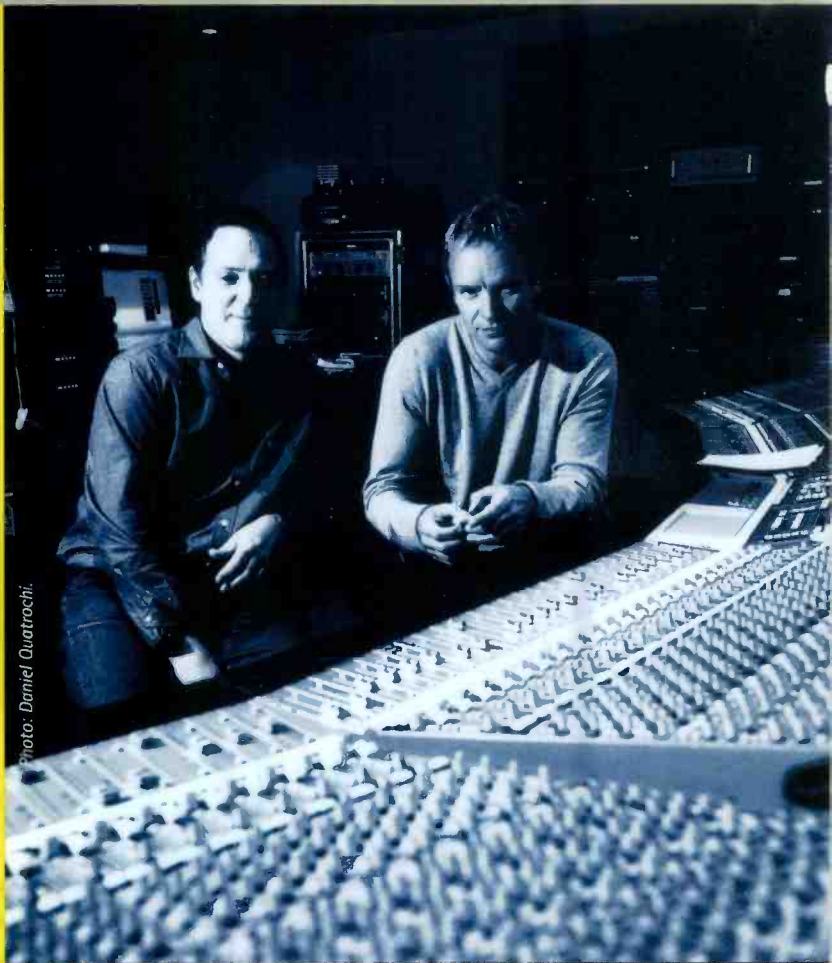


Photo: Daniel Quatrachi.

## MT gets mobile

SSL's MT digital multi-track console is proving popular for mobiles, having been recently installed by Manor Mobiles of Oxford, UK and Le Voyageur of Paris, France. Manor Mobiles is part of one of the UK's most distinguished studio groups including Olympic, Townhouse and Abbey Road. As part of a major refurbishment and expansion, Manor Mobiles has converted one of its fleet - "El Camion" - into an all digital OB vehicle and installed a 64-channel Axiom-MT with 72 remote mic amps. The digital truck will play a key role in the recording, mixing and live broadcasting of major events and popular TV shows.

In addition to its regular broadcast commitments the Manor Mobiles vehicle was recently used to cover Capital Radio's 'Party in the Park', an open-air event in London's Hyde Park where more than 30 bands on two stages played to 100,000 people. The truck provided the audio feed for the live bands -The Corrs, Mike and the Mechanics, Eurythmics, Blondie, Boyzone and Catatonia.

According to Senior Recording Engineer Will Shapland, "The instant reset on the MT is a tremendous advantage. The familiarity of the SSL control surface makes for a much gentler learning curve and, of course, the sonic quality is a given.

"Meanwhile in Paris, leading French mobile recording operation Le Voyageur recently completed the installation of an MT digital multi-track console at the heart of its new state-of-the-art digital mobile, Le Voyageur 1.

A 96-channel MT with 96 mic preamps is fitted in the truck and the console rotates to dominate a large 21' x 14' (6.5m x 4.4m) control room, designed for 5.1 monitoring and with all the facilities and outboard gear associated with a fixed studio. Engineer Yves Jaget of Le Voyageur Mobiles had experienced the MT digital multi-track at Mega Studio in Paris where he had worked on the recording of French artist Zazie. Although a number of consoles were considered for this prestigious project, Yves Jaget concludes, "We finally picked the MT because it was very similar in its way to the SL 9000 J Series, which all engineers around the world know very well already."



▲ Aysis Air Mobile Centre Section



# Brand New Day in Paris

◀ Sting with engineer Simon Osborne at Mega Studio in Paris.

The final mix for Sting's latest album, "Brand New Day," due for release in the autumn, has been completed at Mega Studio in Paris.

The majority of the recording for the album was completed in Tuscany using Sting's portable SL 4064 G+ console which was designed to be easily dismantled and flight-cased. The console has been used on all Sting's albums since "Ten Summoner's Tales" in 1993.

The final mix was completed in Paris using Mega Studio's SL 9000 J Series consoles with engineer Simon Osborne who has worked with Sting over the last nine years and is very familiar with SSL consoles. "They're great tools," he maintains, "and while features like the automation are very useful, the technology doesn't impede the creative process so you're free to concentrate on the music."



▲ Brandon's Way- (left to right) Paul Cox, technical engineer; Jon Gass, mixing engineer; Kyle Bess, engineer; and Paul Boutin, engineer.

▼ Le Voyageur.



▲ Le Voyageur.

▶ Laura and John King-Chung King Studios.



## Sounding great from coast to coast—the SL 9000 J Series

Major U.S. recording facilities continue to install the SSL 9000 J Series, the most requested analogue recording console at leading facilities across the country. With new rooms being added to existing facilities, many are coming back for second and third consoles, strengthening SSL's position as the leader in SuperAnalogue™ console technology.

New York's premiere Chung King Studios is installing its first SSL 9000 in the all-new Gold Suite, a 100-musician, state-of-the-art tracking studio. "We felt a room of this capacity is ideally suited for the 9000," says John King, owner of Chung King. New York also boasts The Hit Factory, one of the city's finest, which now has three SL 9000s with the recent upgrade of surround sound ready Studio 2. "Our experience has been so notable that a third J Series was the only way to go," says Troy Germano, studio VP. NYC is also home to Sony Music Studios, which recently upgraded Studio A with a third SL 9000. This prestigious facility also has SL 9000 Js in both Studios C and D.

Down in the southeastern U.S., Full Sail Center for the Recording Arts in Winter Park, Fla., finds that a second SL 9000 console does the trick for training audio engineers of the future. This installation was born out of necessity after an overwhelming demand by students for training on an SL 9000.

Atlanta's Patchwerk Studios, owned by Atlanta Falcons' first string tackle Bob Whitfield, is installing its first J Series in an all-new facility. "We want to keep our high-end mixing completely in-house, so the 9000 is the only way to go," says Josh Butler, chief engineer.

In Hollywood, Calif., Brandon's Way is a three-room facility owned by the renowned R&B producer/composer Kenny "Babyface" Edmonds. When it was time to upgrade Studio A, the facility's premiere recording room, a 96-channel SL 9000 J Series was the console of choice. Pacific Studios in North Hollywood recently upgraded its Studio B with the facility's second SL 9000. The new room is 5.1 ready to meet the growing demand for surround mixing.



# newsbytes



## Avant for Finland

The University of Art and Design in Helsinki, Finland has ordered SSL's Avant digital film console for a new film mixing facility due to open in September this year. The 64-channel Avant is to be installed in a THX approved all-digital facility - the first of its kind in the country. The principal perceived advantage of the console for this educational application was ease of use - achieved through an extremely ergonomic control surface with knob per function operation.



## New appointment in the U.S.

Michael Descoteau has joined the SSL team in New York as VP Broadcast Sales. He brings with him 20 years of pro-audio experience and an extensive background in the broadcast arena, where he will handle sales to the networks, owned and operated stations, affiliates and broadcast mobiles. "Michael will be a valuable resource to our current and potential broadcast customers," says Rick Plushner, president of SSL USA. "His professional sales and client support experience will play a tremendous role in expanding SSL's position in the broadcast industry."



## More consoles for China

National broadcaster China Central Television (CCTV) has purchased a 96-channel Solid State Logic Aysis Air digital broadcast console for its first digital studio, due to be on air by the end of September. Aysis Air will be used to record events commemorating 50 years of communism and for live and recorded variety shows thereafter. Chang Chun Film Studio, in the rural north of China, has ordered an SL 8032 film console with film monitor matrix and joystick panning. One of the oldest film establishments in China, Chang Chun is being refurbished with a combination of private and government investment.



## Two MTs for Canada's TVA Group

TVA Group, the highly successful privately held Canadian television network, has installed two MT digital consoles in Montreal. The eight studio, six control room facility is using the MT consoles for live-to-air and live-to-tape production as part of a movement to make the network all digital. "We manage our operations with leading-edge technology in all areas of production," says Jean-Luc Sauvageau, senior audio technician for TVA Group. "The addition of the two MT consoles is giving us the power and flexibility to move aggressively into digital broadcasting."



## Fifth digital Proms season for BBC

For the fifth year running, the BBC is using its Digital Sound Vehicle (DSV) to transmit the Promenade Concerts from London's Albert Hall in digital. The DSV is equipped with an SSL 96-channel digital console, for mixing music live to air. The season of Promenade Concerts presents one of the world's greatest challenges to Outside Broadcast operation. With more than 70 concerts broadcast live on Radio 3 over an eight-week period, the intensity of the schedule is unrivalled.



## Second Aysis Air for Italy's VideoTime

VideoTime, the Italian commercial TV network and member of the Berlusconi Media Group, has installed a second Aysis Air digital broadcast console from SSL.

With its original Aysis Air installed less than a year ago, the broadcaster has been favourably impressed with the console's reliability, citing this and familiarity of operation as the chief reasons for purchase.



## First MT in Japan

Japanese post production company Imagicia has ordered a 64 channel MT digital multi-track console for video sweetening work in their Shinagawa studios. Imagicia already have an Avant digital film/post console in their Akasaka complex.

Other Japanese orders include an Aysis 24 and an Aysis Air 24 for Osaka Art University, and several SL 9000 J SuperAnalogue™ consoles, including a 64-channel console for mix engineer training school, Visual Arts.

# contact information

## SOLID STATE LOGIC WORLDWIDE

**International Headquarters**  
Begbroke, Oxford OX5 1RU England  
Tel: +44 1865 842300  
Fax: +44 1865 842118

Email: [sales@solid-state-logic.com](mailto:sales@solid-state-logic.com)  
www.solid-state-logic.com

**USA:**  
320 West 46th Street,  
2nd Floor, New York,  
NY 10036  
Tel: +1 212 315 1111  
Fax: +1 212 315 0251

**USA:**  
6255 Sunset Boulevard,  
Suite 1026, Los Angeles,  
CA 90028  
Tel: +1 323 463 4444  
Fax: +1 323 463 6568

**JAPAN:**  
3-55-14 Sendagaya,  
Shibuya-ku, Tokyo 151  
Tel: +81 3 5474 1144  
Fax: +81 3 5474 1147

**FRANCE:**  
1 rue Michael Faraday,  
78180 Montigny  
le Bretonneux  
Tel: +33 1 3460 4666  
Fax: +33 1 3460 9522

**ITALY:**  
Via Pirandello 17, 20099  
Sesto San Giovanni, Milan  
Tel: +39 2 2622 4956  
Fax: +39 2 2622 4938

**CANADA:**  
702 Brimorton Drive,  
Scarborough, Ontario  
M1G 2R9  
Tel: +1 416 431 9131  
Fax: +1 416 431 4424

**ASIA:**  
150 South Bridge Road,  
02-22 Fook Hai Building,  
Singapore 058727  
Tel: +65 438 2272  
Fax: +65 438 2252

**ARGENTINA & URUGUAY,**  
MAS International  
Tel: +54 114 752 0418  
Fax: +54 114 755 4594  
email: [arced@solidstate.com.ar](mailto:arced@solidstate.com.ar)

**AUSTRALIA & NEW ZEALAND**  
Synnex International Pty Ltd  
Tel: +61 2 9417 4700  
Fax: +61 2 9417 6136

**AUSTRIA, AudioSales**  
Tel: +43 22 36 26 123  
Fax: +43 22 36 43 223  
email: [sales@audiosales.at](mailto:sales@audiosales.at)  
<http://www.audiosales.at>

**BELGIUM & LUXEMBOURG**  
Trans European Music  
Tel: +32 2 466 5010  
Fax: +32 2 466 5082  
email: [mail@tem.be](mailto:mail@tem.be)  
<http://www.tem.be>

**BRAZIL, Savana Comunicacoes Ltda**  
Tel: +55 21 512 9888  
Fax: +55 21 511 0190  
email: [savana@is.com.br](mailto:savana@is.com.br) / [savana@www.is.com.br](mailto:savana@www.is.com.br) / [savana](mailto:savana@www.is.com.br)

**CHINA, Digital Media Technology Co Ltd**  
Tel: +86 10 6310 1190  
Fax: +86 10 6310 1367  
email: [dmt@public.bta.net.cn](mailto:dmt@public.bta.net.cn)

**COLOMBIA, Datanex Ltda**  
Tel: +57 1313 0538/0506/0542/0561  
Fax: +57 1313 0578  
email: [datanex@ia.net.com](mailto:datanex@ia.net.com)

**CZECH REPUBLIC, Audiosales S.R.D.**  
Tel: +420 2 252 6003  
Fax: +420 2 252 5088  
email: [osales@bos.infima.cz](mailto:osales@bos.infima.cz)

**DENMARK, SBS (Studio & Broadcast Systems)**  
Tel: +45 45 04 09 55  
email: [bsj@b-s.dk](mailto:bsj@b-s.dk)

**FINLAND, Studiotec**  
Tel: +358 9 512 35 30  
Fax: +358 9 512 35 355  
email: [sales@studiotec.fi](mailto:sales@studiotec.fi) / [service@studiotec.fi](mailto:service@studiotec.fi)

**GERMANY, Audio Export GmbH**  
Tel: +49 71 31 26 36 0  
Fax: +49 71 31 26 36 100  
email: [AudioExport@seggmann.t-online.de](mailto:AudioExport@seggmann.t-online.de)  
<http://www.audioexport.de>

**HONG KONG, Digital Media Technology Co Ltd**  
Tel: +852 272 10343  
Fax: +852 236 66883  
email: [dmt@dmt.com.hk](mailto:dmt@dmt.com.hk)

**HUNGARY, Audiosales Hungary KFT**  
Tel: +36 1 214 9549  
Fax: +36 1 214 9549  
email: [audiosales@euroweb.hu](mailto:audiosales@euroweb.hu)

**INDIA, Topaz Technovision**  
Tel: +91 22 457 7340  
Fax: +91 22 452 8573

**IRAN, Besat Business Machines Co**  
Tel: +98 21 678 6336 / 6697 100 / 672 8781 2  
Fax: +98 21 670 7000

**ISRAEL, P.T.A. G. Audiotec Ltd**  
Tel: +972 3 562 7861  
Fax: +972 3 683 8494  
email: [audiotec@shani.net](mailto:audiotec@shani.net)

**SOUTH KOREA, Hini Seo International**  
Tel: +82 2 3142 9471  
Fax: +82 2 3142 9475  
email: [teoshin@netsgo.com](mailto:teoshin@netsgo.com)

**NETHERLANDS, TM Audio BV**  
Tel: +31 30 241 4070  
Fax: +31 30 241 0002  
email: [tm.audio@knoware.nl](mailto:tm.audio@knoware.nl)

**NORWAY, Siv Ing Benum**  
Tel: +47 221 399 00  
Fax: +47 221 462 59  
email: [post@benum.no](mailto:post@benum.no)

**SLOVAKIA, Audiosales S.R.O.**  
Tel: +421 7 654 22249  
Fax: +421 7 654 26809  
email: [audiosales@rainside.sk](mailto:audiosales@rainside.sk)

**SOUTHERN AFRICA, Questek Marketing CC**  
Tel: +27 11 706 0405  
Fax: +27 11 706 0308  
email: [questek@questek.co.za](mailto:questek@questek.co.za)

**SPAIN, Lexon SA**  
Tel: +34 93 203 4804  
Fax: +34 93 280 4029  
email: [info@lexon.net](mailto:info@lexon.net)

**SWITZERLAND, Dr W A Günther**  
Tel: +41 1 910 4545  
Fax: +41 1 910 3544

**TAIWAN, Advantech Intl Co Ltd**  
Tel: +886 2 2719 2388  
Fax: +886 2 2716 0043  
email: [advtkpe@ms7.hinet.net](mailto:advtkpe@ms7.hinet.net)

**THAILAND, Digital Equipment & Transducer**  
Tel: +66 2 276 6141  
Fax: +66 2 276 6149

**TURKEY, Censa**  
Tel: +90 212 272 1055  
Fax: +90 212 266 4186  
email: [kursun@superonline.com](mailto:kursun@superonline.com)



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## Sealed for life

THERE IS A FEELING OF UNREST in the classic car world. Tightening emissions control, government legislation and active scrapping policies have been construed as positive discrimination against those who chose to tend modes of transport that they deem of classic importance. While it may seem like the reactionary persecution-driven whimperings of chaps with beards and polishing rags, or chaps with far too much money who spend their weekends ripping around in cars belching part-burned oil, or holding up perfectly normal travellers on their Sunday spins, there is a subclause in their protests that makes a lot of sense.

Modern cars are sophisticated and the days of the DIY service have now largely been reduced to emptying the ashtray, opening the bonnet and perhaps risking a quick rub of the rocker cover. The advent of 'sealed for life' engines and transmissions bodes well for a trouble-free life of motoring, but how long is life? When the items in question fail they will be replaced by the manufacturer. No friendly local mechanic nurtured on the whims of the SU carburettor or armed with a fuel injection diagnostics computer is going to be able to sort you out an affordable fix or rebuild. We are at the mercy of the manufacturer and when that manufacturer decides that engineering has moved on, and for sure it will, then the item in question will be struck off the stock list and we're back to the active scrapping policy. I love progress. It captivates and fascinates me. But I can appreciate the sound of an Aston Martin under load, the classless simplicity of a Morris Minor, and the pure engineering excellence of a vintage Rolls Royce which can be kept on the road using rudimentary and regular maintenance and overhaul. I also appreciate being able to get an obscure analogue tape recorder fixed.

I know of many individuals and companies who can recondition an MTR90 to as-new spec, who can overhaul an old compressor, find the right and elusive valve for that mic and make sure that the PSU is correct for the job, or simply repair an old guitar amp. But for how much longer? I don't know very many individuals, outside of the manufacturers, involved who can fix a digital desk's software and customise it to my requirements, blow new algorithms into a multi-effects processor, or instruct me on how to manage and maintain the hard disk on a DAW. So much of what we see today shows signs of the 'sealed for life' ethic. If that is the price of progress then I am comfortable with it. What I cannot entertain is the thought that one day no-one will want or be able to sort an old Ampex.

Next time you're stuck behind some 'classic' vehicle, turn off the radio, open the windows and breathe deeply.

**Zenon Schoepe, executive editor**

## Futurecasting

I HAVE SEEN THE FUTURE. Not all of it, you understand, but enough to have stirred just enough enthusiasm for tomorrow's television. In fact, all I saw was a piece of the action from the Italian Grand Prix, but as I say, it was enough.

Languishing on the third day of IBC, I sought shelter in a crowd of broadcasters surrounding the Canal+ Technologies stand—and found myself watching the Grand Prix on six television channels. Not only that, but I was in front of a couple of senior BBC chaps using the broadcast as the basis of an enlightening discussion of the Corporation's own activities. Curiously, this was the second time I had eavesdropped on what I would have thought were sensitive issues of BBC policy—the first was sight of a policy document being prepared for the attention of Alan Yentob. My discretion dictates I say nothing of its content, but composing it on a laptop on a busy train suggests its author had rather less. The standard of English was, however, most impressive...

On six television channels I found many of the regular frustrations of watching a Grand Prix lifted. It was, for example, possible to monitor various of the track skirmishes simultaneously, ignore slow-mo replays of incidents that failed to pique greater interest, keep an eye on the pit lane and stay in touch with who was where on the track at any time.

Very interesting, all of it. And quite a different experience from following the whims of a foreign director with an agenda at odds with my own.

Every time the issue of television channels comes up the discussion seems to become one of quantity against quality. It's easy to see why—finite resources mean every expensive production comes at the cost of numerous cheaper ones.

Yet intelligent coverage of a Grand Prix, for example, can surely combine economies of scale with genuine quality.

Obviously, not everybody wants six channels of motor racing in their home, and here came my revelation. Stupid numbers of channels will allow intelligent coverage of a variety of subjects beyond that of sport. And with them go as many channels of audio...

Underestimate the potential of abundant television at your own risk. Fill it with rubbish at our collective peril.

**Tim Goodyer, editor**

# Studio Sound

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Miller Freeman Entertainment Group,  
A division of Miller Freeman UK Ltd,  
4th Floor, 8 Montague Close, London  
Bridge, London SE1 9UR, UK.

Tel: +44 171 940 8500  
Fax: +44 171 407 7102  
Email: [studiosound@unmf.com](mailto:studiosound@unmf.com)  
Net: [www.prostudio.com/studiosound](http://www.prostudio.com/studiosound)

### Editorial

Executive Editor: **Zenon Schoepe**

Email: [studiosound@unmf.com](mailto:studiosound@unmf.com)

Direct line: +44 171 940 8513

Editor: **Tim Goodyer**

Email: [studiosound@unmf.com](mailto:studiosound@unmf.com)

Direct line: +44 171 940 8578

Production Editor: **Peter Stanbury**

Email: [pstanbury@unmf.com](mailto:pstanbury@unmf.com)

Direct line: +44 171 940 8523

Secretary: **Eileen Sullivan**

Email: [esullivan@unmf.com](mailto:esullivan@unmf.com)

Direct line: +44 171 940 8524

Consultants: **Francis Rumsey;**

**John Watkinson**

Columnists: **Dan Daley; Barry Fox;**

**Kevin Hilton**

Design Consultant: **Ben Mallalieu**

Regular Contributors: **Jim Betteridge;**

**Richard Buskin; Simon Croft; Ben**

**Duncan; Dave Foister; Bill Foster;**

**Tim Frost; Yasmin Hashmi; Neil Hillman;**

**Keith Holland; Rob James; Caroline Moss;**

**Philip Newell; Terry Nelson; Stella**

**Plumbridge; Martin Polon; George**

**Shilling; Patrick Stapley; Simon Trask**

### Advertisement Sales

Group Sales Manager: **Chris Baillie**

Email: [cbailie@unmf.com](mailto:cbailie@unmf.com)

Direct line: +44 171 940 8517

Deputy Ad Manager: **Phil Bourne**

Email: [pbourne@unmf.com](mailto:pbourne@unmf.com)

Direct line: +44 171 940 8542

US Representative: **Bill Ford**

Email: [bford@coastside.net](mailto:bford@coastside.net)

Classified Sales: **Andrew Lynn**

Email: [alynn@unmf.com](mailto:alynn@unmf.com)

Direct line: +44 171 940 8518

Advertisement Production: **Denise Walshe**

Email: [dwalshe@unmf.com](mailto:dwalshe@unmf.com)

Direct line: +44 171 940 8539

Publishing Editor: **Joe Hosken**

Direct line: +44 171 940 8602

Circulation Manager: **Caroline Chamberlain**

Direct line: +44 171 940 8579

PA to the Publisher: **Lianne Davey**

Managing Director: **Doug Shuard**

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International Headquarters  
Begbroke Oxford OX5 1RU England  
Tel: +44 (0) 1855 842300  
Fax: +44 (0) 1855 842118  
Email: [sales@solid-state-logic.com](mailto:sales@solid-state-logic.com)  
[www.solid-state-logic.com](http://www.solid-state-logic.com)

New York	Los Angeles	Tokyo	Paris	Milan	Toronto	Singapore
+1 (212) 315 1111	+1 (1) 323 463 444	+81 (0) 3 5474 1144	+33 (0) 1 3460 4666	+39 02 2622 4956	+1 (416) 431 9131	+65 (0) 438 2272

■ American operation, Skip Saylor Recording has installed the country's second SSL Axiom-MT, and the first on the West Coast. Based in LA, the facility has been in operation for over 20 years, and is using the MT as its move into digital working.

**Skip Saylor Recording, US.**  
Tel: +1 323 467 3515.

**SSL, UK.** Tel: +44 186 584 2300.

■ Berlin's UFO Studios has taken the first TL Audio VTC production console. The 32-channel desk will serve the facility as part of its music production, TV-film postproduction, sound design and mastering operation alongside a 32-track, 24-bit Pro Tools system.

**UFO Studios, Germany.**  
Tel: +49 30 428 02405.  
**TL Audio, UK.**

Tel: +44 1462 680888.

■ Norway's Norsk FilmStudio has installed 10 networked DAR OMR8 systems, complementing the Sound-Station installation dating back some nine years. The system is based in the post machine room with patching to the dubbing theatre, Foley studio and all five edit suites. One of Scandinavia's principal production studios, the facility dates back to the thirties and is home to Norway's only rerecording stage.

**DAR, UK.** Tel: +441 372 742848.

■ Bristol-based British radio broadcaster, GWR, has replaced its SADIÉ system with three Fairlight MFX3 Plus workstations to serve its network of stations linked with Fairlight's Media-Link server system. Europe's largest independent radio broadcasting group, GWR's stable of 40 stations is still growing and a collaboration over a digital radio network is planned.

**Fairlight, UK.**

Tel: +44 171 267 3323.

■ Germany's WDR 2 radio On-Air Centre has installed three 20-fader Lawo Diamond-series on-air consoles with a central programme matrix and system control facilities in the control room, presenter, editor and arena areas. The installation involved many custom facilities including integration of the VCS radio automation system and crosspoint panel control of the programme matrix from MTXCON software.

**Lawo, Germany.**

Tel: +49 7222 10020.

■ Detroit-based audio post facility Ron Rose productions, has purchased an AMS Neve Logic 2 console, upgraded all three of its Logic 1 consoles and upgraded nine of its AudioFile editors. The Logic 2 is the heart of an audio post room also featuring D5 and D2 digital video machines located inside the Postique-Griot facility in Southfield. Ron Rose Productions has 14 studios in three Detroit locations and two more in Tampa, Florida locations and posts audio for major radio and television advertisers, industrial and educational films, and custom music mixes. Current clients include: Jeep, K-Mart, Blockbuster, and White Castle.

**Ron Rose Productions, US.**  
Tel: +1 810 424 8400.

**AMS Neve, US.**

Tel: +1 212 965 1400.

■ Polish radio station RMF-FM has installed six 360 Systems DigiCart/II Plus hard-disk recorders. One of the largest commercial operations in Poland, RMF-FM carries a variety of programme material from news and talk shows to rock music to a diverse audience. The station's use of DigiCart dates back to 1992 at the main station in Krakow since when it has been the principle storage and playout system.

**360 Systems Europe.**

Tel: +31 299 437250.

■ BBC Resources Scotland has installed two Calrec C2 analogue production consoles at its Glasgow and Edinburgh studios while London-based BBC Resources has placed a £50k order for Denon CD, MD, cassette and radio systems for its Yalding House offices. The 24-channel Glasgow C2 console has gone into Studio N news and current affairs room responsible for Reporting Scotland and the 28-channel Glasgow desk is for the new TV Studio P in Broadcasting House to carry live programming including Holyrood Live.

World Radio Network, a major London-based international broadcaster, recently installed a complete Sonifex Solutions 2 radio studio package. The studio consisted of U-shaped technical furniture with split desk consoles and rackmount CD equipment. The installation marks the expansion of WRN's operations and follows the purchase of a HDX2000 hard-disk automation system from Sonifex to handle station inserts, jingles, trails and announcements earlier in the year.

**Calrec, UK.** Tel: +44 1422 842159.

**Sonifex, UK.**

Tel: +44 1933 650 700.

■ Vienna's MG Sound Studios has installed a 96-channel SSL Axiom-MT digital multitrack console. Located in the heart of the historic city, the 4-studio complex hosts international artists from as well as multimedia, film scoring and commercials.

**MG Sound, Austria.**

Tel: +43 535 6404.

**SSL, UK.** Tel: +44 1865 842300.

■ London's Whitfield Street Studios has purchased two 16-track 24-96 SADIÉ workstation systems and Dolby DP 569/562 codex for its new 5.1 mastering suite. Equipped to handle new delivery formats such as DVD, the facility has also taken a SADIÉ Artemis 8 workstation with all CEDAR plug-ins including the new DeThump. The sale follows a 32-track SADIÉ 24-96 system to Classic Sound which was first used to edit two recordings of *La Bohème* for the Decca classical label.

**Whitfield Street, UK.**

Tel: +44 171 636 3434.

**Classic Sound, UK.**

Tel: +44 171 624 5432.

**Studio Audio & Video, UK.**

Tel: +44 1353 648888.



▲ **Germany-UK:** Paramusic, a recording facility based in Bensheim, Germany, has installed a 64-fader Soundtracs DPC-II console for owners and producers Roberto Rosan and Heiko Schmidt to ply their trade in hits with the likes of Sweetbox and Fuzion. A further DPC-II has been installed in Berlin's Sound 'n Picture film and TV post facility. The 48-fader console is part of a major refit adding a 24-track Augan workstation and incorporating surround working. Recent projects include *Der Havelkaiser* and various Disney productions. Meanwhile White Lightning Limited, owners of prestigious London post houses *The Bridge*, *Silk Sound* and *Space* have bought seven Soundtracs DPC-II digital desks as a part of the largest single refit project in the capital in recent years. Paramusic, Germany. Tel: +49 62 51 2535. Sound 'n Picture, Germany. Tel: +49 30 628 9280. Soundtracs, UK. Tel: +44 208 388 5000.



▲ **US:** Already home to the world's largest AMS Neve 8078, Ocean Way Nashville has added moved its Sony Oxford console to Studio C to make way for a 96-channel AMS Neve VR with GML automation. The new VR 96 resides in Studio B and is intended for 5.1 music mixing and feature film work. Pictured (left to right) with studio owner Gary Belz, and producers Steve Marcantonio, Chuck Ainlay, Tony Brown, and Ed Cherney, the desk has an 8-channel film monitoring section is also 5.1 compatible. It also sports additional modifications by Mad Lab's John Musgrove. Both Studios A and B have customised monitoring systems, designed and installed by Allen Sides, owner of Ocean Way, Los Angeles and Record One in Sherman Oaks, California. AMS Neve, LA. Tel: +1 818 753 8789.



## Lucent-Orban on IBOC DAB

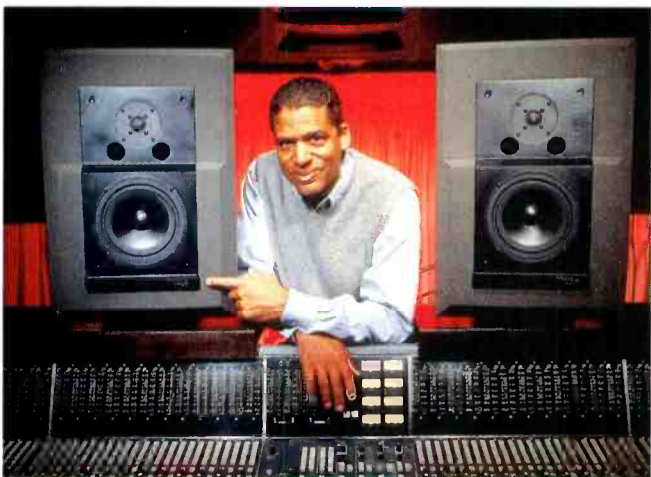
**US:** Lucent Digital Radio and Orban have announced a joint testing agreement to optimise the audio quality for In-Band On-Channel (IBOC) Digital Audio Broadcast. The Lucent Digital Radio IBOC DAB system, which has passed successful field tests, will be tested with Orban's Opti-mod processors, which are installed in more than 25,000 broadcast locations around the world. Lucent's Perceptual Audio Coder (used in the Lucent IBOC DAB system) will be tested with Orban audio processors. Lucent recently conducted tests of its IBOC FM system on National Public Radio member station WB3B-FM marking the first time that an IBOC system successfully passed an analogue-digital hybrid signal over a radio station's antenna and transmitter without affecting the host analogue signal.

Lucent's IBOC system is an enhancement to current analogue AM and FM radio broadcasting systems intended to provide enhanced sound quality for AM radio, CD-like quality for FM radio, interference-free reception and new data services. The IBOC approach will allow broadcasters to introduce digital audio programming to listeners on their current frequencies, transmitters



**▲ Web:** Finalising its Web-based studio listing system, The Studio EncycloMedia now allows studios to enter and update their listings on-line. Using a password-protected system, a new studio can subscribe on-line and all studios have ready access their equipment lists and facility information, with the ability to amend information held on the on-line database. Additionally, studios are included in The Studio EncycloMedia Newsletter, which is automatically emailed to the Pro-audio newsgroup where new equipment acquisitions are immediately profiled. The site also has a new area dedicated to pro-audio manufacturers and service providers called the Information Forum. This is intended to encourage discourse between the recording studio and the manufactures supporting it. Having already attracted Digidesign as sponsor for the Hard-Disk Recording section, it is hoped the initiative will provide a platform discussion customer support and product information.

After the death of IT director Harry Railing, The Studio EncycloMedia has announced Paul Hanson as his successor. Hanson had previously collaborated with Railing on The Studio EncycloMedia, in addition to work on Internet, intranet and e-commerce sites for blue chip companies in the oil, banking and insurance industries. [www.encyclomedia.co.uk](http://www.encyclomedia.co.uk)



**▲ US-UK:** Monitoring systems are increasingly big business in recording with LA-based producer David Rideau (above) choosing the Westlake Lc8.1 system for his tracking and mixing work. In Portland, Oregon, Downstream Sound, has installed Quested 5.1 monitoring systems as part of its redesign. The work of the Russ Berger Design Group, the facility offers three studios with live rooms, and a music composition suite. Studio A now has a Quested 412d active system, Studio B a Q210c active 3-way LCR system with VS1115 subs and H108 surrounds, and Studio C has a Q210c active 3-way system. Across the Atlantic, London's Sarm West has installed a Quested 5.1 monitoring system as part of the refurbishment of Studio 3 while new Soho post house Plus 8 Digital Post has opted for Tannoy surround systems for its two dubbing suites. Westlake Audio, US. Tel: +1 805 499 3686. Q USA Inc, US. Tel: +1 608 251 2500. Tannoy, UK. Tel: +44 1236 420199.

and arials. IBOC DAB is both backward and forward-compatible: current AM-FM receivers will still be able to receive the existing analogue signals in the new system. When a station elects to turn off the analogue signal in the future, IBOC DAB-compatible receivers will operate with the remaining all-digital signal.

**Web:** [www.orban.com](http://www.orban.com); [www.lucent.com](http://www.lucent.com)

## Quantegy's new media and software

**US:** Quantegy is to sell and distribute Ambition data storage media products world wide as part of a move that will allow the company to offer its customers what it claims is 'one of the most complete media offerings anywhere in the world.' The news coincides with the announcement that Quantegy and Xytech, a supplier of facility management software, has entered into a partnership in which Xytech's software will be the standard inventory application for Quantegy products. Xytech will modify its Enterprise 3.0 facility software to interface seamlessly with

Quantegy's stock ordering system. It will allow tape products to be scanned and provide detailed biographical information including dubbing, correcting and time-coding information.

**Quantegy Europa.**  
Tel: +31 24 3727400.

## Fairlight Broadcast news

**Australia:** Fairlight has expanded in to the radio broadcast market with the acquisition of Netherlands-based Vamos Media Solutions following its acquisition of Ogenic On Air Systems based in Australia earlier this year.

The result of both acquisitions is the formation of a new division called Fairlight On Air Systems headquartered in the Netherlands under Vamos executive Hendrik Noorderhaven who will work closely with his counterpart Quentin Gribble in Australia. The company launched Fairlight CoSTAR at IBC as a total software solution for automated radio that handles the digital recording, distribution, editing, planning and broadcasting of audio in a LAN-WAN networked environment.

## Hearing is believing

FURTHER TO your articles in the Technology section of *Studio Sound*, '20-20 Vision' (Philip Newell, June 1999) and 'Topping 20k' (John Watkinson, August 1999).

In 1988 I was working at Focusrite as a project engineer on the Electric Ladyland console and was given the brief by Rupert Neve (then chairman of Focusrite) that every signal path on the console must be flat to at least 100kHz. When questioned about this figure he demonstrated a square wave of a few kHz with a swichable 40kHz low-pass filter in the circuit. The colouration introduced by limiting the bandwidth was obvious even on a modest close-field monitor speaker used for the demonstration.

I believe that I understand the reason for the colouration, but cannot understand what a square wave has to do with well recorded and mastered audio.

**Nicholas Butt, Engineer, Mentorn Barraclough Carey Facilities, UK.**

### Tim Goodyer replies

You may like to peruse this month's Dr John column before considering your problem further. Then again...

## Easy as ABC

AT THE AUSTRIAN Broadcast Corporation we are planning to digitise most important parts of our archive.

Our plan is to establish three different file formats: linear, uncompressed, 16-bit 48kHz for high-quality storage; MPEG Layer 3 (64-128kBit) for a browsing area; and an MPEG Layer 2 (256kBit) area supporting broadcast quality.

As far as our project group has discussed the project, our conclusion is that according to EBU information it is possible to cover them all by using the BWF-Format.

The question that arose was if it also is possible to convert a BWF MP3 file back into a linear, uncompressed, 16-bit 48kHz signal. Theoretically this appears no problem but maybe we don't know the whole story. Is there anyone out there who does? Furthermore we would need the software necessary for producing a compressed MPEG IL2 BWF-File from an uncompressed linear file with taking over all the chunks containing metadata. So soft and hardware is needed which can handle these kind of files and convert them all. I would welcome any recommendations.

**Philipp Ridwald,**  
philipp.ridwald@orf.at

## Mayday

HAS NEIL HILLMAN sent off his entry for the Sam Spade Literary Award? I would be delighted to push his review of the Maycom Easycorder (*Studio Sound*, September 1999) for

consideration if he hasn't?

Actually, I thought the style amusing, but seriously, while penning his novella, Neil has missed several key benefits of the unit. In fact, the features missed appear to be the most important ones. The very ones which are widely believed to set this product head and shoulders above its competition.

The Timeshift facility provides the correspondent (once switched on) with a buffer of between 5s and 20s, meaning that in the event of something happening suddenly, the user does not miss the start while fumbling for the record switch. The Easycorder also features password protected configuration permitting the issuing engineers or technicians to prevent hamfisted users from altering the preferred settings.

The memory options are not clear at all from the article. Firstly it should be pointed out that Easycorder does not use an internal hard disk, rather it uses a solid-state Flash Disk. The unit comes as standard with several sizes of internal storage—40Mb, 60Mb, 80Mb and 140Mb—upgradable using widely available industry standard Flash Disks. External memory can be via PCMCIA Flash Cards in 20Mb, 40Mb and 80Mb as standard, higher capacities are easily available. A 520Mb PCMCIA hard disk is also available.

Download has been covered, but the parallel port has not been mentioned at all. The variety of data file types Easycorder can use, can be downloaded onto a PC via its parallel port at very high transfer rates using the Easycollector software. The other option is transfer via ISDN from location, which is mentioned, but obtusely. With the nearest competitive product you need a PCMCIA adaptor card. The cheapest (and slowest) ones costing £200 or more.

An NiMH battery is used, and as is well documented, this type is less prone to the 'memory effect'. However, the fact that it is a Smart Battery pack has been missed. It has a built-in chip that prevents overcharging or damage to the cells.

We feel that with this many features omitted from the review, the unit cannot be evaluated fairly against its competitors. Despite this, we do of course recognise that Neil was complementary about the Easycorder and its abilities.

We hope you will be able to address the points raised and are waiting patiently with Trilby and long Mac at the ready.

**Richard Kelley, Sales Director,**  
Canford Group, UK

### Tim Goodyer Replies

Operational review in the making... Meet me at the docks after midnight: Password 'danna'.

**t.c. electronic**  
ULTIMATE SOUND MACHINES

### MAIN OFFICE:

TC ELECTRONIC A/S · SINDALSVEJ 34  
DK-8240 RISSKOV · DENMARK  
PHONE: + 45 8621 7599 · FAX: + 45 8621 7598  
EMAIL: INFO@TCELECTRONIC.COM

### USA:

TC ELECTRONIC INC. · 790-H HAMPSHIRE ROAD  
WESTLAKE VILLAGE · CA 91361  
PHONE: (805) 373 1828 · FAX: (805) 379 2648  
EMAIL: INFOUS@TCELECTRONIC.COM

### GERMANY:

TC ELECTRONIC GMBH · FLUGHAFENSTRASSE 52 B  
D - 22335 HAMBURG  
PHONE: +49(0)40 5310 8399 · FAX: +49(0)40 5310 8398  
EMAIL: INFOD@TCELECTRONIC.COM

### AUSTRIA:

TC ELECTRONIC · POSTFACH 20 · A-1124 WIEN  
PHONE: 0800 20 16 52 · FAX: 0800 20 16 53  
EMAIL: TCA@TCELECTRONIC.COM

### SWITZERLAND:

TC ELECTRONIC · POSTFACH · CH-8030 ZÜRICH  
PHONE: 0800 89 89 01 (CH/UK) · 0800 89 89 02 (I/F)  
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### ASIA:

TC ELECTRONIC · ASIA · YOSHIDA BUILDING  
NO. 201. 26-8 · MARUYAMA-CHO  
SHIBUYA-KU · TOKYO 150 JAPAN  
PHONE: +81 3 5456-4071 · FAX: +81 3 5456-4072  
EMAIL: INFOASIA@TCELECTRONIC.COM

### UK:

TC ELECTRONIC UK · P.O. BOX 25767  
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# TC ICON

Icon - /aɪkɒn/ n 1 [An object acting as mediator between man and the ideal] 2 [A symbol having cultural significance and the capacity to excite or objectify a response]



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## October

8-17

### Telecom 99

Pailexpo, Geneva, Switzerland.  
Tel: +41 22 730 5969.

12-13

### DVD Conference Europe 99

Alfa Lisboa Hotel, Lisbon, Portugal.  
Contact: Understanding & Solutions.  
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Email: DVD99@undansol.co.uk  
Net: www.undansol.co.uk.

14-18

### IBTS 99

Milan Fair, Pavilions 9/1 and 9/2, Milan, Italy.  
Contact: General Secretariat  
Tel: +39 02 481 5541.  
Email: assoexpo@assoexpo.com.  
Net: www.assoexpo.com.

15-17

### MusicBiz 2005

Ex'pression Centre for New Media, Emeryville, California, US.  
Contact: Keith Hatschek.  
Tel: +1 415 227 0894.  
Email: info@hatschek.com.

21-23

### Broadcast India 99

World Trade Centre, Mumbai (Bombay), India.  
Contact: Kavita Meer, Saicom.  
Tel: +91 22 215 2721.  
Email: saicom@bom2.vsnl.net.in.  
Net: www.saicom.com/broadcastindia

20-23

### LLB 99

Sollentunamässan, Stockholm, Malmvägen 2, S-19123 Sollentuna, Sweden.  
Tel: +46 8 92 59 00.  
Net: www.solfairse/llb/

## November

2-3

### 24th Sound Broadcasting Equipment Show

NEC, Birmingham  
Contact: Point Promotions.

Tel: +44 1398 323 700.  
Email: info@pointproms.co.uk  
Net: www.sbes.com

18-21

### Reproduced Sound 15

Residential Weekend, Stratford Victoria Hotel, Stratford upon Avon, Warwickshire, UK.  
Contact: Institute of Acoustics.  
Tel: +44 1727 848195.  
Fax: +44 1727 850553.  
Email: acoustics@clus1.ulc.ac.uk

19-22

### SMPTe Conference and exhibition

New York Marriott Marquis, New York, US.  
Contact: Bryan Nella.  
Tel: +1 914 761 1100.  
Net: www.smpte.org

22-24

Messe Frankfurt  
Trade exhibition and convention for audiovisual system installation  
CMF, Ludwig-Erhard-Anlage 160327 Frankfurt  
Contact: Metin Ergül  
Tel: +49 69 7575 6130.  
Email: metin.ergul@messefrankfurt.com

## December

8-10

### Convergence India 99

Pragati Maidan, New Delhi, India.  
Contact: Exhibitions India.  
Tel: +91 11 463 8680.  
Fax: +91 11 462 3320.  
Email: exhibitionsindia@vsnl.com  
Net: www.exhibitionsindia.com

## January 2000

24-27

### Broadcast, Film and Audio, BFA 2000

Bombay Exhibition Centre, Mumbai, India.  
Contact: Jasubhai Media.  
Tel: +91 22 6542363.  
Net: www.exicomindia.com.

## February

19-22

### 108th AES

Palais des Congres, Paris, France.  
Contact: Hermann A O Wilms.  
Tel: +32 2 345 7971.  
Email: 108th\_exhibits@aes.org  
Net: www.aes.org

## March

5-7

### Entech 2000

The Dome, Sydney Show-ground & Exhibition Centre, Homebush, Sydney, Australia.  
Contact: Caroline Fitzmaurice, Connections Publishing.  
Tel: +61 2 9876 3530.  
Fax: +61 2 9876 5715.  
Email: caroline@conpub.com.au  
Net: www.conpub.com.au

## April

12-14

### Optical Disc Production 2000

Tokyo Big Sight, Tokyo International Exhibition Centre, Japan.  
Contact: Mesago.  
Tel: +81 3 3359 0894.  
Fax: +81 3 3359 9328.  
Email: kunimoto@message-jp.com  
Net: www.mesago-jp.com/odp

## June

6-9

### Broadcast Asia 2000, Cablesat 2000 and Professional Audio Technology 2000

Suntec Centre, Singapore.  
Contact: Singapore Exhibition Services.  
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Fax: +65 339 5651.  
Email: info@sesmontnet.com  
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# DOUBLE RUBY

Genelec's 1029A is a 2-way bi-amplified monitor system able to deliver 110dB SPL at 1m (for a pair) for close-field and surround sound work. It uses Genelec's DCW and is shielded against magnetic fields, has overload protection circuitry, room response controls and sufficient LF extension (-3dB at 68Hz) for most applications although the 1091A subwoofer is available to extend the system to deliver -3dB at 40Hz.



## THE GENELEC 1029A QUESTIONS

- Q1** Where is Genelec based?
- Q2** Which subwoofer complements the 1029A?
- Q3** What is DCW?

**CLOSING DATE: 5th JANUARY 2000**

**TO ENTER**, you can either email your answers to [ruby.competition@unmf.com](mailto:ruby.competition@unmf.com), fax them (to +44 171 407 7102) or send them on a postcard to Ruby Competition, *Studio Sound*, Miller Freeman Entertainment, 8 Montague Close, London SE1 9UR, UK. As long as you are a registered *Studio Sound* reader, you may enter any number of installments of the competition as long as you do so separately (multiple entries will be collected and used as fuel for *Studio Sound's* millennium cookout season), and include your Unique Reader Identification Number.

**...include your Unique Reader Identification Number.**

**The Unique Reader Identification Number is the 9-digit number located in the middle of the top row of your *Studio Sound* address label.**

ALTHOUGH THERE ARE two sets of questions to match the two prizes, you may enter either one or both sections of the competition as you see fit. All you have to do is to correctly answer the questions below and co-ordinate your studio's colour scheme to embrace the *Studio Sound* Ruby theme.



# REWARDS



STUDIO SOUND'S ANNIVERSARY GIVE-AWAY continues with an opportunity to win not only a CEDAR Series-X DHX Dehisser but also a pair of Genelec 1029A monitor speakers. In common with the other prizes in this series, these are custom editions of current models finished in ruby red livery. In every remaining issue of the magazine until the end of the year, you will have the opportunity to win two items from the *Studio Sound* Ruby series listed below.

CEDAR's DHX Dehisser (*Studio Sound*, August 1998) takes the power and flexibility of the company's computer-based processing and packs it into a powerful but easy to use rack unit employing just three controls rather than pages of computer screens. Optimised for removing tape hiss and other broadband artefacts encountered when restoring for CD and movie soundtracks, the DHX is part of the Series X/X+ range that includes the DCX Declicker, CRX Decrackler, BRX+ Debuzzer and AZX+ Azimuth Corrector. It now packs v1.02 software making it better equipped than ever for all types of speech and music restoration duties.

# Studio Sound

## REWARDING RUBY PRIZES

**AKG** 535 stage condenser, C1000, and C3000 microphones

**A&H** 32-channel GS3000 console

**CEDAR** Series-X DHX Dehisser

**Drawmer** DS201 dual gate

**EMO** E520 Single DI box; E445 cable tester; E325 3-way mic splitter

**Genelec** 1029 monitors

**Joemeek** VCI compressor

**KT** DN-360 graphic

**Marantz** CDR640 CD recorder

**TL Audio** CI Classic compressor

**Purple Audio** MC76 compressor

## THE CEDAR DHX QUESTIONS

- Q1** Which CEDAR-processed soundtrack hit the Billboard Top 200 for the first time in history in 1997?
- Q2** Which significant birthday did CEDAR Audio enjoy earlier this year?
- Q3** From which series do CEDAR's recent film and video soundtrack restoration products come?

On-going thanks are due to all those who have so readily contributed equipment, time and advice in the preparation of this competition.

# Tascam TM-D4000

As the affordable end of the digital mixing console becomes more crowded, the requirement for genuine development grows. **Rob James** evaluates Tascam's latest offering



**B**Y NO MEANS a novice in the digital console field, Tascam's track record takes in the innovative TM-D 8000 and the diminutive TM-D 1000. Where the former was compromised by the absence of moving-fader automation, the latter is a clever confection of broad connectivity and solid performance at a keen price which also manages to sound good. The TM-D 4000, then, is the latest in this series. The new desk has arrived in a market dominated by the Yamaha 02R which despite several recent contenders remains the one to beat.

The formula, at least superficially, follows the Yamaha paradigm: a compact, moving-fader 8-bus console using a combination of layering and assignability to keep the size and costs down. That said, I would expect anyone with a nodding acquaintance with the 02R or 03D to be able to operate the 4000 at a basic level without opening the manual. The 4000 repays closer investigation and this is where the differences start to become apparent. For openers it has proper machine control. The automation requires the use of a separate PC but is solid and intuitive.

The review console was fitted with TDIF and AES-EBU options. Unfortunately, as so often happens in real sessions, I only had an ADAT machine at the time and the only multichannel PC interface I had installed also uses lightpipe. However, I did have a Tascam IF-TAD format convertor to hand. The combination worked perfectly.

The familiar ingredients are all present on the control surface, but the presentation is a little different from the norm. The digression is the case design—instead of the usual gentle slope containing most of the controls followed by an almost vertical upstand, the 4000 has a fairly steep rake beyond the fader and control section followed by a horizontal plateau with sockets and trims which also provides a base for the meter bridge. This design serves to bring commonly used controls closer to hand and reduces the overall depth of the console at the expense of increasing its height. This approach is often useful in small studios and other applications where space is at a premium. The data entry and machine control section is where the Tascam starts to shine. With this type of console and the applications it will be used for, this is an area where clarity is vital. Each channel has 4-band EQ and a dynamics processor. The EQ is fully parametric  $\pm 15$ dB of boost and cut with a Q range of 0.27 to 8.65. The top and bottom bands are also usable as shelves. When cut is set at over 15dB the filter becomes a notch or in Shelf mode a steep low-pass or high-pass filter. The sound is sweet and clean; not as clinical as some but not an analogue simulacrum either. I think it is perhaps the most usable I have encountered on a console in this price range even with large amounts of 'correction'. Unfortunately, the same cannot be said for the dynamics. As with the other consoles in this class they are in the wrong place

for post work (pre-fader) and there are none on the buses. They also seem to be prone to pumping even with relatively modest attack and release times.

The overall sound of the console is excellent whether digital or analogue interfaces are used, a fact that only serves to emphasise one snag that the 4000 shares with several other consoles—there are not enough steps on the faders. This makes it difficult to achieve long slow 'fades to black'.

The stereo effects unit is not the most comprehensive in the world, but the basic algorithms are more than acceptable. The reverb in particular is clean and useful and more than adequate for a lot of work. The rest of the repertoire covers the usual time-domain stuff, delays pitch changing, flanging, chorus and phase plus dynamics. The effects unit is fed from either Aux 1 & 2 or Aux

## INTERFACE CARDS

### IF-TD 4000

Provides eight channels of digital I-O in the Tascam TDIF-I format.

Audio connection via a 25-pin D-sub and remote out via a 15 pin D-sub.

### IF-AE4000

Provides eight channels of digital I-O in 1992-3 AES-EBU format.

Connection via a 25 pin D-sub.

### IF-LP4000

Provides eight channels of digital I-O in the ADAT lightpipe format.

Audio connections via two optical Toslink connectors, sync out via a 9-pin D-sub.

### IF-AD4000

Provides eight channels of balanced analogue I-O at +4dBu. Convertors are 24 bit and connection is via a 25-pin D-sub

## REAR PANEL

Power in is an IEC socket with on-off push switch adjacent.

Stereo digital I-O, Digital In 1 is AES-EBU via XLR.

Digital In 2 is SPDIF on a phono

Digital outputs are AES-EBU via XLR and SPDIF on a phono

Word-clock sync in and out are BNCs with switchable 75 $\Omega$  termination on the input.

RS422 (P2) and To Host (PC) are 9-pin D-sub connectors.

Cascade in and out connect multiple consoles via 25-pin D-sub.

A 37-pin D-sub caters for the optional meter bridge.

Three DIN sockets deal with MIDI In Out and Thru.

LTC input is an unbalanced phono

Three proprietary expansion slots accept a variety of interface cards



5 & 6 and returns via Stereo In 2. This is a slight limitation since the routing choices for the digital inputs are somewhat restricted. Digital In 1 to Channels 5-6, 13-14, or Stereo In 1 and Digital In 2 to Channels 7-8, 15-16 or Stereo In 2. Effects settings are stored in a library with 51 factory presets and a further 77 user-memories which may be named. EQ and dynamics are similarly equipped with 20 factory presets and 80 user-memories.

The 4000's surround facilities are not bad and can be set for 2+2 (L,R,LS,RS), 3+1 (L,CRS) and 5.1 (L,CR,LS,RS and Sub) modes. A variety of busing patterns are provided from each option to suit the operators preferred method of working. Bus delays are available to compensate for speaker placement and so on. The first problem comes, as usual, when you consider monitoring. The 4000 is better served than some in this respect since with the right option cards it is possible to obtain multiple bus outputs and the meter bridge lets you look at all the bus send levels. However there is no obvious way to introduce a multitrack return for monitoring purposes other than by using the switching on the recorder. The better answer to this, as with others, is to use a dedicated surround monitoring controller. Surround panning has divergence, but only diagonal vectors and no dynamic automation.

Not only does the 4000 generate and slave to LTC but it has onboard control of a single RS422 (Sony P2) protocol device. In addition to control over Tascam DTRS machines and an assortment of Sony models, which might be expected, there is also control for various flavours of ADAT. A most welcome inclusion from a rival manufacturer, others please take note. Up to ten machine setups for different tasks can be stored and recalled, useful since only one machine can be controlled at a time.

Simple snapshot automation is built into the console. Apart from the factory setting, a total of 60 snapshots can be stored and recalled at will. There is no means of cross-fading between snapshots. Along with the other libraries snapshots can be dumped and reloaded to and from MIDI devices allowing effectively unlimited storage.

The dynamic automation uses an industrial Moxa PC serial interface card. This is a legacy ISA device and installation is definitely not for the faint-hearted. Unless you really know what you are doing with PCs I would leave it to the

supplier. On the other hand, the software and its operation are simple. Four modes—Write, Read, Update and Manual—along with the parameters to be automated can be quickly enabled either on the console or on screen. There is no true touch sense, but the software may be set to react to a fader move in two ways, either putting it into Write or Manual. Read and Write are self-explanatory, but Update is a little less obvious. In Update any fader moves on armed channels are added to the previous moves as offsets. The automation moves are initially recorded into the PC's RAM. Mixes can be saved to disk and recalled for further work. There is no sequencer-style on-screen editing, but most people find it quicker to use the controls to change a mix. The things I missed were the lack of a 'keep pass' facility and an 'undo' for the last pass. The other missing element is automation of the surround functions. Apart from this the automation is simple and highly effective.

The digital console sector of the console market is becoming crowded. I am sure the criticisms common to all the current 8-bus consoles could be addressed at this price point. The wish list is actually fairly short: proper touch sense automation, more fader steps, at least two stereo effects, proper machine control and surround monitoring. You can see from this list the Tascam comes closer than most. The 4000 is very accessible, especially to anyone who has used a similar console. Despite this it is less of a 'me too' than other pretenders to the Yamaha throne. It offers a genuine alternative by providing different ergonomics and more emphasis on machine control. The interface options are versatile, particularly when combined with some of the excellent little stand-alone interfaces and format converters from Tascam. The build quality is strong and the overall sound is clean and uncoloured. ■



## TOP PANEL

Channels 1 to 8 are equipped with MIC level XLR connectors (Nominal -50dBu, adjustable with the trim control from -67dBu to -20dBu a switchable pad reduces this by 20dBu). A LINE switch selects the alternative line level, balanced 1/4-inch TRS Jacks (Nominal +4dBu adjustable with trim from -39dBu to +8dBu). Analogue inserts are unbalanced with a nominal level of -2dBu and follow the tip send, ring return convention. An overload LED lights when the output of the analogue input section exceeds -3dBFS. Phantom powering (+48V) is independently switchable for MIC inputs 1-4 and 5-8. Four unbalanced 1/4-inch jacks are used for L (mono) and R inputs to the two stereo in faders. Nominal level is +4dBu and trim pots are provided. The six aux buses appear on unbalanced 1/4-inch jacks.

There are two stereo outputs and two 2TR return inputs for a mastering recorder, stereo outs (balanced) and 2TR return (balanced) are on XLRs. Nominal level is +4dBu. Stereo outs (unbalanced) and 2TR return (unbalanced) are on phono. Nominal level, -10dBu. CR (control room) and studio monitor outputs are on 1/4-inch balanced jacks nominal level +4dBu. Level may be adjusted by the CR LEVEL pot and STUDIOPHONES level pot. Stereo headphone output is a 1/4-inch jack.

## CONTROL SURFACE

The surface is divided graphically and physically into logical sections. On the 'flat' part of the surface the first block consists of 16 identical channel strips. The 100mm moving faders are followed by two LEDs which indicate automation Write and Update respectively. When both are lit the strip is in Read. These LEDs are also used as null indicators when the fader motors are switched off. Four square keys with associated indicator LEDs give Cut, Solo, Select and Record Arm functions. The two stereo strips are the same but omit the REC arm keys. The Stereo Out strip just has a SELECT key. This fader differs from the others in that it is purely an attenuator—with the fader full up the gain is unity.

The ALL SAFE key might be assumed to be a global solo defeat, but in fact it turns off track arming and recording on any external machines under console control.

The data entry wheel-jog shuttle control is chunky and would not disgrace a video editing console. There are only two adjacent keys, ENTER below and the JOG-SHUTTLE toggle above. To the right are four cursor keys and above these a row of transport keys which are big enough to hit instinctively and inspire confidence.

The autolocator has ten memories which can be programmed manually or grabbed 'on the fly'. A clear numeric keypad is used for entering time code values directly.

The dominant feature on the sharply angled section is the LCD screen. Along the bottom of this are four rotary encoder knobs, each with two associated keys. In Tascam parlance these are known as PODS. I have been unable to discover why. The PODS are used to set continuously variable parameters on the screen such as aux send level and the keys are used for on-off functions. Where a screen contains several rows of parameters the >





two screens EQ-Dynamics and EQ-Aux-Pan.

To the right of the screen a vertical row of Module control keys allow quick and easy routing to buses and switching of EQ and dynamics on the selected channel. For users of DTRS machines such as the ubiquitous Tascam DA-88, auto-punch is available on dedicated REHEARSAL, IN-OUT and CLEAR keys.

On the far left are sampling rate and clock source indicator LEDs. Three keys switch the fader layers between channels 1-16, 17-32 and MASTER and six further keys control the global automation functions. On the far right the monitor section has a stereo bar graph and monitor select keys for each of the six Aux buses, the two digital stereo inputs, Main Stereo out and 2TR return. Indicators for solo in place and PFL and a couple of talkback keys for slate and To Aux 1-2 complete the panel.

**METER BRIDGE**

The meter bridge is a bonus. Sixteen bargraphs in the usual Tascam orange and red show input levels pre or post dynamics with a further three pairs for the stereo ins and out. A switch changes what the first 16 display in the same way as the fader layers. I would have liked to have seen an option for the meters to automatically follow the fader layers as well.

< ROW CURSOR keys are used to determine which row the PODs will affect. Which group of functions the screen displays is determined by a block of keys on the left. This is divided into three sections, Library, Configuration and

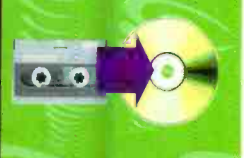
Mixing. There is a shift key giving two functions to some keys but I am glad to say this only applies to configuration options. Where other keys have multiple screens these are selected by pressing the key again—the MODULE key has

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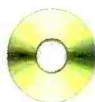


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# Amek 9098i

Proving that there is still interest in big analogue boards, Amek's 9098i injects the inline concept into the 9098 line. **Dave Foister** decides whether big is indeed still beautiful

**S**INCE AMEK ACQUIRED the services of Rupert Neve the company has been quietly and meticulously building up to its new flagship in-line console. Circuit elements have been presented as outboard devices, linked by the 9098 designation and Rupert's signature, whetting the appetite of the world for the mixer to follow. How successful this angle has been is shown by the background to Europe's first 9098i installation at Booya Music in Hamburg.

Booya is a production, management, and record company specialising in the Euro dance market, an area that despite making little impact in the UK is evidently huge virtually everywhere else. Successful involvement in acts like Fun Factory and others led to the installation of the first in-house studio in the present building, and after the usual console research the chosen board was an Amek Rembrandt. More hits followed with artists such as Nana and rapper Pappa Bear, financing the leap to the new studio, still to be effectively a private room for Booya, and in particular partner and producer, programmer and engineer Buelent Aris. The close relationship with Amek had led to the trial and purchase of several 9098 outboards, and the proven capabilities of the mic pres, EQ and compression made the 9098 console in its new in-line configuration an obvious candidate as the centrepiece of a new top-flight room. Indeed it says a lot for the console that this is a private studio, so that the practical and musical needs of the Booya team were more important than the ability to attract clients with a big-name big-bucks console.

The compliment to the sonic qualities of the board is further enhanced by the fact that Booya's needs are relatively simple, and that some of the 9098i's power may never be used here. The power is undeniably there, however, and the combination of Neve's legendary circuit design and the flexibility of the features and automation make this a spectacularly uncompromising desk.

In most respects the 9098i is a classic in-line desk, with channel facilities splittable between two paths. Those facilities are naturally impressively comprehensive, so much so as to risk suggesting that this is being sold on features rather than sound—until you remember whose signature adorns it.

That signature is represented as much as anything in the equalisers. Each channel has 4-band EQ with dedicated bands for top, bottom and upper and lower mid. All the controls you could possibly want are on there, plus some specials that lift the EQ into another league. The top and bottom bands can be configured as having either shelf or bell filter characteristics, and the two mids have a Notch mode rarely seen anywhere else. With this engaged, the band becomes a cut-only

notch filter, with fully sweepable frequency, cut as extreme as 25dB and Q all the way up to about 40. This is surgery at an unexpected level, and as it is separately switched on the two mid bands the variety of treatments available is huge.

The HF and LF sections both have an extra switch, again exclusive to 9098 EQ; at the top there is a SHEEN switch while the bottom has a corresponding GLOW switch. These add

gentle rising contours to the ends of the spectrum and at the same time broaden the slopes of the shelves; the unlikely poetic descriptions perhaps suggest that these are meant to emulate the characteristics of classic Neve EQ. I find it interesting that normally staid manufacturers (Studer has done it too) find it necessary to resort to terminology like this when they run out of conventional technical words to describe what they are trying to do; at >





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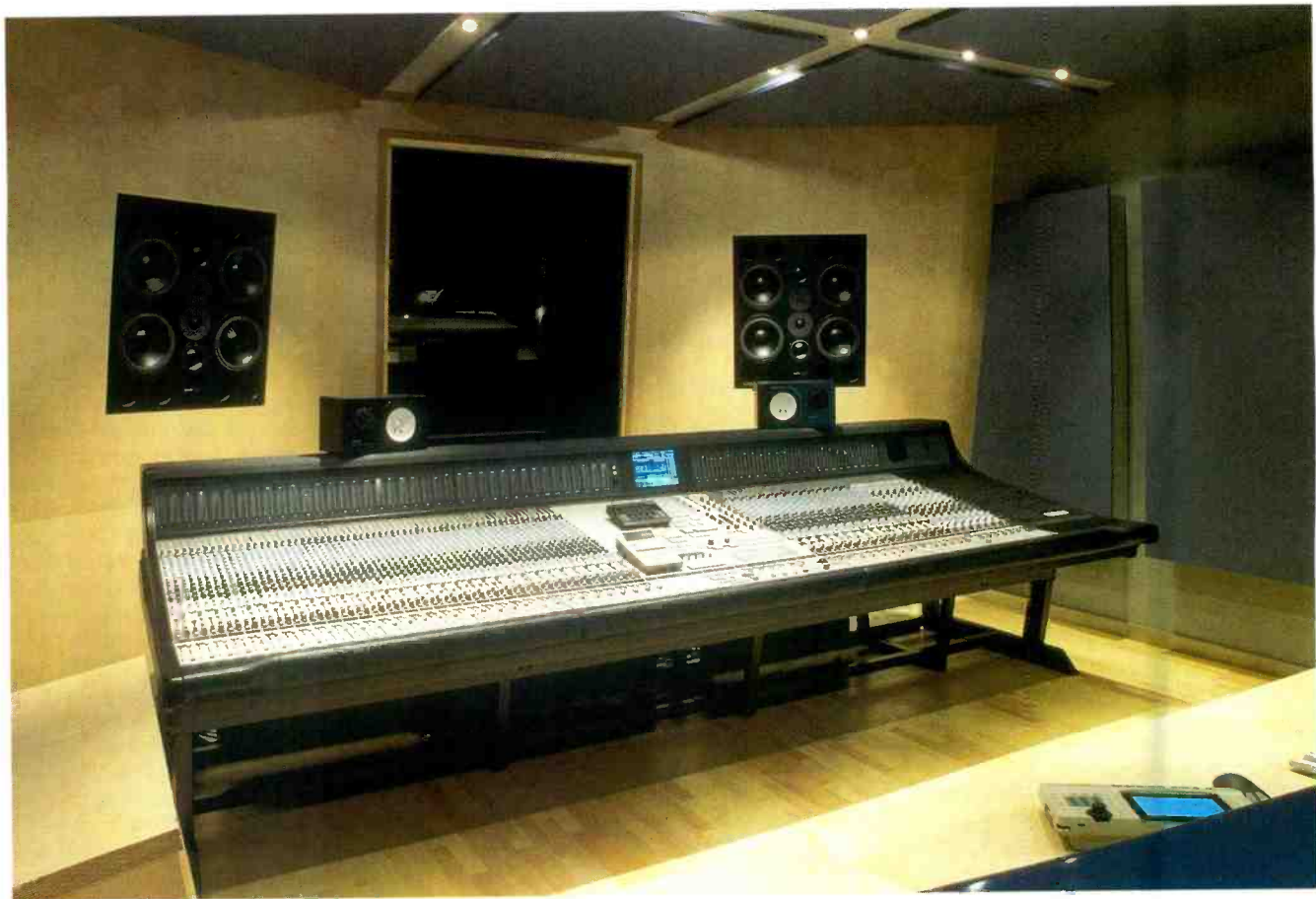


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< each devouring half a dozen units of rack space. For on-air applications backup supply systems are available.

Unlikely as it may seem to be using a console like this on the air, this is one of a selection of master modes for the desk that configure it for a variety of tasks including broadcast (allowing for a live stereo mix and a separate multitrack recording), tracking, mixing, film work and full surround mixing with a choice of panning configurations. For surround work there is an optional joystick panel carrying two 5-output joysticks with simple automation. An interesting twist is a LINK switch that allows one of the channels to follow the panning of the other, but with an adjustable delay in its movement to chase it around. Even without this, surround panning modes are available and use LR and CS master faders; these, like all the subgroup faders, can have dynamic processing assigned to them.

The picture is completed by more monitoring controls than you can shake a stick at, and lots of metering options. As standard it comes with a new design of 100-segment bargraph, but mechanical meters and a wide range of OEM meters can be chosen as options. Booya decided to have Studer bargraph meters installed in their console, which otherwise is pretty much a standard desk.

Booya's choice of the 9098i in the first place is an interesting one, and one that throws light on the console's qualities. Buelent Aris, the virtually exclusive user of the 9098i room, chose what is undoubtedly a very expensive, very powerful console almost entirely because of its sound. As an engineer heavily involved in the club market and the very distinctive European dance styles, he has strong

views on how he wants things to sound that may be surprising. Finished mixes of a typical Booya product contain massive, foundation-challenging amounts of bass, and Aris is adamant that this must remain as clean as possible, and that this is helped by a similarly clear top end. He believes that the Rupert Neve designs deliver this better than anything else he has heard.

While the EQ must surely be one of the top selling-points of the 9098 series generally, Aris is surprisingly minimalist in his use of EQ, preferring the classical approach of delivering the right sound to the console to begin with and choosing a console that will preserve it as closely as possible through to the final master. Having said that, when EQ is needed then the 9098 EQ would be the choice anyway, as it is in other Booya rooms, so having it right there on the console is ideal.

Similarly with the dynamics, which appear to get rather more use than the EQ. Some desks have dynamics as quick-fix basic solutions to the easy problems, assuming something more elaborate will be called on for more critical situations. This is clearly not the case with the 9098 Virtual Dynamics, which Aris is happy to use as the primary processors throughout, apart from work within Pro Tools when convenience makes it easier to use the Focusrite plug-ins.

Basic mix automation is of course a requirement for this kind of work, and the dynamically automated aspects of the Ameck are more than enough to make life simple in this respect, but another surprise is that Aris

makes virtually no use of the recall facility. 'If I don't like a mix I'll do it all again rather than fiddle around with changes—that way you can lose the concept and I'd rather start from the beginning.'

Again, the VFX features are not a reason to buy the Ameck when your recording medium is Pro Tools with an arsenal of plug-ins and you can already remote control most of the gear in the studio—this studio's outboards are already mostly in the machine room. It is still a useful alternative option, and is getting a certain amount of use.

The point of all this is that Booya is not perhaps the obvious prospective purchaser for an Ameck 9098i. If you are investing that kind of money, it would seem likely that you would be focusing on the facilities you need and not paying out for a powerhouse with systems in it whose surface you are only just going to scratch. The only conclusion is that Aris believes the console is worth the asking price almost on the basis of its sound alone, with the other elements the icing on the cake. By extension, if you are in the market for the

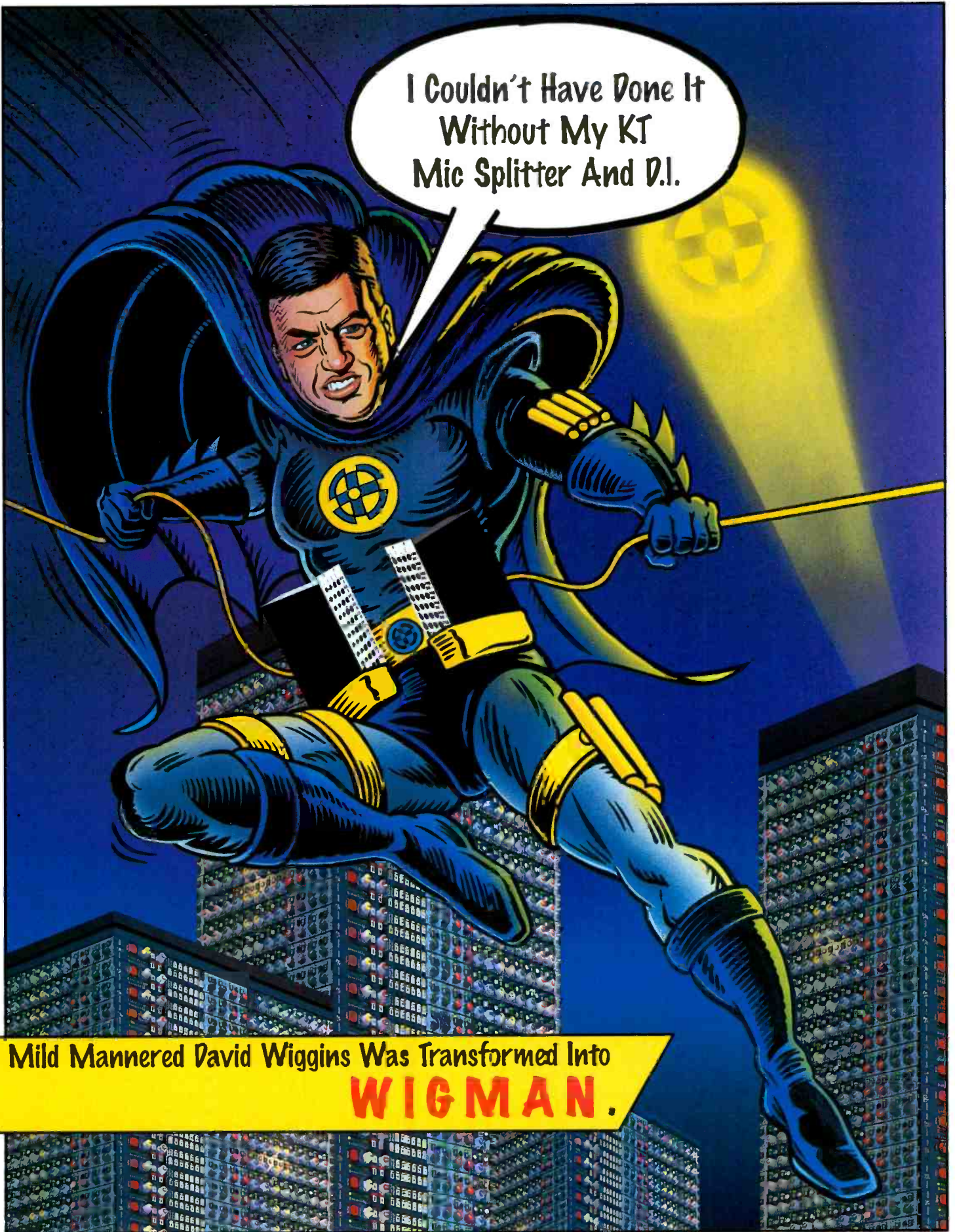
bells and whistles that are going to cost you this sort of money anyway, the 9098i gives you a sonic quality many regard as the ultimate currently available thrown in for free. Whatever your position on analogue versus digital mixing, few would argue with the

notion that Mr Rupert Neve's designs continue to represent the state-of-the-analogue art, and the 9098i manages to combine that with everything high-end mixing demands, apparently without compromise. ■

#### Contact

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## Soundtracs DS-M

Co-operation with SADiE has endowed Soundtracs with an integrated digital mixer, recorder and editor with nonlinear video. **Zenon Schoepe** investigates the nature of the sum of the parts



**S**OUNDTRACS showed its entry into combined digital mixing and hard-disk recording editing at IBC with the DS-M. It is a product that has been expected for some time following the announcement late last year of a co-operative agreement between the British digital desk manufacturer and DAW specialists Studio Audio & Video. The fruit of the work will ship in December.

Some confusion may exist about the precise nature of the beast as it was originally, but briefly, named Digitracs before a swift change in title to DS-M. The product is intrinsically linked to the DS-3 (*Studio Sound*, April 1999, p26) and it is important to understand the distinction and similarities between the DS-3 and the DS-M. The DS-3 is the stand-alone digital mixer and the DS-M is essentially a DS-3, but with the hard disk recorder editor inserted and integrated.

It is also important to acknowledge

that the DS-3 has also been tweaked, as intended and expected, since its first airings as a working prototype at the spring shows in response to potential customer feedback. It has been rejigged cosmetically and in terms of panel layout and controller count, but perhaps the most significant change has been the fact that it will now ship as a 64-channel console rather than the 96 channels originally suggested.

According to Soundtracs this is because the smaller size seems better suited and more interesting to the sort of market it is targeted at. A by-product of this move is that the price has also dropped slightly.

While the desk aspects of the two products are identical the hard-disk recorder section cannot be retrofitted to a standard DS-3. However both share the same sorts of options for I-Os with analogue, AES-EBU, TDIF, ADAT and MADI.

The DS-M gets an additional control panel for the hard-disk system placed between the input sections and the master section which contains a large screen to show you what is happening on the editor, a set of dedicated edit controls and keyboard all located close to the jog and shuttle wheel.

The hard-disk system is available in 24 and 32-track versions and either are available with random-access video. This is based on SADiE's Portia system which represents integrated random-access video within the SADiE edit list. It is the name given to a JPEG card that can be installed into any SADiE system. Using JPEG video compression, video can be recorded into an edit list and accessed alongside the audio. Features include video cut, copy, delete and duplicate, along with complete audio-video sync even when scrubbing at speeds greater than real-time.

Internally the software and hardware of the hard-disk recorder is based on the SADiE system and has been adapted in a number of ways for Soundtracs' own purposes with all the programming performed by SADiE for Soundtracs. Soundtracs is at pains to point out that this is a Soundtracs product and will be sold and supported by Soundtracs only and does not amount to the same as buying a SADiE 24-96 SADiE and strapping it on to a DS-3.

Even so you can transfer projects between SADiE systems and the DS-M and also benefits from SADiE's activity in interchange formats. Consequently, Soundtracs assures that any development work conducted on SADiE products will potentially also be available for the DS-M, although Soundtracs will control these and make releases according to its own chosen direction and user base. Thus SADiE upgrades and tweaks to its CD mastering capabilities, for example, will be judged nonessential for the sound-to-picture work inclinations of DS-M users.

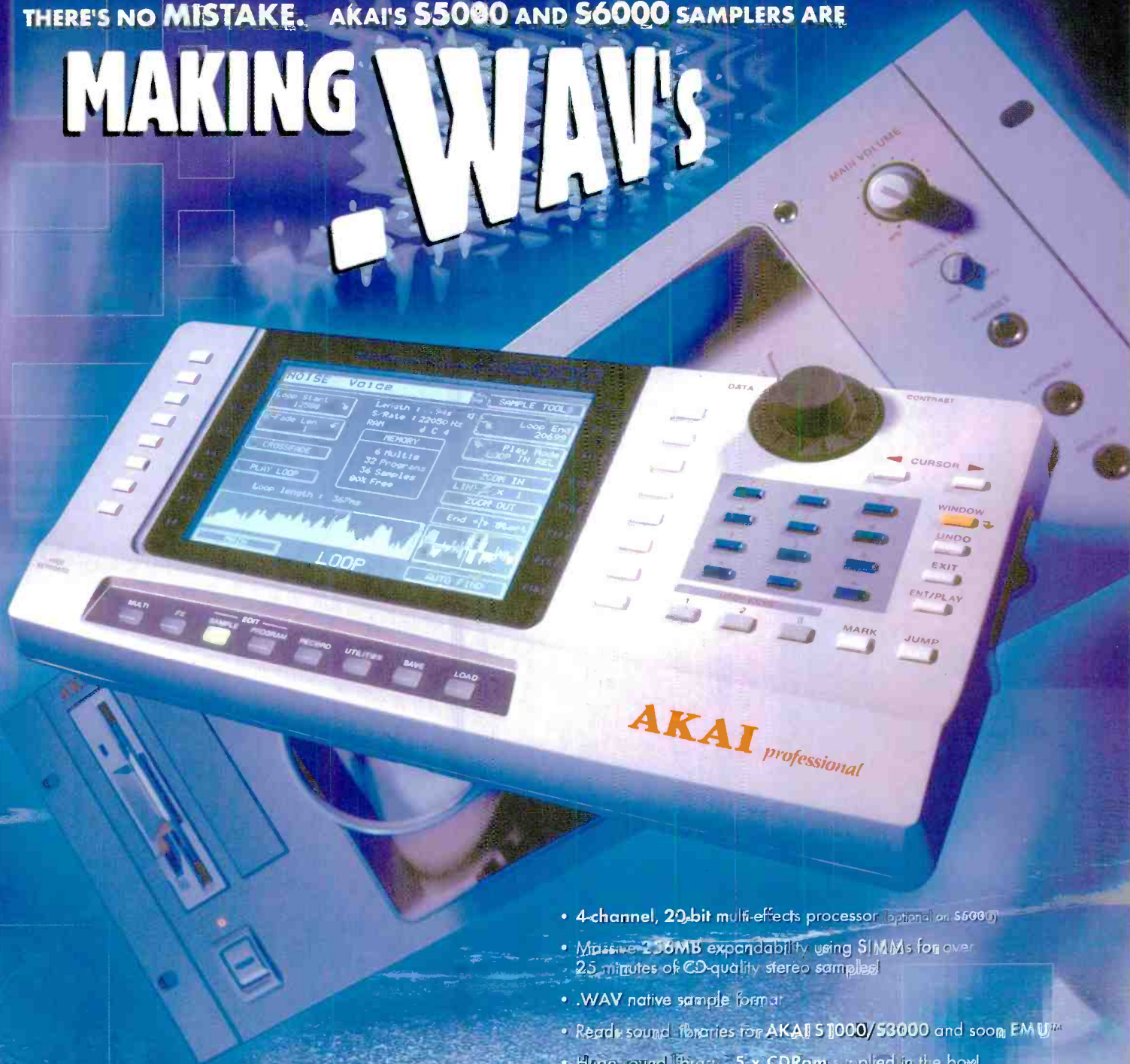
The benefits of combining digital mixing with nonlinear recording include the fact that the business of interfacing the two systems has been simplified with regard to clocking, as the two are locked together, and with regard to time-code synchronisation. The system offers sub-frame scrubbing of video, audio and automation data simultaneously.

The SADiE's routing matrix and mixer have been removed from the DS-M as they are duplicated on the desk. In terms of arrangement, channels 1 to 8 on the mixer equate to the same >



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◀ tracks on the hard-disk system as a default, but can, of course, be reconfigured. Soundtracs has tied the automation and editor screens together to give a simple and clear representation of what is going on and if you switch the view or zoom on one screen the other follows and reflects its associated data. This aspect works extremely well.

The editing functionality and appearance of the DS-M's editor will be familiar to existing SADiE users. The DS-M has all the same editing features with the same options of using the pointer or hardware keys for the routines. On hardware controls you can hit Stream or Clip to identify a segment and hop along them with PREVIOUS and NEXT buttons and then use IN and OUT buttons to adjust the portion to be processed. Additionally there's a Trim Editor to take two clips of audio into a dedicated place for resolving a join and Region Editing for wiping across a section of audio for selection and moving it around.

There's also razor editing, scissors, lock and slip. Clips can also be snapped to timeline, original position or hot point. But if you are familiar with SADiE then you will be acquainted with these already.

The desk quotient will be available with a 48kHz or 96kHz engine (both 64-channel) while the editor operates at 48kHz in 24-track and 32-track versions with half the number of tracks available at 96kHz. Potential purchasers would therefore be protected for the future.

Default storage size is to a 9Gb drive with bigger sizes available and back-up is to exabyte or other media. There is also the potential for ATM-based networking in the future for a multiple system complex supported perhaps by stand-alone SADiE editors, although removable media would be most immediately convenient and, as already mentioned, SADiE has not been lax in expanding its import-export portfolio.

There is much to commend the DS-M. The tightness of the integration between the recorder and desk means that essential audio segment-based automation has

been realised. The automation data can be represented by a set of curves superimposed on top of the audio waveforms in the editor display. The package impresses with its cohesiveness and togetherness even though it is still a way from being finished.

If I have one reservation then it is the layout of the editor section. The screen is placed top of the panel with its associated editing keys directly below it, but a fixed QWERTY keyboard inserts itself between the operator and the all important sharp end. You can still reach everything, but anyone using the editor hard will want to have it as close as possible.

They have also addressed the bugbear of saving data, an issue that causes considerable problems when disparate systems are forced to cohabit. On the DS-M it is a simple matter of single step filing and restoring of entire projects and this can be performed from the editor or the automation portions of the system. For archival purposes, crucial in post where jobs frequently return, the SADiE software bundles data together in projects and this has enabled the desk automation data to be inserted along with it.

Price then. For a 48kHz DS-M with 24-tracks of audio, the 64-channel desk but no video they are asking £80,000 (UK). Video is expected to add perhaps another £10,000.

It amounts to something of a master move. After its first initial move to digital, the DS-M is probably the most important product for Soundtracs as it represents the missing piece in its controlled and deliberate progress into postproduction. The addition of an integrated editor assures the company's ability to provide systems across the board and at all levels and puts it in the position to equip an entire postproduction facility. Comparisons will be made to Fairlight's FAME, but the DS-M probably has more in common with AMS Neve's Logic/AudioFile combos in terms of genesis and direction.

It is also a smart move for SADiE as it buys them a good foot in the door into postproduction and gives them integrated access to a large hardware mixing console while also opening up a

route to supplying its systems in a supporting role in preparation suites feeding DS-M rooms.

There is a popular line of thought that suggests that the potential growth in post as a result of increased broadcast programming brought about by new channels and formats will manifest itself in

work for the B rooms rather than the flagship big-buck rooms. The DS-M would seem to be sensibly poised to take advantage of this. It is certainly worth investigating by anyone who agrees. ■

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# CEDAR NR-3

A proliferation of cheaper ways into CEDAR's universe of sound restoration has perhaps detracted from its best attempts at the top end. **Dave Foister** rediscovers the state of the art

**O**VER THE PAST FEW YEARS you could be forgiven for thinking that CEDAR's efforts had gone entirely into making its products ever simpler and more affordable. You may even have thought that the company felt that it had achieved all that could be achieved in the way of removing noise, that its algorithms had reached a peak of sophistication where further improvement was pointless. In both respects you would be wrong. Alongside the most recent additions to the Series X range of 1U-high processors the company released NR-3, its most powerful and flexible noise removal system yet.

NR-3 is a package that runs on the CEDAR for Windows system, explored here in July 96. This, it will be recalled, is a real-time hardware and software

platform using CEDAR's powerful PC DSP cards and a console/plug-in front end to allow any or all of the various algorithms to be purchased as required and used simultaneously according to how much hardware processing power has been fitted. The modules include de-click, de-crackle, de-buzz, azimuth correction and noise removal, and it is this last that has now been updated to the NR-3 process here.

One of the things that has always distinguished the computer-hosted noise removal processes from the hardware equivalents is the use of noise fingerprints. While it was hailed as a considerable achievement for the hardware boxes to be able to deal with any kind of broad-band noise without having to be fed a sample of it first, no-one has ever disputed the notion that the fingerprint remains the most powerful approach and the one most likely to be able to deal with the problem without side-effects. The idea is to play a short sec-

tion of the noise alone into the process, so that it knows exactly what it is trying to remove. But that is not the end of it. Being CEDAR, the algorithm is not a dumb automated process but allows the user to fine tune the way it works and to help it achieve the best results. Much of what is new about NR-3 lies in the increased power the user has over what it is doing, usually with the intention of minimising the work the process has to do in order to reduce the already negligible side-effects even further.

With characteristic honesty and in stark contrast to many of its would-be competitors, CEDAR begins the instruction manual by pointing out: 'It is impossible to remove all the noise from a signal and leave the desired signal completely unaffected.' The fact that CEDAR intends to get as close as possible to it is demonstrated by what follows, where the most experienced and powerful algorithm in the business is joined by new tools to help it get better still. At the heart of it is still the noise fingerprint, known in CEDARspeak as the Noise Reduction Curve or NRC. Obviously the process of taking this fingerprint is easiest when there is a portion of the recording with no wanted signal present, but when things have been tightly edited there is often no

opportunity to do this, and part of the improvement in NR-3 is its enhanced ability to analyse the noise even with small amounts of signal present and in a very short space of time. Independent curves can be taken for the two channels, to allow for differences in the groove walls of a disc or inconsistent tape machine line-up.

The 'shape' of the noise the process has found is displayed as a spectrum line in the upper window of the screen along with a continuous live display of the input signal spectrum. This shape is the NRC, and forms the basis of the noise-reduction process that follows in that it is this spectrum of low-level information that NR-3 will try to remove without damaging the wanted signal. The simplest thing to do at this stage is simply to adjust the Attenuation of the noise on the basis of this NRC alone, and in many cases this does an excellent job. But this assumes that all the noise it has found is equally intrusive, and if it works

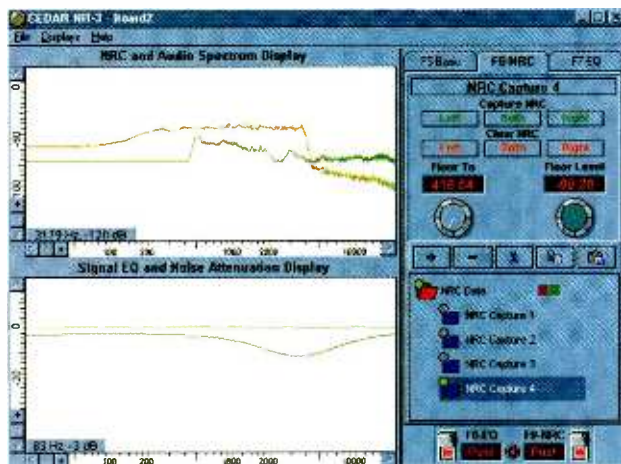
hard on the perceived problem it will be working equally hard on the parts whose presence is less objectionable or noticeable. There is scope for making the process quite seamless, with a bit of manual intervention, and NR-3 has more scope for this than ever before.

To begin with, the captured curve can be manipulated in a variety of ways. It may be that the grabbing procedure has captured some wanted signal and this is often obvious from the display. A range of drawing tools is provided to redraw parts of the curve or to smooth jagged peaks, besides which the armoury of EQ options can be applied to it. NR-3 offers four types of EQ band, known as nodes, comprising high and low shelves, a parametric called a Q node, and a notch filter. Any combination of these can be used to modify any of the curves that appear in the system, including the NRC. The manual points out that in the case of the NRC the drawing tools are a more appropriate approach, but the EQ option is included to provide continuity to users of earlier CEDAR systems. The final adjustment of the NRC is its overall level in relation to the complete signal; getting this right makes the crucial difference between over-processing and under-processing, with the unavoidable side-effects both produce.

But at this stage no actual noise removal is taking place. The lower window of the display shows two lines, one representing the frequency response of the wanted signal (Signal EQ), and the other the amount and shape of noise removal based on the NRC (Noise EQ). Only when this second line is below the first is any work being done, and the fact that both these lines can be shaped with the EQ bands is the key to controlling and monitoring what NR-3 does.

Advancing the Attenuation control will make the Noise EQ line move downwards and introduce across-the-board noise removal based solely on the NRC in the upper window. Applying one or more EQ nodes to the Noise EQ allows it to be shaped, determining where the process will work hardest and where it will do less. For example, with the overall attenuation set at zero but a parametric band dipping the line around the mid-frequency area, that area alone will be treated, using the relevant portion of the NRC as its guide, and the parts of the spectrum above and below this band will have no noise removal carried out on them at all.

This allows the processing to be targeted very precisely at the specific >



platform using CEDAR's powerful PC DSP cards and a console/plug-in front end to allow any or all of the various algorithms to be purchased as required and used simultaneously according to how much hardware processing power has been fitted. The modules include de-click, de-crackle, de-buzz, azimuth correction and noise removal, and it is this last that has now been updated to the NR-3 process here.

One of the things that has always distinguished the computer-hosted noise removal processes from the hardware equivalents is the use of noise fingerprints. While it was hailed as a considerable achievement for the hardware boxes to be able to deal with any kind of broad-band noise without having to be fed a sample of it first, no-one has ever disputed the notion that the fingerprint remains the most powerful approach and the one most likely to be able to deal with the problem without side-effects. The idea is to play a short sec-

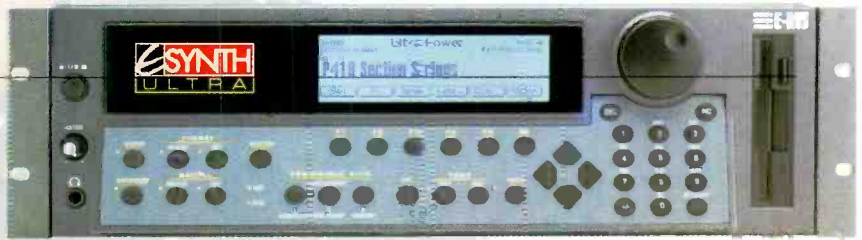


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





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# E-MU SYSTEMS

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< problem being addressed while minimising the introduction of side-effects in parts of the spectrum where it is not felt that there is a problem. The overall Attenuation control is still active, but now it moves the whole curve up and down, retaining the chosen emphasis.

The drawing tools are also available on these EQ curves, and to help with their use the display can be zoomed in and out to show more or less detail. In this case, however, the familiar EQ controls would appear to be the more intuitive way of going about it.

As a convenient short cut, three preset profiles are provided based on CEDAR's research into how the ear perceives noise, loosely based on the Fletcher-Munson curves. These can be applied to the Noise EQ and then manipulated using all the other tools.

An important aspect of what is going on here is that the EQ controls can be applied independently to the wanted signal and the noise component, or to the two simultaneously. While EQ on the main signal is not intended to be a substitute for dedicated outboard EQ, subtle use can compensate for any perceived tonal changes brought about by the processing. If a frequency range is to be cut, obviously it makes sense to cut both signal and noise; if on the other hand it is to be boosted, the arrangement makes it possible to boost the wanted signal without bringing the

noise up with it—Noise-free EQ as CEDAR calls it. None of this should be confused with the Brightness setting, which has nothing to do with altering the EQ of the sound; as CEDAR followers will know, this is a parameter that advises the algorithm how much brightness is contained in the wanted signal to help it distinguish between wanted HF and noise.

One of the most impressive aspects of CEDAR's hardware processors has been how simple they are to operate, and by contrast NR-3 can appear daunting at first sight. But it soon becomes clear that it is in fact very easy to use and adjust, and that there are usually several ways to tackle a particular job. For instance, the standard CEDAR procedure for adjusting the Noise EQ is to work directly on it, pulling it around until it has dealt with the problem without doing any more than necessary, but I tried another approach on some tape-hiss-type noise and was equally happy with that. In the same way that a parametric EQ can be used to deal with a problematic resonance by first turning it up and sweeping to pinpoint the problem, then cutting it, I applied the EQ first to the signal, boosting a parametric band to find where the noise was most obnoxious.

It was easy to adjust the bandwidth to

the point where widening it made no difference, and then I felt I had identified the problem quite precisely. This EQ setting could then be transferred to the EQ curve and used to cut instead of boost, and the noise disappeared immediately with only a few dB of attenuation.

One of the problems a restoration specialist has to deal with is the fact that the nature of the noise can change in the course of a reel of tape or a side of a record, and in the past this has been difficult to accommodate. NR-3 now has a Morph feature, allowing two independent treatments—A and B—to be set up so that a smooth transition from one to the other can be executed. Moreover, complete settings can be filed away and loaded into the A memory while B is in use and vice versa, so a continuous sequence of treatments can be set up for dealing with inconsistencies between tracks.

While CEDAR's opening remarks about the impossibility of removing noise without side-effects are technically correct, for all practical purposes NR-3 proves them wrong. With this much power available, it really is simpler than ever to get at noise problems with surgical precision and without any perceivable effect on the wanted signal. The best just got better. ■

**CEDAR Audio UK,**  
9 Clifton Court,  
Cambridge.  
Tel: +44 1223 464 117.  
Fax: +44 1223 464 118.



**London**

505-507 Liverpool Road,  
London N7 8NS.  
Phone us: 0171 609 5479  
Fax us: 0171 609 5483  
email us: sales@funky-junk.co.uk



**Paris**

Pierre Valentin  
19, rue des Parisiens,  
92600 ASNIERES, France  
mob: 0(033) 616 72 1977  
email us: pierre@funky-junk.com



**Milan**

Paolo Orizio  
via Pollaiuolo, 15, 20159 Milano,  
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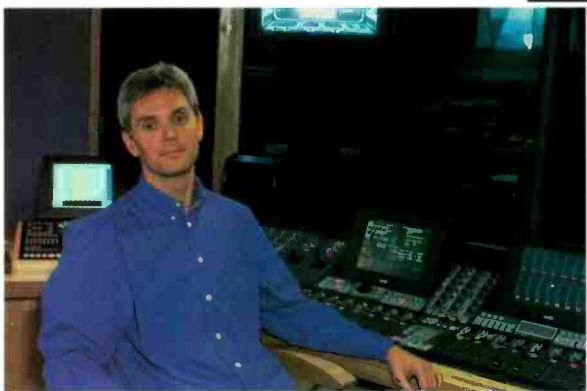
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## AES New York Review

AES New York was a corker of a show. **Zenon Schoepe** reports from an exhibition that witnessed the largest batch of new product introductions for a good many years.

**Y**amaha confirmed long standing rumours with the unveiling of the digital PM1D live-sound production console. Most significant is the price which starts at \$110,000 and rises to around \$140,000 for the largest configuration as it represents the most anyone has ever been asked to spend on an item of Yamaha equipment. This would seem to give a wide area of price scope for any future 'supporting' desk products.

By definition the all-digital desk will stack up against the existing leading analogue breeds, but will no doubt also impact on manufacturers serving OB truck applications. An important observation is the first appearance of a separate processing rack from Yamaha which would suggest that the mechanism with which to tag on, perhaps, alternative discipline worksurfaces is now in place. Good.

Processing is 32-bit with the CS1D control surface operating the DSP1D digital audio engine. Configurable in 48-channel and 96-channel versions with 48 mix buses, a 24-way matrix and 12 DCAs, the board has 28-bit A-D and 27-bit D-A conversion. Dual inputs on each channel provide 96 inputs for the 48-channel system and 128-192 inputs on the 96-channel version.

All console-to-stage audio and control signals are carried via one 68-pin cable and three Ethernet-type cables.

Features include recall, undo, off-line programmability, central control, and graphic

and graphic parameter read-out. Up to 1,000 scene memories can be stored and in the event of a control-surface crash the system will continue to pass audio.

Channel features include remote control of head amp gain from the control surface with recall, 4-band fully parametric EQ, dynamics processing, and a user-definable number of aux sends, effects processors and graphic EQs.

Multiple control surfaces can share I-Os and the main DSP-2000/DSP1D mix and processing engine can be configured to select which control surface can adjust head amp gain.

Revealed alongside the new desk and described as a programmable DSP engine, Yamaha's DME32 is a 32-input, 32-output processor expandable to 128 inputs and 128 outputs with 32 mix cascade buses. Intended primarily for installed systems it also has obvious applications as a matrix-routing and multi-effects unit (it has eight on board multi-effects processors). Parameter adjustments, scene changes and other functions can be accessed from the front panel of the 3U-high rackmount that can house a variety of card options. Programming can be performed using proprietary software and an outboard computer.

An assortment of DSP components includes mixing consoles, parametric and graphic EQs, dynamics processors (compressor, noise gate, expander, compander, ducker), delays, crossovers, automatic mic mixers, matrix mixers and 10 multi-effects processors. Intro-

duced as part of the system are the AD824 and DA824 converters (incorporating Apogee Convertors), which can be located up to 200m from the DME32 via AES-EBU cards.

● **tc electronic** launched a new flagship processor optimised for 5.1 multichannel applications and two boxes in a new affordable line.

The System 6000 sports an expandable and updatable mainframe, remote CPU and Icon hardware controller. Algorithms are focused specifically on the areas of music production, mastering and postproduction.

Three ADA24/96 2-channel analogue I-O cards can be added in the Mainframe 6000 along with the DSP-card fitted with four pairs of AES-EBU and word-clock input for a total of 14 channels of I-O. All are 24-bit and can run at 96kHz. The CPU 6000 incorporates the CPU, power supply and all control-I-O connections, while the Icon remote has a large touchscreen and six motor-faders.

Internally the system operates with a structure of four engines and holds 1,000 factory presets and many user settings. Engine, routing and scene preset banks permit recall of single effects presets to complete 4-engine reconfigurations. Algorithms include Surround 5.1 reverb, which has a stereo input and five channels output with two Early Reflection patterns and five totally uncorrelated reverb-tails. It is the first in a range that will be developed for multichannel. The MD-5.1 algorithm is a 5-channel, 3-band exp-comp-lim dynamics plus one full range >



# ADAM S2A

For methodology see *Studio Sound*, April 1998, page 14.

See it on the Internet net-site:

[www.prostudio.com/studiosound/apr198/r\\_tannoy.html](http://www.prostudio.com/studiosound/apr198/r_tannoy.html)

*Studio Sound's* 'bench test' loudspeaker reviews continue with the S2A. **Keith Holland** reports

**T**HE ADAM S2A is 2-way active loudspeaker consisting of a 185mm woofer with a composite cone, and a rectangular 'air-motion transformer' tweeter with diaphragm dimensions of approximately 30mm wide by 35mm high, mounted vertically above the woofer. The power amplifiers and crossover circuitry are built into the cabinet that has dimensions of 220mm wide by 370mm high by 320mm deep. The front panel of the cabinet



has a bass reflex port, an ON-STANDBY switch, dip switches for input gain (four positions from +6dB to -10dB) and high gain (five positions from +4dB to -4dB) and two miniature, screw-driver-operated potentiometers for room equalisation ( $\pm 3$ dB below 150Hz and  $\pm 3$ dB above 6kHz). The review measurements were made with all equalisation controls set to 0dB. The rear panel contains a mains socket and ON switch and a switchable choice of RCA phono unbalanced, or XLR-type balanced inputs. No amplifier power ratings or maximum output levels were supplied with the review example.

Fig.1 charts the on-axis frequency response and harmonic distortion for the S2A. The response lies between  $\pm 3$ dB limits from 47Hz to 15kHz, with a rising top-end above 6kHz which could be tamed using the equalisation control if necessary. Low-frequency roll-off appears to be approximately 5th order, indicating the use of a mild high-pass protection filter, with -10dB at 38Hz. Low frequency harmonic distortion

performance is good with the second harmonic below -40dB (1%) above 80Hz and the third above 65Hz. The high frequency performance is less good however, with the second harmonic distortion rising to -30dB (3%) at 9kHz. The audibility or otherwise of these levels of high frequency distortion is open to debate, but many other high frequency drive-units exhibit much lower harmonic distortion than this example, without any other obvious drawbacks. Figs 5 and 6 chart the off-axis frequency responses in the horizontal and vertical planes respectively. High frequency directivity is well controlled with no evidence of side-lobing and a response that falls off smoothly with increasing frequency at all angles. There is little mid-range narrowing in the horizontal plane, except for a narrow dip in the off-axis responses at 1.5kHz, but the characteristic interference notch is evident in the vertical plane at 2kHz. The time-domain performance of the S2A is shown in Figs 3, 4, 2 and 7, which chart the step response, power cepstrum, acoustic source (see note) and waterfall charts respectively. The step response, Fig.3, is fairly accurate, with the high frequency 'spike' leading the mid-range by only about 0.5ms, indicating good crossover design and driver time-alignment. The power cepstrum, Fig.4, shows evidence of a significant 'echo' after a very short time (about 0.05ms), but is otherwise fairly clean. The acoustic source chart, Fig.2, shows that the low frequency components of transient signals appear to emanate from a position some 3.5m behind the loudspeaker; this is characteristic of a fairly rapid low-frequency roll-off due to bass reflex loading and the use of a high-pass protection filter. The waterfall chart, Fig.7, is clean except for some mild ringing at 600Hz.

Overall, the ADAM S2A is

a good performer. The only obvious drawback of the design is the amount of nonlinear distortion at high frequencies, although it is not clear whether this is much of a problem in practice. The loudspeaker should suit a wide variety of acoustic environments, due to good directivity control and the provision of useful equalisation controls. ■

#### Note on Terminology

Some confusion exists in the audio industry as to the use of the term 'acoustic centre', with some using it to describe the centre of rotation of a loudspeaker for directivity purposes and others (including myself) to specify phase-related delays. The AES has clarified the situation by stating that the preferred term for phase-related delays should become 'acoustic source' and that 'acoustic centre' should refer to the centre of rotation. In this, and all subsequent reviews in this series, the phase-related delay will be termed 'acoustic source'.

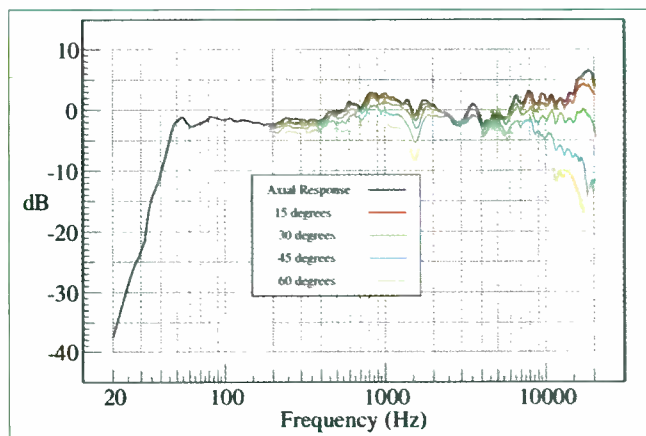


Fig.5: Horizontal directivity

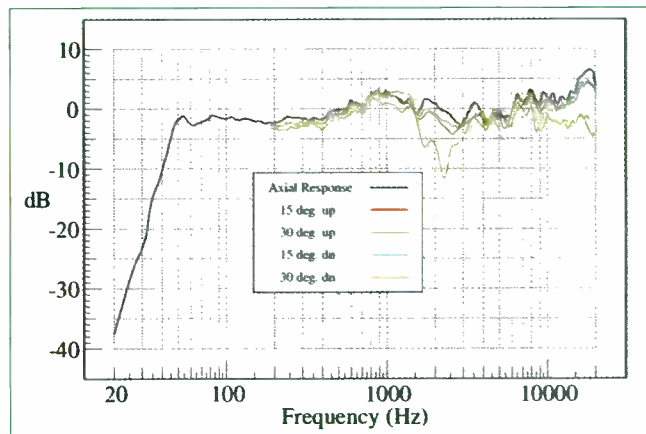


Fig.6: Vertical directivity

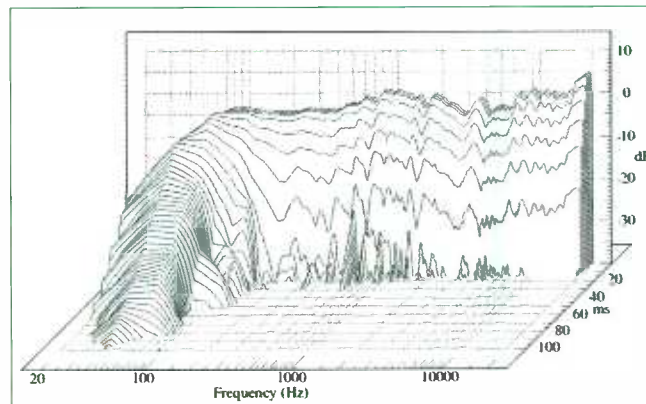
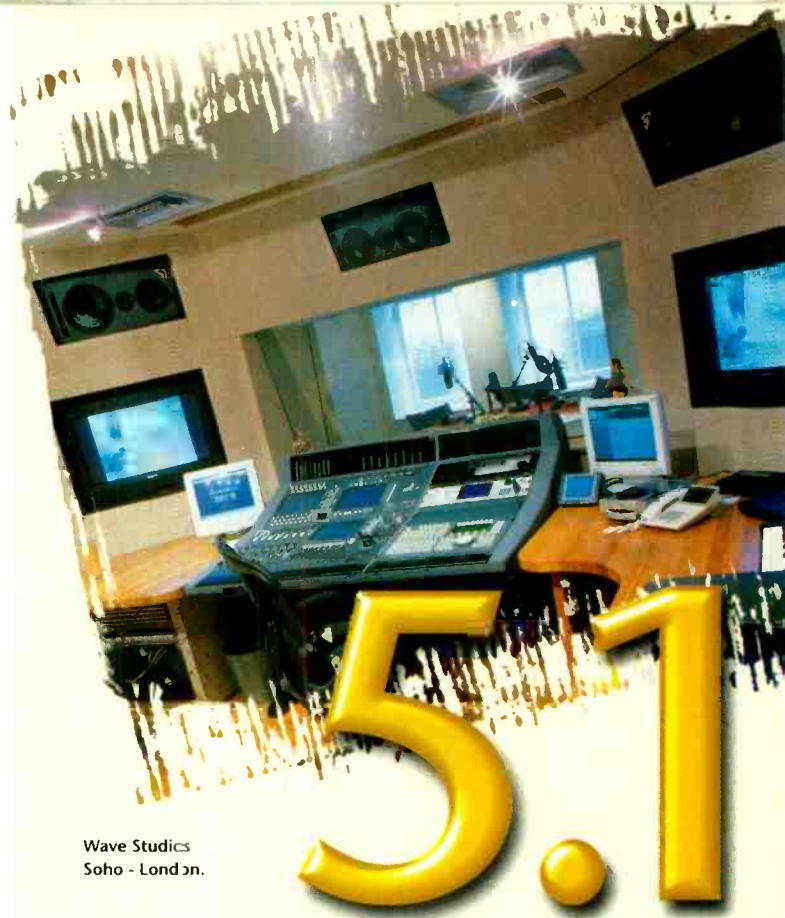


Fig.7: Waterfall chart

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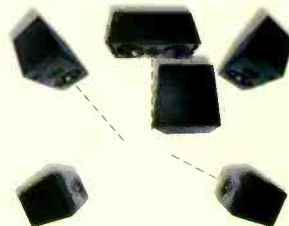
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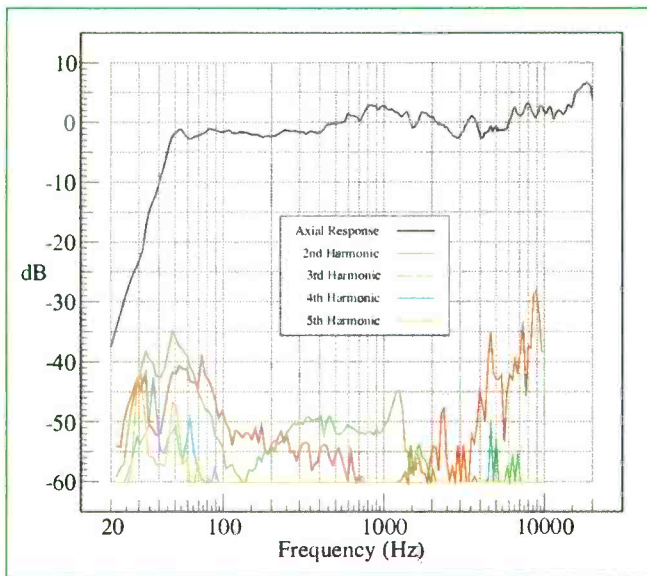


Fig. 1: On-axis response and distortion

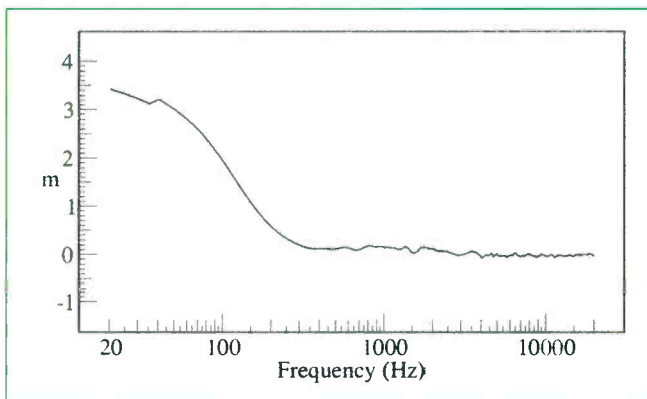


Fig. 2: Acoustic source

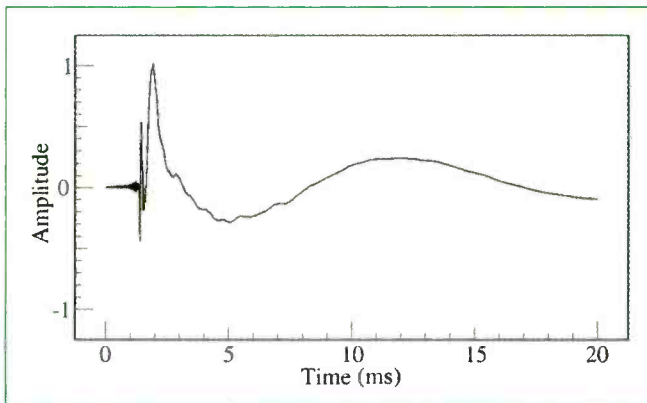


Fig. 3: Step response

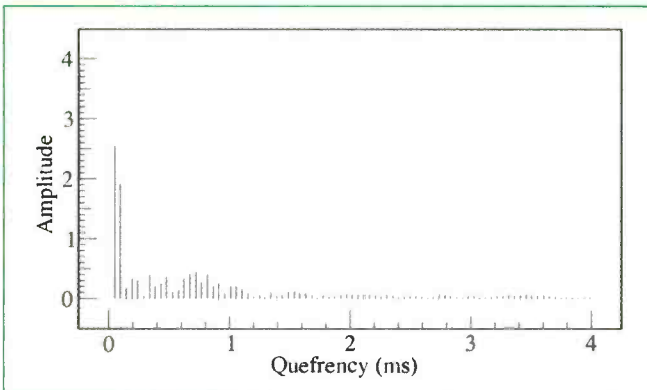


Fig. 4: Power cepstrum



# Jünger Audio Accent 1 & 2

The latest Jünger digital dynamics processor comes in two flavours and combines operational flexibility with sonic clarity. **Rob James** enjoys the mix

**A**CCENT2 is the latest digital dynamics unit from Berlin-based Jünger Audio. Available in two versions the Accent1 has digital I-O only, Accent2 adds 24-bit, 96kHz A-D and D-A converters. Like other outboard, the unit is a 1U-high 19-inch rackmount. Like other Jünger machines, due to its depth (251mm) and weight, it really needs some rear support in the rack. The neat and clearly labelled rear panel sports two pairs of XLRs and BNCs for AES I-O with a further two pairs of XLRs for analogue. Two more BNCs deal with sync in and out and a 1/4-inch jack allows for a remote fader such as a tc electronic Master Fader, although any 50k $\Omega$  pot will do. Two female 9-pin sub-Ds permit RS232 remote connection and GPI connections.

The brushed aluminium front panel is anodised in a subdued green. Two black keys select either Gain adjustments or Configuration of the audio path. The first window has sample rate

audio, clocked with the original sample rate. I was delighted by the inclusion of the AES31D type BNC connectors in addition to XLRs since I have always found this method of connection more robust.

Sample-rate conversion is available on Digital Output 1. Output 2 always follows the system clock. Versatile configuration options allow various permutations for the reference source. Dither to 20 bits or 16 bits is provided. All internal processing is 32-bit.

The programmable GPIs provide for remote selection of Presets 1 to 4, remote switching of the individual processor blocks and reset clip indication. Four tally programmable outputs indicate selection of Presets 1 to 4, sync OK or limiter Active.

The main processing blocks are configured in logical order—expander, compressor, gain, limiter. The filter section may be placed before or after the expander or used to control the side

circuits'. This approach is different to a conventional multiband device where the spectrum is split and parallel processing takes place with the signals summed before the output. What all of this is aimed at is achieving transparent control. The control circuits adapt to the incoming signal and vary attack and release times to suit. This enables the use of long attack times with steady state signals while still achieving very fast attack on short duration transients, actually zero. Due to this adaptive processing there are no conventional attack and release times to set. Instead, for the limiting and compression functions their is simply a choice of nine ranges of processing time parameters. These vary from PRO1 (2ms to 0.s) up to PRO9 (250ms to 10.0s).

Since there is no such thing as a free lunch, transparent brickwall limiting can only be achieved by a look-ahead function. This means the signal is subject to a certain amount of delay. Jünger has

kept this down to a commendable 1ms at 88.2kHz/96kHz and 2ms at 44.1kHz/48kHz sampling rates, although this must obviously be borne in mind when

considering mixing direct signals with the output of the Accent2.

In practice, the Accent2 performs exactly as I would expect from a Jünger. Setting up and parameter adjustment are not completely intuitive, but the Accent2 seems better in this respect than some earlier Jünger models. As with many dynamics processors, it will take time to experiment with the many variables in order to derive maximum benefit. The multiple simultaneous processes allow highly complex dynamic manipulation to be achieved. Time spent setting up and saving presets will be repaid by near instant solutions to many day-to-day problems. There are 99 stores for the purpose.

To my ears, the sound is impeccable whether using digital or analogue interfaces. The emphasis is on clean, clinical control. If you need raucous or bouncy you will need to look elsewhere. The algo-

rithms are well chosen for a wide variety of 'serious' applications from dynamic range compression through broadcast limiting to de-essing and problem solving. A worthy addition to the range. ■



indicators and the main Edit display, which is a back-lit LCD. Four internally lit keys select the Compressor, Expander, Limiter or Filter for editing. The LEDs light when the processes are switched on. The SELECT-EDIT knob is the only rotary control. Pressing this selects, and turning adjusts, processing and setup parameters. Two further keys, SETUP and PRESET, select the setup-utility and preset menus respectively. All metering takes place in the multiview display which has separate horizontal bar graphs for limiter reduction, compression gain, expander reduction, dynamic filter activity, left and right input, and left and right output plus a group of three indicators for stereo, SRC and dither, and a group of two for insert send and return overload. All levels are referenced to 0dBFS. Despite the amount of information presented in a small area, in operation the display is easy to read. The final two keys reset peak indications and bypass the unit. A mains switch completes the panel.

Interfacing 88.2kHz and 96kHz is achieved in one of two ways. Two-wire uses two AES-EBU lines, one for each channel, clocked with half the original sample rate and 'high speed' uses one AES-EBU line with two channels of

chain of the expander or compressor elements which allows for de-essing and other effects. The insert may be placed between the Expander (or Filter) and Compressor.

Limiter threshold is adjustable down to -20dBFS to accommodate headroom requirements. The Compressor is somewhat unusual in that it can boost the low-level signals as well as reducing the gain of material louder than the threshold. Where this would be undesirable because of the effect on unwanted background noise, the maximum gain of the Compressor can be restricted, independently of the compression ratio, anywhere from 1dB to 15dB. In effect, the Compressor can be set up as a leveller, somewhat reminiscent of an Aphex Compellor, but rather more subtle. The Filter can be shelving or peaking with  $\pm 15$ dB of boost or cut and variable Q from 0.5 to 9.9. The filter can also be used in dynamic mode where only signals above the threshold are affected.

Jünger makes much of its 'multiloop principle' of dynamics control coupled with 'multiple frequency linear control

**Jünger Audio, Studiotechnik GmbH, Rudower Chaussee 5, D-12489, Berlin, Germany.**  
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**NEW**

GS<sup>3000</sup>

# OK... or Outstanding?

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- 2 SVT (symmetrical valve technology) valve preamps
- Wide ranging mic preamp
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- 2 dual stereo inputs with automation as standard
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- 4 mute groups
- MIDI machine control
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- Group/direct switching
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- 2 studio feeds
- Solo in place and PFL on both fader paths
- Channel status indicator LED
- Optional 21 segment input bargraph meterbridge
- Interface for three 2-track recorders

## SVT VALVE PREAMPS



GS3000's 2 valve preamps can be patched to individual channel inserts, groups or LR. The valve preamps incorporate Symmetrical Valve Technology, allowing them to be used in balanced mode for regular inputs or in single-ended 'guitar' mode, which drives the the valve to give the type of pleasing harmonic distortion much sought after by guitarists. Other valve preamp features include valve drive control, pre-valve swept frequency EQ, hi-cut filter and output level trim.



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email: [sales@allen-heath.com](mailto:sales@allen-heath.com)

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HEATH**



NEW TECHNOLOGIES

**Wireless evolution**

Sennheiser has introduced the Evolution wireless UHF series with prices starting at a few hundred pounds and including a frequency agile IEM. All items offer rugged build quality with metal hand-held and

bodypack transmitters, frequency switchable operation, true diversity receiver technology, a new HDX compander system, simple operation and a wide choice of mic capsules and configurations. The 100 series is the entry-level price system with optional hand-held and bodypack transmission sets, a 4-channel preset switchable operation and a miniature plug-in transmitter set to convert a wired mic for wireless transmission. The 300 Series has more advanced control and operation with eight preset frequencies with a range of hand-held and bodypack transmitter sets. Audio out on the fixed receiver are balanced XLRs. The 500 series has 16 switchable frequencies and a full complement of Evolution transmitter and receiver options including a clip-on attachment for cameras. A soundcheck mode permits accurate on-stage level check. There's a choice of two dynamic and one condenser capsule, and bodypacks can have an omni or cardioid lavalier or a headset. The IEM provides eight preset switchable channels with stereo earphones, a safety mode for volume control can be overridden while a Focus function splits stereo to dual mono operation.

**Sennheiser, UK. Tel: +44 1494 551531.**

**Yamaha CD-R**

Handling CD-R and CD-RW, Yamaha's CDR1000 CD-R machine uses Apogee UV22 for processing high-bit resolutions. Other features include a SRC, word-clock input, and I-Os on coax, AES-EBU and balanced analogue. The machine has 16-segment meters with peak hold, sync recording, quad speed finalise, selectable copy protection, parallel port for external control, record start footswitch and a wireless remote.

**Yamaha, UK. Tel: +44 1908 369269.**

**AT895**

AT's AT895 adaptive-array microphone system aims to outshoot shotguns and employs a software algorithm, an acoustically tuned element microphone array and special analogue circuitry to provide adaptive directional acquisition of sound sources. The output of the array is manipulated and filtered by acoustical, analogue and digital means to enhance the pick >

# Joemeek JM47 Meekrophone

Adding a front end to its series of processing has completed Joemeek's range. **Dave Foister** mics up

IT SEEMS TO BE all about shape just now. If you want your latest offering to be taken seriously as a studio vocal microphone it has to be a certain shape. Not just the generic shape of a Neumann, but a particular flared version of it, preferably with a grille made of perforated sheet metal rather than woven meshy stuff. So common has this become that I had to go and look up some pictures to make sure Joemeek's first venture into microphone land was not just a rebadged or re-engraved version of something we've seen before, and to be honest I'm still not sure.

Rather than paint it green, Joemeek has decided to give this major departure from anything it has previously done a clever name. Thus we have the JM47 Meekrophone, presented as an ideal partner for various Joemeek products, but particularly offered as a package with the VC3 ProChannel as the JM47 TrakPak.

The whole kit is neatly assembled in its own flight case, with compartments for the microphone, the standard shock-mount, the VC3 and the wall-wart VC3 power supply, and comes complete with a 5m microphone cable. For this review I had just the microphone itself, in a much simpler, but still sturdy box, and including the shock-mount as standard.

The JM47's instruction leaflet goes into some detail about the microphone's heritage. As is not uncommon, there are links to Gefell and Neumann capsule design, together with co-operation with far Eastern manufacturers. There is talk of specialist Chinese companies sharing in the East German Gefell technology and producing high-quality microphones in their own right, and it is elements of these together with extensive in-house testing that has produced the Meekrophone, claimed to possess the sound of 'the finest microphones in the world'.

In operation it is a straightforward side firing cardioid, with a readily identifiable front indicated by a huge JM47 engraving. It fits into the same kind of shock mounting that everybody seems to be using lately, only in this case the big bulldog clip levers are at the side of the microphone. This is a good solid mount (although I did manage to snap the elastic on one once without too much effort) with a helpful lever for locking off the swivel angle. The microphone is no lightweight, as its size would suggest, but the mount holds it firmly without swinging about. Above the edge of the holder, easily accessible and in plain sight for once, are the

two switches for adjustment. All that's on offer here is a pad (10dB) and a high-pass filter at an unspecified frequency. The solid brass body feels substantial and the whole thing is reasonably well constructed, with clear engraving and a good finish.

Inside the electronics follow the traditional pattern, with an FET preamplifier and a transformer output—the transformer itself is double screened for additional hum protection. The capsule is a centre electrode type with a 1-inch mylar membrane diaphragm, and uses dynamic feedback at the capacitor element to reduce high level distortion. While some other manufacturers are going to great lengths to assure us that electret need not necessarily mean second best, Joemeek is equally keen to make it quite clear that the JM47 is not an electret microphone.

That's all there is with the kit—the microphone and the elastic mount. The instructions advise against the use of a foam wind shield because of its effects on the sound, but recommend a nylon-type wind screen; neither appears to be available from Joemeek. On the other hand, a thread adaptor for the mount is supplied as standard.

A microphone is proclaiming certain aspirations by being shaped like this, and usually the sound it produces reflects those aspirations in some way or another. In the case of the Meekrophone what we get is a noticeably present sound, not too hard at the top but capable of providing a useful edge in a mix. Much of the emphasis in the instructions is on vocal recording, and there can be little doubt that this is what it will do best. Its sound is big enough to provide the cutting quality without getting thin, and unless a singer is particularly bright or sibilant to begin with it could well be just what the situation demands. At the same time, its high level handling capacity invites its use on musical instrument amplifiers. At the other end of the dynamic range, its noise floor becomes a bit of a problem with quiet speech work, but this is an extreme case that does not reflect badly on its musical usefulness.

Ted Fletcher's forté at Joemeek has been to give us something a little different, always with an ear on the sonic character of the past, and always at a bargain price. As a result the bright green processors have found their way into a variety of studios, their character suiting the big ones and their price the small ones. There is every reason to suppose that the JM47 Meekrophone will enjoy the same broad success. ■



**Contact**  
**Fletcher Electroacoustics, UK.**  
**Tel: +44 1626 333 948.**  
**Fax: +44 1626 33 157.**



# EAR-Yoshino 660

Taking the legendary Fairchild compressor-limiter on is a brave move for any manufacturer. **George Shilling** finds EAR brave enough

**E**SOTERIC (esoter'ikl, adjective inner; secret; mysterious; taught to a select few—this is the dictionary definition of the 'E' of EAR, that says much about the philosophy behind the company and its designs. Tim de Paravicini's company, which employs six people, has been producing its 660 valve compressor since 1984, yet total production totals only the low hundreds. So this is no upstart, cashing in on the recent valve technology boom that has mirrored the digital onslaught. Paravicini has long been a champion of analogue and valve technology, his outspoken views springing forth to challenge the motivation and wisdom of high volume manufacturers. Meanwhile, his Cambridgeshire-based company quietly builds small quantities of EQs, compressors, tape



recorders and such like. They are coveted by those in the know.

The 660 is a typical example of Paravicini's theory and practice. He designs equipment to sound good, and all other aspects take a back seat. Hence the unashamed duplication of the revered Fairchild 660's model number and design features. Paravicini has taken what he feels to be the best aspects of this design, improving and changing only where necessary.

For a mono unit, the rack space seems excessive at 3U-high, and this height makes the 10-inch or so depth seem shallow. Six valves are mounted on the back in a recessed cubbyhole. This makes servicing easy and keeps them away from other circuitry, but they are not completely safe here, as I found when someone tried to helpfully remove a unit from its box with their hand inside the recess. No major damage, thankfully. Inside, there is transistor circuitry for non-audio circuits such as power supply.

As well as XLR audio connectors, there is a jack socket to link two units for stereo operation, which was successfully used, thanks to the availability of a second unit. This is activated by a front panel toggle switch. As well as an IEC mains input, there is a useful IEC mains output, enabling the feeding of one unit from the other with the correct cable—a terrific idea for keeping things tidy. Why does nobody else do this?

The front panel sports a black anodised fin-

ish, and features a large, conventional vu meter showing gain reduction. The controls are presented in a row of odd, small switches and pots, with certainly more huffin-appeal than sex-appeal. The push-button power switch lights. There are lock nuts on preset pots for meter balance (to adjust tubes' current matching) and meter zero, so I did not touch those. In association with these is a 3-position switch for balancing each half of the tubes—you can check all is well by making sure the meter reads zero in all three positions. Like a Fairchild, compression adjustment is done with the INPUT ATTENUATION pot and the THRESHOLD. The INPUT knob is perversely as tiny as the Fairchild's is huge. There is no legending or calibration, and the tiny knob is undamped. As a bonus compared to the Fairchild, there are two different threshold knobs on the EAR. DC THRESHOLD varies the slope: at full anticlockwise the unit will gently compress, and at the opposite end it will hard limit at a 10:1 ratio. However, turning this control clockwise also has the apparent effect of raising the threshold, so in fact turning this control alone will give you less gain reduction as you turn it clockwise. This control is stepped with 11 positions. There is a soft high-frequency 'ping' on the outputs when you change this. The AC THRESHOLD is a more conventional threshold control, which can be adjusted in conjunction for the desired amount of gain reduction. Attack and Release times are variable by a 6-position rotary switch, which will be familiar to Fairchild fans. Four different attack and release settings are available, while positions 5 and 6 give auto program dependent release times. The manual recommends position 6 for classical music, with a very fast release for short peaks, and a very slow release for sustained high levels. Release times are helpfully listed on the front panel.

The manual is a fairly elementary affair, with charming hand-drawn circuit diagrams and a few misprints.

In use the 660 is smooth and warm, having a clarity not associated with Fairchild units—and Paravicini boasts that his units are better than Fairchilds. They have input and output transformers of his own design, for great bandwidth, and PCC189 triodes which are true vari-mu tubes that are long lasting and more easily obtainable than those found in Fairchilds. He is right, of course. But the grunge and magic glow of a Fairchild is yet to be convincingly replicated, so the real thing will still be covered. But the EAR is a very

worthy performer, magically and unobtrusively smoothing vocals, guitars, pianos and so on. For drums, I sometimes prefer something faster (in which case I would plug something else in). But mostly, where compression is required, all the niggles and foibles are quickly forgotten, as this is a slick and charming performer, second to none. Okay, except perhaps a Fairchild. ■

#### Contact

**EAR-Yoshino, Rectory Farm, Cambridge Road, Godmanchester, Cambridge PE18 8BP, UK. Tel: +44 1480 453791. Fax: +44 1480 432006.**

## NEW TECHNOLOGIES

< up of a sound source from a desired direct on relative to unwanted background noise or interference providing cancellation of up to an impressive 80dB. Claimed benefit is include improved sensitivity pick up distance and gain before feedback, 'unprecedented' off-axis rejection, 'out-



standing' low frequency directionality (up to 78dB rejection at 200Hz), marked reduction of proximity effect and greatly reduced susceptibility to mechanical noise. The AT40-7SV features a transformer-coupled output and uses dual, gold-plated and aged large diaphragms for extended frequency response, low self-noise, wide dynamic range and high SPL handling. A switchable 80Hz high-pass filter and 10dB pad are included.

**Audio-Technica, UK. Tel: +44 113 2771441.**

### Amek Pure Path

Designed by Rupert Nave, Amek's Pure Path processors include the Channel-in-a-Box (CIB) Driver-in-a-Box (DIB) and the Stem Compressor. The Stem Compressor offers eight channels of digitally controlled analogue compression and limiting for use in multi channel mixing. A 5.1 mix together



with a separate stereo mix, or two different LCRS mixes can be processed. Rotary encoders provide direct access to threshold, attack, release and ratio and these encoders can be selected to control the compressor or the limiter. An internal crosspoint matrix controls the linking of channels and access to side chains. The CIB combines mic pre, line pre, high-pass and low-pass filters, 4-band EQ and a compressor. The mic filters and EQ are virtually identical with those of the Amek 9098i. The DIB comprises eight separate Line-In/Line-Out transformer-coupled line amps and is capable of matching equipment to long lines.

**Amek, UK. Tel: +44 151 868 2400.**

### Westlake LC5.75

Westlake's LC5.75 is the smallest monitor ever built by the company. The 2-way monitor employs a 5-inch woofer and 3/4-inch tweeter in a single port enclosure with a claimed frequency response of 60Hz to 18kHz.

**Westlake, US. Tel: +1 805 499 3686.**



# Choosing the right audio Codec.



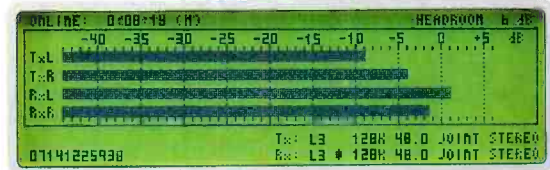
The Dialog4 MusicTAXI range is one of the most comprehensive codec packages on the market today. It contains all the standard ISO/MPEG audio coding algorithms in common use today such as Layer 2 and Layer 3, as well as CCITT G.722 for high grade voice bandwidth connections, and G.711 so it can talk to a plain old analogue telephone line, too. Connectivity features include upto three ISDN terminal adapters and X.21 port, for operation up to 384kbps. Dialing is quick and easy using the 96 entry directory.



The range of network protocols included means that it can be taken to virtually any part of the world. In the studio the audio i/o can be analogue or digital (AES/EBU & S/PDIF interfaces are both provided). The aux data channel enables embedded control data to be sent alongside the audio, and the unit can be controlled remotely from a PC or the external Remote Panel if desired. Most importantly automatic sensing of the codec at the other end of the call means that it sets itself up to communicate with the most commonly used systems in use today, i.e. Telos Zephyr, CDQPRIMA, Glensound and



others without complicated manual programming. Operationally the buttons are large and straightforward to use, while the illuminated LCD display gives a clear indication of what is going on at all times. No noisy internal cooling fan to worry about in quiet studio conditions. The Remote Panel can control a MusicTAXI from over 500m away via the RS422 interface. The online menu indicates online time, send-level, receive-level, adjusted headroom, Rx



and Tx audio configuration, SYNC flag of MusicTAXI at the other end.

Tapeless recording and transmission on the spot is the answer to the enhanced requirements of correspondents. The CTAXI is the solution and is set to become the standard for mobile recording and transmission, because it satisfies the users demand: stereo recording, editing, file-transmission to computers, realtime-transmission to all well known codces. The CTAXI is, of course, child's play to operate. You can use it as telephone, walkman, audio recorder, mobile editing station, transmission device. The size is as small as today's cutting



edge technology allows: 58 x 239 x 150 mm, the weight is 1150 g including 2 x Li-ION batteries. The charger is inbuilt and allows uninterrupted operation. PCMCIA flash cards or hard drives can be used for stereo recording. BWF format is supported.

We are not American or British We don't belong to a big industry corporation. So we have to work that little bit harder. We started 8 years ago with advanced MPEG integration into Audio Codecs and have dedicated ourselves to making them as user-friendly as possible. Our product know-how covers ISDN and satellite transmission, recording, editing and storage. Add our experience, research capabilities and production expertise and you have the legendary German Quality that keeps us one step ahead. For more information, call our UK distributor Charlie Day at THE UK OFFICE, Tel. +44 (0) 1442 870103, or contact our Headquarters in Germany.

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# SPL Gold Mike

A high-quality mic pre with only one small concession to SPL-ism.

**Dave Foister** is impressed for all the right reasons

**W**HILE IT MAY BE TRUE that every company nowadays has to have its own microphone amplifier, you would think that any exceptions to the rule might include SPL Electronics. Over the years this enterprising German company has taken great delight in offering us off-the-wall signal processing, giving us psychoacoustic enhancement, digital emulation of tape saturation, clever dynamic control and EQ with a bit of fairy dust, what it has never done is attempt to deliver a signal untouched and without effects. Unless, of course, you count the joint venture with Brauner to produce the control electronics for the 5-microphone Atmos surround array, where SPL's ability to deliver high-quality amplification without any

LED that goes out when the valve has reached its correct operating temperature—the output is muted until the light goes out.

The final switch is marked **FLAIR**, and introduces the one departure from straight amplification that we might have expected from SPL. In familiar style, SPL is just vague enough as to what this does to leave us guessing, although it does give some details. A gentle boost is applied to the frequency range from 1.5kHz to 20kHz, with its centre at 6kHz boosted by 2.5dB. Besides this, the Flair circuitry is described as 'a timebase-shifting (phase) device that enhances a sound's harmonic content. The close relation between frequency and amplitude timebase and the source signal's dynamics remains intact.' Make of that what you will; the important points are (a) that it is a subtle and pleasing effect, softly lifting a signal and bringing its detail forward a little, and (b) that if you don't like it you can just switch it off. What you are left with is a clean high-quality signal path.

In fact SPL has gone to considerable lengths to provide such a path. The Gold Mike is as far as possible a dual mono block design, although it stops short of providing two independent power supplies as a true dual-mono power amp would have to do. Instead it has a heavy-duty central power supply with a big toroidal transformer and a star-ground wiring scheme designed to minimise the effects of the demands of one channel modulating the other. It suggests that as a result it is possible to put snare through one channel and vocal through the other, which might indeed stretch the capabilities of some preamps. It does however only have one ground-lift switch on the back to deal with both channels.

Also on the back are the input and output connectors, with the unusual addition of unbalanced outputs on 1/4-inch jacks. There is no separate provision for line or instrument inputs. A nice touch, seen before on SPL gear, but rarely anywhere else, is the double labelling of the connectors, with the printing upside down above the sockets so that it can be read when you're peering over the top of the box.

In use this is a fine preamplifier: quiet, clean and with a smooth, flat, extended frequency response (specs go up to 100kHz and down to 10Hz  $\pm 0.5$ dB). It is important to those who would imagine that SPL's priorities might lie elsewhere, and that the main selling point of the Gold Mike must be the enigmatic Flair circuitry. This

is certainly not the case; as a straightforward preamp it can hold its head up in exalted company, and the Flair adds an extra touch that can be very helpful when a little extra subtle presence is called for. ■



fancy tricks is clearly in evidence.

Yet it is still something of a surprise to encounter the Gold Mike. As I got it out of its box I searched for the features and frills, but apart from one switch the search was fruitless. What we have here is a 2-channel microphone preamplifier pure and simple, with the emphasis on audiophile quality.

Electronically it is a hybrid design, with a transformerless input, a solid-state first stage and a valve second stage. In case the words Vacuum Tube printed on the front panel are not enough to alert you to this, the valves themselves are visible through two windows in the middle of the panel. This is just as well, as apart from this the 2U-high gold panel is fairly featureless, with buttons and indicators that look as though they were chosen to save space. With the one exception referred to earlier, the facilities they provide are standard and comprehensive.

The biggest things on the panel are the gain knobs and corresponding output level meters, the meters again being smaller than they need to be and suffering a little from being set back from the panel, making them hard to see off axis. The gain is continuously adjustable, with its effective range modified by a switched 30dB pad. This is one of a bank of five push-buttons, whose status is confirmed by a row of tiny coloured LEDs spaced puzzlingly some distance above them. Others cover the expected functions of phantom power switching, phase reverse and high-pass filter, rolling off 12dB per octave below 50Hz. Nearby is a warm-up

#### Contact

**SPL, Germany.**  
Tel: +49 2163 983414.  
Fax: +49 2163 983 420.  
**UK: Stirling.**  
Tel: +44 171 624 6000.

## NEW TECHNOLOGIES

### JBL LSR 25P

JBL's LSR25P monitors feature many of the technologies of the LSR Series including metal-domed HF driver and low frequency transducer and are targeted at multimedia, audio-for-video and edit-room monitoring. The monitor claims virtually distortion-free



operation even at highest operating levels with a frequency response from 60Hz to 20kHz  $\pm 2$ dB, a low-frequency extension of 55kHz at -10dB, and a 2.3kHz 4th order Linkwitz-Riley crossover. They retail at under \$400 (US) each.

**JBL, US. Net: [www.jblpro.com](http://www.jblpro.com).**

### More Alesis mics

Alesis has added three condensers to the GT Electronics AM series line. The AM30 and AM40 are both slim front address mics for instruments and guitar amps while the AM11 is a large diaphragm model for vocals. The valve AM40 costs \$799 (US) and its mid-size diaphragm cardioid is interchangeable with hypercardioid and omni units. The AM30 at \$400 (US) is similar, but uses a Class A FET preamp. The AM11 costs \$399 (US) includes a switchable 75Hz roll-off and a pad switch.

**Alesis, US. Net: [www.gtelectronics.com](http://www.gtelectronics.com)**

### SC2.2v4 'dark'

Joemeek has redeveloped the SC2.2 stereo compressor to incorporate 'dark sound'—an audible by-product of floating ground reference for the feedback control for the



optical servo amplifier' according to company. The 'dark mode' can be selected on a switch. Other enhancements include dynamic image control circuitry to cancel out image shifts, and a hard wire bypass.

**Fletcher Electroacoustics, UK.**  
Tel: +44 1626 333948.

### Soundcraft Series Two

Soundcraft's Series Two is a compact live sound console available in 24, 32 and 40 mono channel frame sizes with two fully featured stereo line inputs. Features include phantom power, phase reverse, variable-frequency HPF and 4-band EQ with two sweepable mids. Eight mono auxes are >

October 1999 **Studio Sound**



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D - 47877 Willich

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Fax: + 49 (0) 2154 / 92 06 65

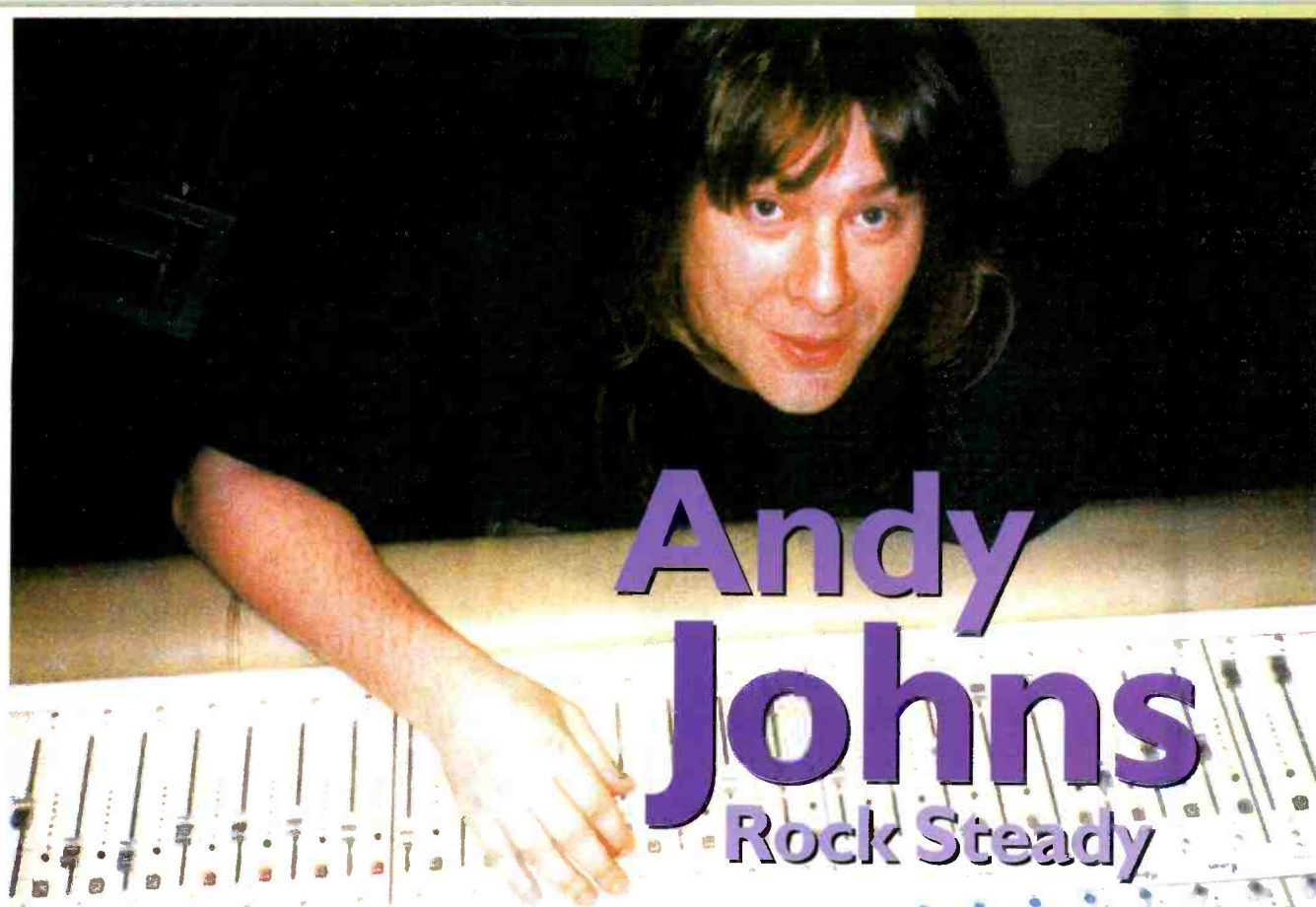
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Claiming a core of classic rock credits, Andy Johns is one of the engineers who shaped the genre.

**Richard Buskin** goes rock climbing

**T**HE "FLAVOUR OF THE MONTH" thing never really affected me until grunge came along.' So says Andy Johns referring to the attitude whereby in-vogue producers are deemed requisite for the creation of a hit record. 'At that point it got really tough, because I guess everyone thought, "Andy Johns? He must be too old to get this". That's ridiculous. I get everything as long as it's good—except for rap music, in which case there is nothing to get—but I know that there were certain acts who I wanted to work with, and who, when they'd look at my resumé and see that it goes back to the sixties, would think, "He's too f-old," and so I wouldn't get the gig. That disappointed me and I'm only becoming reconciled to it now.'

Wouldn't the situation have been the same during the sixties, had a producer shown up with a resumé going back to the early-forties? 'Well, yeah,' comes the reply, 'but at least now we're still dealing with the same bloody art form, whereas The Beatles had absolutely nothing to do with Max Bygraves.'

Point taken. Andy Johns, you see, has always worked in the rock vein, and as for his resumé, well, given the quality and variety of the acts that it lists, you would hardly want to hide or even truncate it in order to give the impression that AJ's career began during the punk era. From his earliest days as an engineer he was working on some landmark projects. A quartet of Led Zeppelin

albums, four more by The Rolling Stones, three by Ten Years After, and others with Blind Faith, Joe Cocker, Humble Pie, Jethro Tull, Free, Traffic, Mott the Hoople, Cat Stevens and Rod Stewart.

'Just because of the work that I've done over the years, people associate me with a certain type of music,' Johns says. 'That's a bit unfair, actually, because I've done all kinds of things. I mean, I'll do anything as long as I like the songs. I don't care what it is, and it doesn't even have to be anything to do with rock 'n' roll.'

'That having been said, when I was very young some of the bands that I worked with would come into the studio with songs that they had already been playing on the road for a while, and so things would be much more finely honed than in the case of a bunch of people who'd come in and say, "Well, what shall we do now?" and make things up as they went along. That can work too, but if somebody's been playing live that will help them to find out what works and what doesn't. That's why bands like Free were good, because they were always touring and they would play the stuff live. I haven't worked on a project for ages where the artist has been out and played live for two months to get ready for the studio. It's never like that.'

Andy Johns worked on Free's *Highway*, *Free Live* and *Heartbreaker* albums between 1970 and 1973, and

by then his career was in full swing. Indeed, what stands out is how quickly things got going for him. Having hung around the studio as a kid while older brother Glyn was already turning pots and pushing faders, Andy started as a tape op at Olympic studios in 1967 and quickly made the transition to engineering on some very big sessions.

'Back then there wasn't any competition,' he explains. 'There were two or three blokes in London who knew what they were doing when it came to loud rock 'n' roll, and that was it. My brother was an independent engineer-producer—the only independent engineer in England—and so if you booked a studio they presented you with an engineer. Of course there were guys who were popular at the various studios and who would be asked for, but the idea of going out on your own and billing people just didn't exist. At the same time, in those days we'd be working on at least three projects at the same time—you'd work with one artist from maybe ten until six, until midnight with another and then start a third session >





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< 'Not only could they take ages to turn up in the studio,' he says, 'but then, when they did, they would spend a lot of time getting a song right if that's what they thought it needed. That was especially true with 'Exile On Main Street'. They would try lots and lots of different ways to do something if it didn't work the first time, and they had no compunction. "Oh, well, let's give it a calypso feel," or, if that didn't work out, "Well, how about reggae?" and although they'd maybe come back to where they'd started they would never give up.'

Even taking into account the talent and material with which they were working, how could the producer and engineer discern between worthwhile effort and a complete waste of time?

'With a band like that there is nothing you can do,' comes the reply. 'They're going to do what they bloody want anyway, and, what with all of the squabbling every now and again, it's just a case of having to wait it out. At a certain point it clicks. Back then the Stones could play very, very badly—you could sit there for two days and they would sound like absolute rubbish; like a bunch of amateurs who'd just learned to play two weeks ago—but it would turn from this garbage into magic. That was worth the wait. When they were good they were f-ing amazing.'

'There also wouldn't be huge panics within the Stones when they were going around in circles, and that taught me something. Beforehand I used to panic a bit, but now, after many years, I pretty much know what's going on. If there's a problem with a song I know what to do to fix it or at least help it to make sense, but back then it was still a new game. Don't forget, even when I first started working with the Stones in 1969 they'd only been doing it for six or seven years, whereas now if I meet people who have been doing it for six or seven years they're just beginners. So, I liked the fact that the Stones didn't panic, as opposed to a lot of other artists back then who would get this look in their eyes if it was-



n't working and just lose it.'

Maybe, yet Johns also points out that, given the calibre of artists with whom he was working with during his formative studio years, the quality of material and standard of musicianship would often be taken for granted.

'A band like Zeppelin, for example, were such fantastic players that you knew the tracks were going to be amazing,' he says. 'Pagie [Jimmy Page] always had pretty good knowledge of instrumentation, so he'd invariably have interesting ideas about the sounds, but then it really was down to his writing and them just playing it. It wasn't that exotic to record. Those records would go quite quickly, and even something like 'Stairway To Heaven' had very little to it. There are the recorder parts at the beginning and the end, but the rest of it is just piano, bass, drums and a couple of guitars.'

'At that time we were always pushing the equipment to its limits. You'd go home, go to bed, and as you were going to sleep you'd be trying to come up with new ideas. As we said, there wasn't any outboard gear, so to come up with a new sound you really had to think quite hard. For instance, take the Zeppelin song 'Black Dog': Those heavy electric guitars are direct, and I was using the mic amp in the board and some compressors to make them distort like that. They were triple-tracked,

and the sound was so amazing and the apparent level on them was so loud that it left room in the mix for the other instruments to be loud. You could have the three guitars turned right down and they'd still be wailing.

'We used to do physical things as well, because it wasn't all at the touch of a button. I would take an M160 mic off its stand and, using it like a reverse-Leslie, swing it by the amp in true Daltrey fashion just as the guitarist was playing some big chords in order to get a Doppler effect. In fact, I remember using that quite effectively with Jethro Tull on one of the tracks on the *Stand Up* album, and I don't know why I have never done that since. It's a pretty good sound.'

Andy Johns' first excursion into record production was on the 1969 album *Ahead Rings Out* by Blodwyn Pig. However, what that hit project confirmed to the 19-year-old newcomer was that he was not yet ready to don the role of producer.

'I didn't really know what I was doing then,' he admits. 'I remember Mick Abrahams was going to do a vocal, and I thought, "Well, I am the producer, I'd better do something." So I went out into the studio and said, "Mick, you know it would be great if you sang really well. Okay? All right, man, just sing really well." That's how I knew I wasn't really equipped to do this.'

Wisely, throughout the next decade Johns stuck to what he knew best, engineering. 'I only worked with one producer for any length of time, and that was Jimmy Miller,' he recalls. 'I learned a lot from him about grooves, and he also had a good imagination for bizarre little sounds and things. There again, I did work with Paul Samwell-Smith, who was like a producer's producer and very clever actually, and also with Guy Stevens, although Guy didn't really do anything. He would just shout and scream and throw things and create a vibe. He understood absolutely nothing about music or sound. Guy would simply influence the course of events >

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Here are the notes we talked about...  
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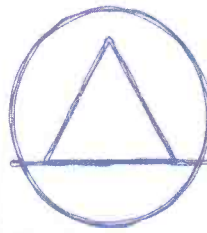
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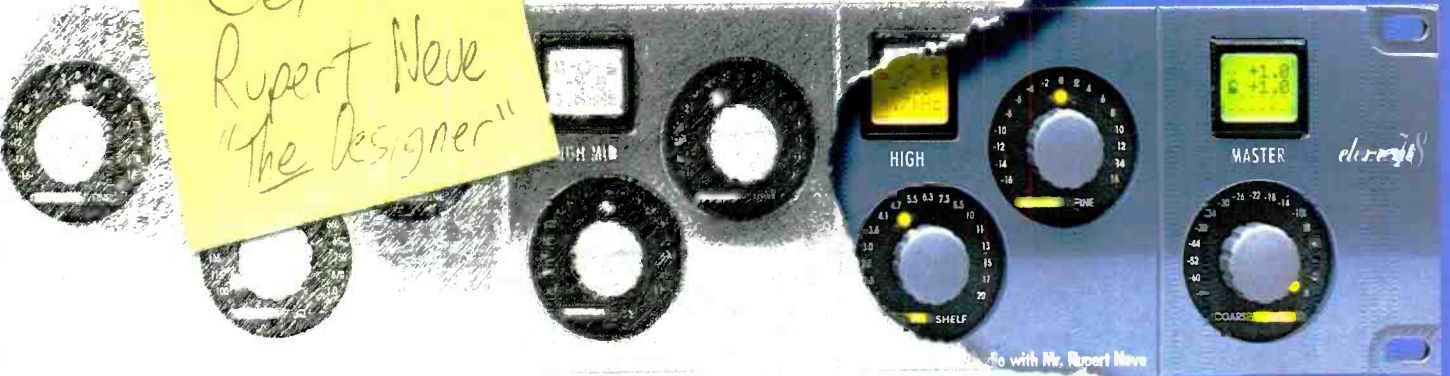
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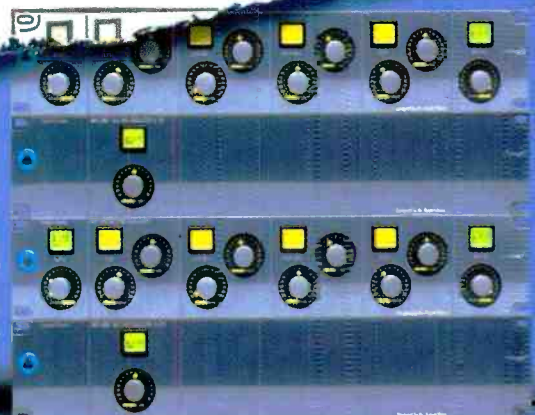
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'It's one thing to have talent, but it also helps if you've got some experience too, especially if you're supposed to be in charge. That way you can spot problems as soon as they come up.'



< more in terms of how people would feel on a certain day as opposed to anything else. Nevertheless, I enjoyed working with him. Guy was a very good friend of mine and we did some very crazy things, but I didn't learn anything from him. There wasn't anything to learn.'

In 1977 Andy Johns produced Television's *Marquee Moon* and *Detective's Swan Song*, but it wasn't until 1980 that he felt ready to assume this role in a full-time capacity.

'I worked for Tom Dowd on records with Rod Stewart and Eddie Money, and I found myself coming up with a fair amount of the arranging ideas,' he recalls. 'I would be very cool about it and not try to make him look bad, talking to him first about what I thought, but of course after a while I'd have got fed up with it had I been dealing with some bloody kid on the same basis, and in the end he did. It got a bit funny and we had a few fights, and then I thought, "What's the bloody point of this?"'

The point was that if Johns had some musical ideas of his own then perhaps

he should garner the production assignments to try them out. Which is what he has since done—while keeping his own fingers on the faders—to the mutual benefit of himself and artists such as Gary Moore, Cinderella, Bon Jovi, Ozzy Osbourne, Van Halen and Joe Satriani.

'It's one thing to have talent, but it also helps if you've got some experience too, especially if you're supposed to be in charge,' he says. 'That way you can spot problems pretty much as soon as they come up. You don't have to go around and around and around to fix them, and also if I make a suggestion and it doesn't work then I can tell right away that it doesn't work. I'm the first person to say, "No, we're not doing that, but thanks for trying." Getting performances out of people is half the game.'

Currently producing a variety of emerging talent—including an Epic Records band named Honky Toast that he likens to 'New York street punk meets Rolling Stones and Led Zepelin'—Andy Johns doesn't necessarily differentiate between new and established artists when trying to gauge the enjoyability factor.

'I have worked with some people who think that they know a lot when they don't, and that has been major artists and people who have just been starting out,' he says. 'That ranges from those who have listened to a lot of music at home and think that they have got it clicked, to those who have sold millions and millions of records and don't know what the hell they're talking about half the time. That can be very frustrating, especially if it's not the kind of person with whom you can have a little shout and a scream for ten minutes and then it's all over. That's really horrible. They're convinced that they know, yet they are doing the wrong thing, or they're trying to tell someone else what they ought to do and, one, they're not explaining it properly because they haven't figured out how to communicate in English and, two, they're telling

them the wrong f-ing thing. That can drive you absolutely around the wall. I mean, how can you just stand there and not say, "No, look, please don't do that"? You can't let something wrong go down.'

'On the other hand, I'm being proved wrong and having my mind changed for the better all of the time. The more I do it, the more I realise how easy it is to be wrong. That's why I'll never say, "Look, you are absolutely and completely out of order here". Usually I try to keep a very open mind, but there are also certain times when something's going on and you know it's completely bloody wrong. For instance, I remember Alex Van Halen once wanting to try something that looks like a good idea on paper: He wanted to run his drums through some speakers and close-mic the speakers to get a sound that he had in his head—he was trying to get a certain snare sound, and Alex describes things a little strangely. He wanted it to be more wooden, but this wasn't the way that it was going to work because I've tried that avenue many, many times just because it seems like it might be useful. However, I wasn't going to tell him that. I said, "All right, Alex, let's give that a try," because the only way he's going to find out is if I set it up and give it my very best shot. After all, my effort shouldn't be just half-arsed, because one thing about this business is that you never know...' ■



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What started life as a contractual 'get out' became one of the most strident images of the sixties. **Tim Goodyer** and **Richard Buskin** cover the bases on the rerelease

**J**F THE BEATLES' Anthology series was intended to explore the wealth of alternative and unreleased material left by the world's most influential pop group, the rerelease of the *Yellow Submarine* album is something different.

For where Anthology further exposed the Beatles' songs, *Yellow Submarine* reckons to bring their legendary technical vision into the next century.

Originally the vinyl complement to Al Brodax' and Heinz Edelmann's animated fantasy, the album presented the six new songs in the film along with some orchestrated material from George Martin. The 1999 release redresses that, presenting all the songs from the film including 'All You Need Is Love', 'Sgt Pepper' and 'Eleanor Rigby'. And it goes further in using

5.1 surround as opposed to the film's mono or vinyl's stereo. It might have been a simple matter of making surround mixes from the original multitrack tapes had the group not pushed recording technology to the limits back in

1968. Inevitably, there was the opportunity to use alternative takes to those originally released, but the charter was to get as close to the original mix as possible—regardless of listening in 5.1 or folded down to stereo. This was the challenge presented to the remix team.

'The prevailing format of the Beatles recording career was 1-inch, 4-track tape except for the first two albums which were 2-track and 8-track towards the end of their career,' recalls Peter Cobbin, the man responsible for primary mixing duties and now seated at the desk at Abbey Road Studio 3—where the remixing as well as original mixing took place. 'So this collection of songs was all 1-inch, 4-track recorded on EMI tape. The tape itself is immaculate to look at with not the slightest sign of any shedding. EMI made a lot of equipment and ancillary things like tape to provide for their numerous studios around the world and the tape that was used through this period was just known as "Emitape". It was good tape then, and obviously, 30 years later it's proved to be good tape now. It sounds fantastic coming off the machine today.'

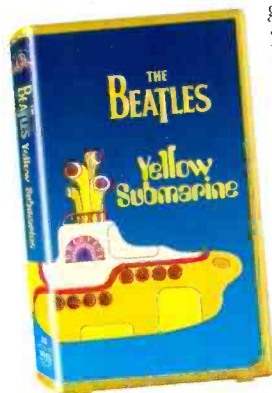
Also involved in the project was Allan Rouse in whose care the Beatles archive is trusted. But it was his thorough knowledge of the original sessions that smoothed the transfers off a Studer A80 Mk.1 via Prism AD124 converters into a Sonic

Solutions Workstation where they were NoNoised and copied with the original tracks onto a Sony 3348HR DASH.

'Being great experimenters, George Martin, Geoff Emerick and the Beatles themselves would often change the speed of a machine during mixing,' Cobbin explains. 'It was most important that we replicated the transfer at exactly the same speed as the masters so the first thing myself and Allan would do was to lay up the original mono master and the original stereo master not only for listening reference later on but to provide the bottom line reference for what we had to sync to. The Studer has a card that enables precise changes of speed and once we had found the speed of the song we used a Q-lock system to event-fire the machine to start at a specific time-code point. This is what Allan is particularly expert in. That would give us our first pass.'

'For a straight 4-track, that was it,' he continues, 'but many of the songs were more adventurous and required an understanding of just how the recordings were made. On songs where they wanted to overdub beyond four tracks they would bounce those four tracks onto one track of a second machine leaving three more tracks to play with. For more adventurous songs they would do that again. And for the really adventurous songs they might have a fourth tape. But they could only mix off the last tape, and we were separating all the tracks from all the tapes.'

The obvious problem with the process is that of ensuring sync between





the later tracks and earlier ones on another tape. 'There was always something to reference to,' Cobbin assures. 'On track one of the first tape might be a bounce of guitar, bass and drums, for instance. The second tape might have the guitar on one track, the bass on one track and the drums on one track, so it's exactly the same information but split. So we could always sync the second tape to the first tape.'

'Once the tracks were in sync on the 3348, there was further work I could do on some of the songs. The Beatles were great in using the space on the multi-tracks very efficiently. And even with the process of reduction—bouncing from one 4-track to another—they would still cram up space. Unlike today where we might give a whole track to a guitar solo, they would have a backing vocal for the choruses, a guitar solo and a piano part later in the song all on one track. So I would split off that one particular track into say three tracks enabling me to have better control in the processing and panning of each part. Then it was time to begin mixing—and that was the fun bit.'

'The general starting point was to ensure the arrangement was exactly the arrangement that the world knows,' he continues. 'There was a lot of listening to the originals, constant referencing to the originals to make sure that what we had were actually the right components because even though we'd found the right take, within that take there might be a number of vocal tracks and when they were mixing, even though there was no automation, they might have chosen different lines from each of those tracks. There might also be a guitar track from top to bottom, but they might only have used it in certain places. So to make that a little bit easier, on spare tracks I would clone only the parts of that track that were used. In a sense I was building up a set of open faders that were playing just the arrangement of the song. That then made it much easier to determine the original processing of the song.' He opens a series of faders on the desk as he speaks as if to illustrate the point.

Having constructed the multitrack tape that George Martin had only imagined, Cobbin faced the prospect of recreating the processing used on both individual tracks and over the entire mix.

'Often they recorded effects to tape—particularly things like vocal delays and things that were unusual,' Cobbin says of the Beatles' working methods. 'They committed wholeheartedly particular sounds to tape, but, as we do today, reverbs and echoes, the use of the chamber or perhaps additional compression were done in the actual mixdown process and I had to replicate them.'

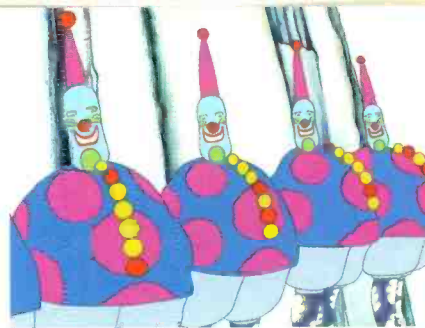
Thankfully, Abbey Road retains a lot of the outboard equipment used during the sixties—valve EMT plates,

Studio 2's echo chamber, and valve KM56 mics that gave the short-echo sound used on much of the Beatles material, Fairchild compressors, valve equalisers... The last thing on anybody's mind was a digital processor.

'There really wasn't much I didn't have,' Cobbin admits, 'even the delays and ADTs I made using tape machine even though I didn't use the BTRs that were originally used. It made it much easier to replicate the precise quality of the original sounds. The sort of processing that they used relied very heavily on tape machines which they could use for standard tape delay, regen, tape echo, ADT, phasing, flanging... so that one tool opened up a whole lot of things. The Fairchild compressors were sometimes used as an effect to create a pumping sound. So beyond the console that they used, there really wasn't much I couldn't do.'

'The degree of difficulty changed from song to song and the more that I did, the more my ears became tuned to what was going on. Some things were a challenge, perhaps because of interaction between processes. If there was an overall compressor on the mix, it might be reducing the level of something rather than it being a volume change in the mix. Things like that took

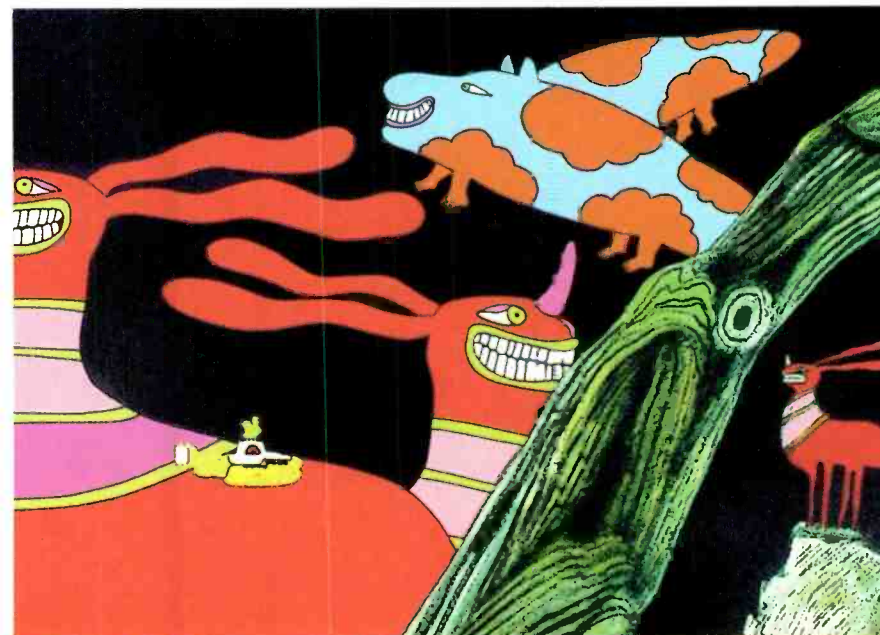
Right: the submarine remixing crew. At the back, left to right: Mirek Stiles, Guy Massey, Allan Rouse. In front, left to right: Peter Cobbin and Paul Hicks



a little time and experimentation. Again there was a lot of listening—the mono mix as well as the stereo mix sometimes gave clues as to why things were done. Nothing actually defeated us, we sorted everything out. And because it's the material it is, we wanted to make sure everything was done properly.'

Cobbin likens the work to archaeology, rediscovering the events of the past. Had the track sheets helped in the chase?

'The track sheets aren't like today where there's a sheet inside the box,' he explains. 'They are hand-written on the back of the tape boxes—bearing in mind that there are only four tracks >







<and there might only be one or two songs, there was always something documenting what was on those tracks. Good records were kept about the Beatles sessions, even by the sixties Abbey Road had been functioning for a 30-odd years so there was a good system in place for detailing what went on there. We had access to those work sheets and there were often notes there about what went on in the mixdown or adding certain EQ. It was good fun; a bit of detective work and there was a lot to learn.'

The transfers from the 4-track masters had taken a couple of weeks and the



tapes were laid up ready for mixing in October 1997. But where it wouldn't have been unusual to have three songs mixed in a 3-hour session at the time *Yellow Submarine* was made, these were just about finished by Christmas 97.

'As any engineer will tell you, it's often a more arduous task to replicate one of your own mixes without the aid of automation than the original mix,' Cobbin concedes, and he was faced with the prospect of turning Beatles classics into 5.1...

'Stereo was by no means the accepted format at that time,' he begins. 'Mono was the accepted format. But even



through much of the sixties stereo was a requirement that had to be met in case it took off one day. It was really only towards the end of the decade it started. The *Abbey Road* album was the only Beatles album specifically mixed for stereo. Often they would do the mono mixes and then it could be days, weeks, months, in fact it was sometimes years later when the stereo mix was done. So often there were differences between the stereo and mono mixes. I came across one—'Only a Northern Song'—that was never mixed for stereo. Instead a duo-phonics or "mock stereo" version was made when it was released on a >

**W**HILE PETER COBBIN took care of remixing the songs at Abbey Road in London, 6,000 miles away, in Santa Monica, California, Ted Hall revamped the dialogue and sound effects at POP Sound, together with the George Martin's score that had featured so heavily on the original *Yellow Submarine* album.

'I had total creative freedom,' says Hall. 'I was working with a 3-track mono 35mm mag soundtrack—comprising separate dialogue, music and effects stems—and so I had some ability to manipulate things. The idea was to make the mix as exciting as mixes are today, but without going and adding new sounds. No breaking out the CDs of effects and adding new explosions or redoing footsteps. Whatever I used was from the original soundtrack.'

Nevertheless, complicating matters was the fact that, on that original soundtrack, certain elements were missing; no hand-claps in a scene where The Beatles can be seen applauding, a lack of sound in another where a Blue Meanie lets out a burp. Hall and MGM/UA's vice president of feature postproduction, Bruce Markoe, therefore re-recorded the effects themselves.

'Bruce wanted a modern-sounding 5.1 digital 6-track mix,' says Hall, 'but that was pretty difficult coming from a mono soundtrack that was fairly noisy, hissy, clicky and poppy. Anyway, first we ran it through Sonic Solutions, and that's a pretty nifty system. It takes a sample of hiss, reinverts it back in and washes it away. That was one problem taken care of, but then the other problem was the missing stuff that needed to be filled in. I don't know if things

were missing on that original soundtrack because of a time constraint, but you'd have a shot where you'd hear footsteps and then the next shot you wouldn't hear any. So the way I approached it was that first I created a sound library of about 300 effects that had been used in the movie. The editing back then was very linear—there wasn't much overlapping or compositing—and so I was able to cut each effect which was then reused.'

Thinking in more spatial terms thanks to the modern-day benefits of in-house surround setups, Ted Hall also created new effects and did plenty of looping and doubling in order to produce bigger sounds that he could pan around the theatre. A case in point is the Flying Glove, which terrorises the much-maligned inhabitants of Pepperland, as well as the missiles fired by those unrelenting Blue Meanies.

'I cut everything on a non-linear 24-channel system,' Hall continues, 'and I'd take individual sounds and put them on different tracks so that I could do pans and different EQs and have them start overlapping. You see, the original track sounded really thin. It was old and it had no body to it, so I put more EQ on everything, I processed sounds and in certain instances I dropped them down an octave to give more harmonic depth. This applied to the effects mostly, as well as the voices in some places. The dialogue track was the dialogue track—that didn't need much EQ—so the primary stuff was the effects.'

'When it came to assembling everything Peter Cobbin sent the mixes from England over here, but the problem was that they didn't run in sync with the

picture. My next job was to therefore varispeed them digitally so that they fit, and I also made a couple of music edits on some of the songs that were on the original soundtrack. Some were actually varispeeded quite a lot; "Only A Northern Song" is a lot slower than the version that is on the album. They must have purposely done that when they were mixing it, just to make it sound heavier.'

When it came to George Martin's score, Hall took every opportunity to replace the mono soundtrack recording with the stereo album version and spread that into 5.1.

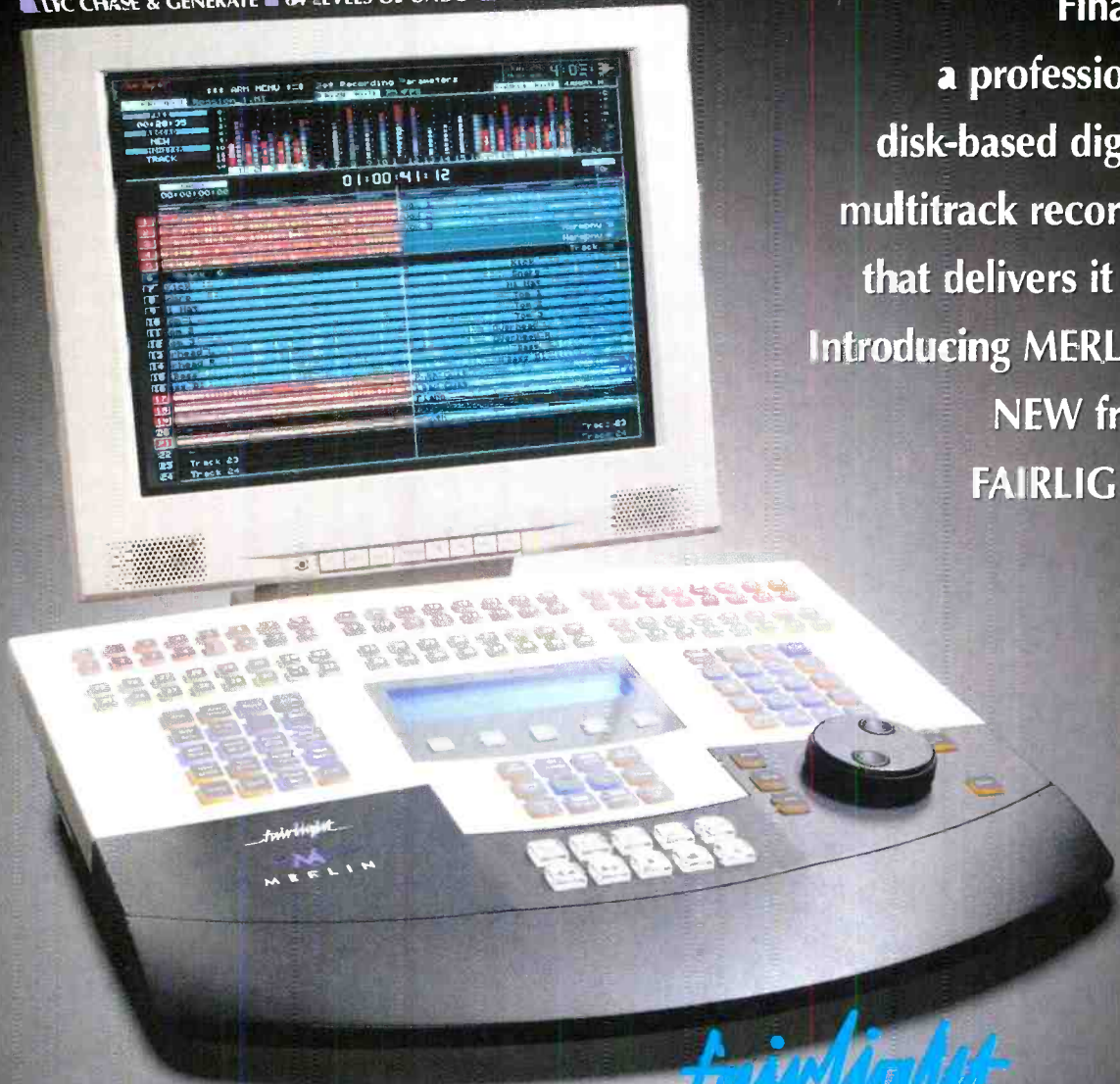
'That [stereo] score was not from the original scoring date,' he explains. 'George Martin rerecorded it several months later, so the arrangements were slightly different, but it did sound good and so, being that the only element I had was the funky mono music stem, I tried to use the stereo as much as possible. As a result there's a constant change-over—eight bars in stereo, eight bars in mono—and I had to edit that together and make it seamless. It was hard, but absolutely worth it.'

'Still, for me the main challenge was to avoid people accusing us of "colourising" things, and so I never strayed too far from the original concept. That meant keeping the original balances when I was mixing the music into the soundtrack, and so, although some songs dip down into the dialogue and then back up, in general I wanted the film to be the way it sounded back in 1968. In fact, at first I'd thought that the little mono soundtrack was pretty cool, but now I'm happy with what we've done.' **RB** ■



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**G**REG KJUMBLE, who was the overall in-house producer and restoration supervisor for *Yellow Submarine* at POP's sister facility, POP Video, confirms that the process of restoring the visuals was long and tedious. In the first place he was presented with the original negative for all five reels of the film, yet in terms of the interpositive there was only protection for reels three, four and five.

'All of the original release prints were made off the original negative, so you can imagine how beat up those negatives were,' he says. 'We therefore had new timed interpositives made at a laboratory, but there were still a lot of things to fix from scene to scene. When you're scanning you're making an electronic version 2,048 pixels wide and 1,556 high, and you get a separate data word for each of the red, green and blue records. That means three pieces of data for each pixel, which comes to about 13Mb of uncompressed hard-disk space per frame. Well, we had to scan over 61,000 frames into the computer for those first two reels, and, being that we could only do three frames a minute,

that took about 340 hours. Remember, this was a year and a half ago. The new scanners are faster.

'Once we had scanned everything in we found all sorts of things. Any physical damage in the original negative was passed to the interpositive, although, as you got further into the reel where it was protected, there was less damage. Still, there were tears to repair, crooked splices to fix and the colours had faded at different rates over the years. Reds had become brown, whites had yellowed, and in the opening titles where there are white letterings on a black background the black had become cyan. Now you can bend and shape colour the way you can bend sound on a graphic equaliser, so we digitally corrected the colour while other problems—such as where there were frames that someone had forgotten to colour, or where there was dirt or a scratch—were painted by hand. Then there was camera steadiness and flicker to fix. I went through everything frame by frame, and then I'd write out instructions: "On frame 4275 there's a blob in the left-hand corner", and so on.

'I had two artists working two shifts with Kodak cineon software, which is a fantastic package, and we would correct the steadiness and flicker and then turn the results over to a night artist who did the painting. We were doing 2,500 frames a week, and what with the prep scan, the scanning itself, the instructions and so on, creating the new print took us about six months to complete.

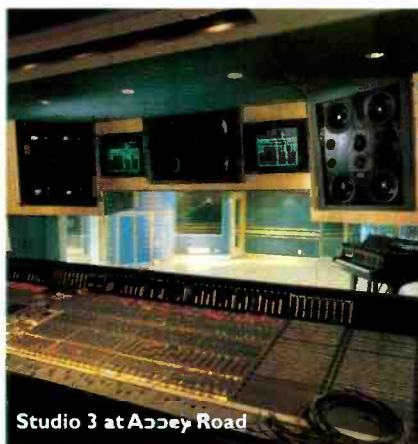
'As a film preservationist I would have liked to restore the entire picture, but it was a question of dollars, and, since they had protection [the interpositives] for the final three reels, they decided not to do that. I just made sure that there was consistent colour contrast from cut to cut. As a result, if you have a very astute eye you may notice that the first two reels have slightly more vibrancy to them. Also, when we did the high-definition transfer for DVD, the picture was so sharp that you could see every fingerprint on the cells. The cells are static, they have a negative charge and they attract dust. Still, at least the picture's now safe. We've restored the first two reels and so it should be good for another 40 to 50 years...' **RB** ■

< stereo album later.

'From a technical point of view, when we embarked on the 5.1 mixes it was very much a new thing. Being the material that this is, I wasn't interested in doing something that sounds great for ten minutes, but you live to regret. But it is amazing how, used in the right proportions, it makes a great sense of space.

There were some songs that lent themselves very easily to using them in an adventurous way—and it is a film soundtrack, remember—but the songs have to sound strong.

'First and foremost it was about creating a very strong front soundfield and then finding ways of using the rear



Studio 3 at Abbey Road

speakers to effect. I found I was not just using them as a pair in isolation, but using them to extend the front soundfield—like if George's guitar had an ADT, I could use that twice with a slightly different delay coming from the side. It's the sort of thing that when you listen to it, you could be forgiven that there's nothing coming from the rears, but if you turn them off it sounds dramatically different. But the songs are different and some lend themselves to naturally being more adventurous. 'Yellow Submarine', the title song itself, has all sorts of sound effects that can be used to make it more 3-dimensional than a straight 4-track that's rocking from the front.' >



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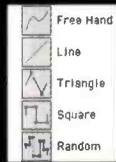
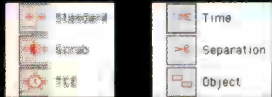
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Rulers

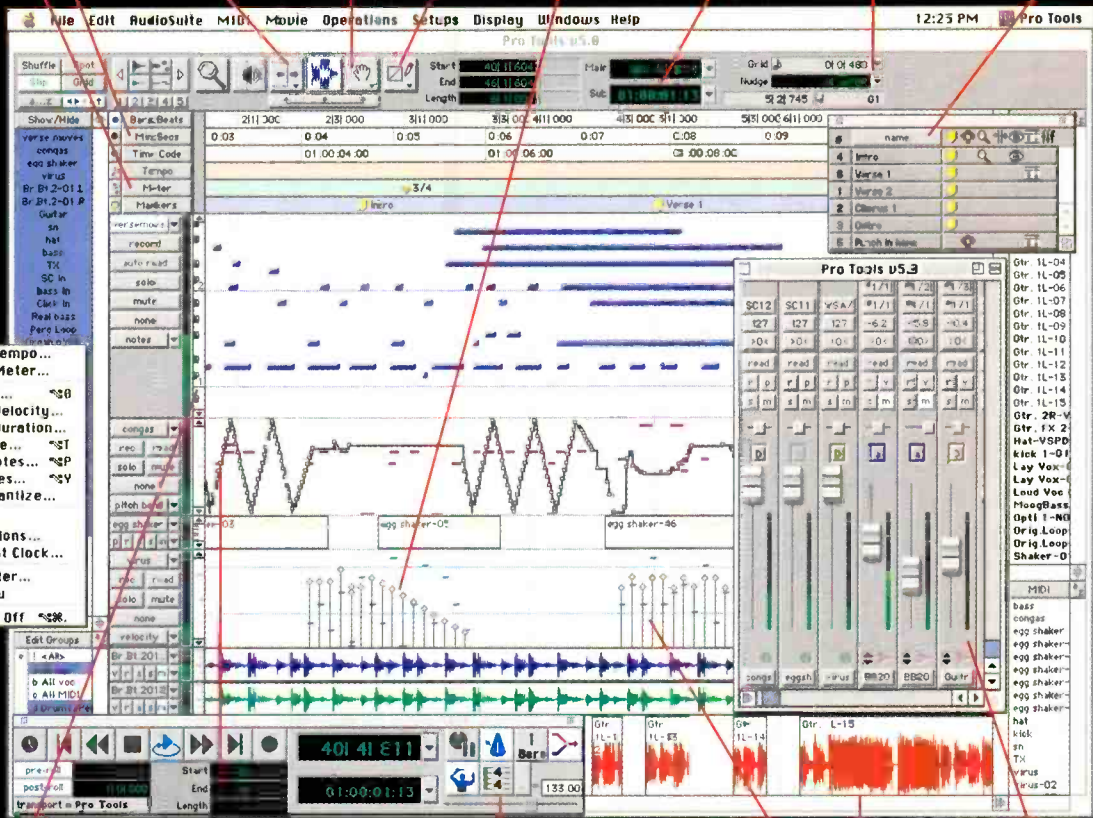
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Conductor

Velocity Stalk  
View

Main &  
Sub-Counter  
(always visible)

Separate Grid &  
Nudge with Pull-  
Down Menus

Time-Ordered  
Visual Markers



- Change Tempo...
- Change Meter...
- Quantize... %30
- Change Velocity...
- Change Duration...
- Transpose... %T
- Select Notes... %SP
- Split Notes... %SY
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- Click
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# Big Trucks in the Arctic

Soundcraft's Broadway digitally controlled analogue desk is earning its keep in-house and out about with a broadcaster in the Arctic circle.

**Zenon Schoepe** reports on a convenient solution

**A**MONG the world's broadcasters, Norway's NRK enjoys a peculiarly high profile. It is one of those three-lettered abbreviations that is somehow remembered by people who may, for example, struggle with the array of equivalents that make up the complicated German broadcasting system. NRK's predicament throws up the traditional Scandinavian conditions of a large, long and spreading land mass occupied by a population of a mere 4.5m with all the usual ensuing broadcasting problems that are associated with it. Predictably the headquarters of all activities is in the capital Oslo, but it is supported by regional centres located in Bergen, Trondheim and Tromsø each progressively further north; although Tromsø, which is positioned well into the Arctic Circle, is by far and away the most isolated. We are talking about seri-

ous midnight sun and northern lights up here and a purity of air that positively supercharges a city dweller.

Each of the regional centres supplies local news to the national pool, but the Trondheim base is something of a radio centre in contributing two of the three radio channels which take in classics, news and youth programming. National coverage is supplemented by regionalised assistance that reminds yet again of the geographical distances involved and the sparsity of population in certain areas.

NRK has two television channels, the second was launched in response to the onset of commercial television the biggest of which is TV2 followed by TV Norway (owned in part by TV2) and

TV3 which is transmitted from London and therefore gets around the national dicta that states that commercials can only be shown between programmes and is thus free to have commercial breaks wherever it chooses.

However, on this occasion it is the Tromsø centre—around 100 staff are employed here compared to the 2500 in Oslo—that is of particular interest. It may be described as something of a little brother within NRK, but its outside broadcast truck houses one of the first Soundcraft Broadway digitally controlled analogue desks anywhere. Calling it an OB truck does not, however, do it justice as the new MANN vehicle also serves as the centre's audio control room when docked and >





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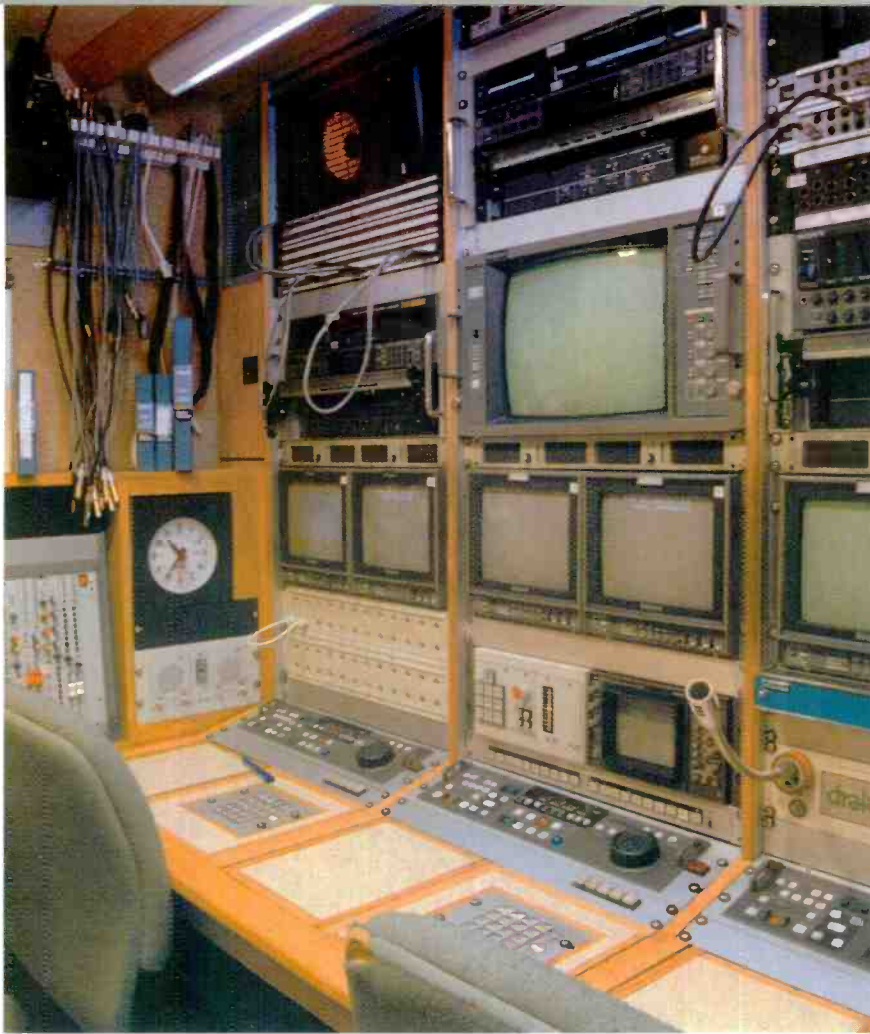
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< connected up to a bay alongside the regional centre's other OB vehicles.

The level of equipment is largely similar in the regional centres. Trondheim and Bergen have older and smaller trucks equipped with Soundcraft TS24s and the former also has a control room in the building, something that has been sacrificed in favour of flexibility at Tromsø which uses its Broadway truck for the large amounts of OB work demanded of the audio department working in an isolated part of the country that needs to be able to travel and give coverage and backup for the whole region it serves.

'We had a control room for audio here in the building before,' explains Tromsø head of sound Irvant Drier, 'but we have always used vans for picture. We used to have a 24-channel SEEM mixer in that control room and what we have done is trade the control room space in the building, which has been converted into a studio for our locally originated television programmes, in exchange for a fairly big van with the Broadway in it. The point is that our old control room was not that big, whereas most of the big productions we do tend to be outside broadcasts, so it has worked out very well for us.'

Indeed the truck's control room is much larger and more comfortable than the permanent room it replaced and is positively capacious in comparison to the VTR and vision control vans. Designed in-house, it is well equipped and has been optimised to make the whole business of unplugging and hitting the road as painless as possible.

Only Oslo has a larger truck in NRK; although it is a good deal older and sports an AMS Calrec assignable desk. The capital's headquarters also houses a permanently fixed AMS Neve Capricorn desk.

At its launch a good four years ago, Soundcraft's flagship Broadway was pitched in the first instance in attitude and name at the installed theatre sound market. However, it was clear to many

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who investigated that the board had obvious and immediate applications to OB use given the compact nature of the worksurface and the flexibility of its routing and I-O arrangement.

For example, a 40-channel audio rack can be controlled conveniently from a 20-fader worksurface operating on two layers with a total of eight layers available and accessed by a single button-push. It will stretch to 160 audio channels and the worksurface can be expanded or contracted according to requirement, space or cash. A sophisticated Cue system permits desk snapshots and configurations to be recalled. Three separate PFL buses enable three different operators to balance different chunks of a production on separate, although integrated, fader sections. In the context of live sound this would allow FOH and monitors to be balanced on the same system by allocating the desk's 32 outputs (Soundcraft was first to call these 'grauxes' because it chose not to make a distinction between groups and auxes) and five main outputs intelligently.

The arrangement represents something of an ideal for multiband festival configurations, but the suitability to comparable broadcast situations is clear. But then the requirements of theatre sound and broadcast overlap heavily on the immediacy of the tasks in hand and the need for bombproof reliability.

NRK was quick to spot this potential and commissioned the truck more than two years ago and has housed the electronics racks towards the rear of the van with the worksurface arranged comfortably widthways.

NRK had got in quite early with the AMS Calrec assignable and that has been used inside and outside and it's very convenient,' says Drier. 'We started planning for our own truck perhaps four years ago and there was nothing else around like the Broadway then and I don't know of any other assignable digitally controlled analogue desk that we would consider now that is as cost-



effective. It's still out on its own in terms of price and performance.'

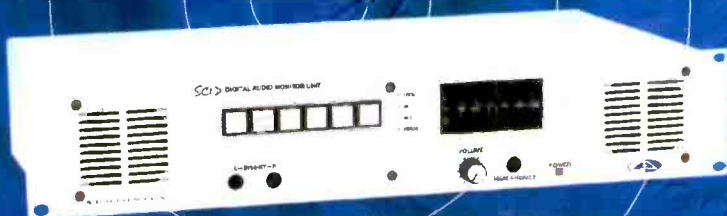
The Tromso 60-input console is used for local programme generation and everything else from purely providing a stereo feed for rehearsals or single mic news. Its communications panel has been modified to Tromso's taste with source selectors and additional metering options that allow the station output, which is always processed through an Aphex Compellor and Dominator, to be metered before and after processing. Talkback facilities have also been expanded along with surround monitoring options and switching. The desk is always run split for 2-man operation with the assignability allowing each operator to have his own physical space and hardware control.

As one of the first customers for the Broadway, Drier states that while the desk has not been without early problems there have been no critical breakdowns and adds that they have been pleased >



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# Walking the Walk

While the Mac comes first for its fellow US MIDI + Audio companies, Twelve Tone Systems has always championed the PC. The company's product range, centred around its Cakewalk line, continues to grow in sophistication and diversity. **Simon Trask** tunes in

**L**IKE THE OTHER COMPANIES in this series, Twelve Tone Systems began life in the eighties producing MIDI-only sequencing software. Unlike them, however, its software roots are not in the Atari ST or the Apple Mac but the PC—or the IBM-compatible PC as it was more commonly known in those days. The US company, which like MOTU is located in Cambridge, Massachusetts (also home to the famous Massachusetts Institute of Technology), debuted in 1987 with Cakewalk 1.0, a 256-track MIDI sequencer written by programmer and company founder (and nowadays its President and CEO) Greg Hendershott. Although it offered drop-down menus and pop-up dialogue boxes like the graphical editing environments of the ST and the Mac, the program's black-and-white screen layouts were still essentially rather basic DOS-style alphanumeric affairs. Designed around three main screens—track, event, and measure—Cakewalk combined accessibility with flexible, in-depth regional and event editing and filtering capabilities. At the time it was considered to offer a lot of sequencing power for its relatively modest \$150 asking price. This combination of power and flexibility with affordability has remained a characteristic of the company's product range down through the years.

Cakewalk has remained the core product for Twelve Tone Systems to this day, its equivalent of Opcode's Vision or MOTU's Performer. In the mid nineties the company even started calling itself Cakewalk rather than Twelve Tone Systems (understandably, you might say); nowadays, on its website, its packaging and its advertising, the only mention you're likely to see of the original name is in small print, something along the lines of 'Cakewalk is a registered trademark of Twelve Tone Systems.'

In 1990 Cakewalk reached version 3.0, complete with 'piano-roll' editing, enhanced step recording, MIDI song-

file support, and a generic SysEx librarian, and also spawned a Professional version that added SMPTE sync and multiple MIDI Out support (with appropriate hardware) and the Cakewalk Application Language, a programming language for creating MIDI data processing routines that can be integrated into Cakewalk as keyboard macros. Showing an early propensity to offer supporting material, the company also introduced the Romeo Music Cakewalk Series, featuring three disks of MIDI songfiles in a variety of musical styles for \$25.95.


With the advent of Microsoft's Windows OS, Twelve Tone Systems introduced Cakewalk and Cakewalk Professional for Windows, and the program began to take on a much more graphical orientation. By version 3.0 in 1995 the Windows software had a graphical on-screen mixer complete with 96 assignable faders and support for the Mackie OTTO 1604 MIDI automation package, a drum and percussion editing grid, built-in score-writing with lyrics capability, groove quantising, MIDI Machine Control, and support for digital audio wave file playback on Windows-compatible soundcards. By this time the price tag had risen to \$349, but in a move that has become characteristic of the company it also released Cakewalk Home Studio, a still well-specified version that removed the pro-level features and cost only \$129.

The inevitable move into full-blown MIDI + Audio functionality followed. Cakewalk Pro Audio offered unlimited tracks of digital audio, graphic and parametric EQ, Audio-to-MIDI groove quantising, and support for PC-compatible Digidesign and Soundscape hardware, in addition to Cakewalk's familiar 256 MIDI tracks and associated MIDI functionality. The program came in Windows 3.1 and native Windows 95 versions on a single CD-ROM for a suggested retail price of \$399, with a Deluxe

Edition at \$479 including a Musician's Toolbox CD-ROM of audio and MIDI files, tools and tutorials. At the same time, Cakewalk Professional, more modestly priced at \$249, provided an entry-level introduction to MIDI + Audio with four tracks of digital audio.

Cakewalk Pro Audio 6.0 shipped in May 1997, with a Deluxe version following in July—this time including Musician's Toolbox II, a two-CD-ROM set offering over a gigabyte of data including audio loops and MIDI files covering a range of musical styles from funk to classical. With version 6.0 Cakewalk introduced support for Microsoft DirectX audio plug-ins along with its own line of CFX DirectX plug-ins which provided core effects in the form of reverb, chorus, echo-delay and flanger. The company was also quick to pick up on the third-party angle, developing sales partnerships with other DirectX plug-in manufacturers such as QSound (QTools/AX 3D audio processing tools), Tracer Technologies (DART DeClick), Waves (Native Power Pack) and Arboretum (Hyperprism). In the case of QSound, Cakewalk Music Software, as the company had become known by then, became the exclusive international distributor for the QTools plug-ins.

Another significant development with v6.0 was the introduction of StudioWare functionality, which enabled integration and automation of any MIDI-controllable studio equipment from within the program using StudioWare panels, that is virtual control >




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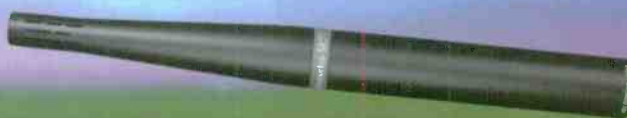
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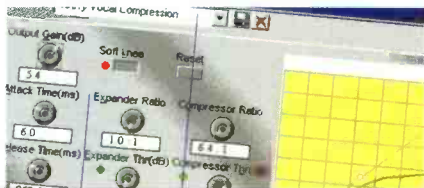


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< companies to support the Yamaha DSP Factory's DS2416 card, for 16 channels of integrated digital recording and mixing and combined use of Cakewalk effects plug-ins and the 2416's own onboard effects. In advance of the second-quarter shipping, Cakewalk also announced the Cakewalk Purchase Protection program, which guaranteed free 7.0 upgrades to anyone purchasing version 6 software.



Adopting the same approach it had with Metro, in April Cakewalk acquired the Macintosh-based professional notation software package Overture, which had previously been an

up Who bassist John Entwistle playing at NAMM with percussionist Pedro Vargas at the Media Lab, used a combination of conferencing technology and Cakewalk's software, and was also broadcast live over the Internet in RealAudio format.

Opcode product. Only in this case the company went on to ship the program in both Mac and Windows versions in Summer 1998. Commented Cakewalk's Overture product manager, Jim Rippie: 'Our goal is to provide all composers with professional music notation software that's as easy to use as a word processor. The original Overture for the Macintosh solved the ease-of-use objective. The new Overture for Windows and Mac OS makes this ease of use available to nearly everyone with a personal computer.' Later in the year, the company also released a cut-down version of Overture, called Score Writer, for just \$69—in this case just for Windows 95/98. Today, Scorewriter is one of two programs available for download sale at Cakewalk's website, the other being Cakewalk Express 8, which at a mere \$19 is the company's cheapest program yet, but still provides two tracks of digital audio plus MIDI sequencing and realtime audio and MIDI effects.

In July of last year Cakewalk announced a new addition to the Cakewalk software family, in the form of Cakewalk Guitar Studio. The \$149 program provided eight tracks of digital audio and the usual 256 tracks of MIDI, plus realtime effects support, a familiar cassette multitracker-type display, a Virtual Fretboard for step-time entry of chords and melodies, an on-screen Roland GR-30 guitar synth control

plug-ins and other software via the online eStore at its website ([www.cakewalk.com](http://www.cakewalk.com)). For instance, as at writing, Cakewalk 8.0 owners and potential upgraders can purchase Antares' Auto-Tune plug-in and Seer Systems' SurReal software at respectively \$70 and \$30

panel, a staff notation display together with the ability to create lead sheets complete with guitar chord grids and lyrics, an on-screen guitar tuner, and a Song Wizard for creation of backing tracks from a library of preset material.

Cakewalk also formed the Guitar Technology Alliance with Fender and Roland in support of the new software, producing a combined package consisting of the Guitar Studio software. Roland GR-30 Guitar Synthesiser and Fender Roland-Ready Strat (a classic Stratocaster with a built-in Roland pickup).

In addition, the company released its second collection of 32-bit real-time effects plug-ins providing amplifier and analogue tape simulations. The recently introduced Guitar Studio 2, at a new \$249 price tag, doubles the number of digital audio tracks to 16 and quadruples the number of simultaneous effects to 16, and introduces the AmpSim Lite effect plug-in—a customised version of the Cakewalk Audio FX 2 package—and the Session Drummer MIDI plug-in, which allows users to arrange and play back drum tracks from preset drum patterns. In addition, a Tablature display has been added, and improvements made to the Fretboard and chromatic tuner features.

The beginning of this year saw the introduction of the Cakewalk 8.0 range, with prices staying the same despite



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some significant developments. Perhaps most notably, the Pro Audio version introduced 24-bit/96kHz audio support.

Another important development was digital video support, with the ability to import AVI, QuickTime and MPEG video, plus sample-accurate audio and video synchronisation, scrubbing of both audio and video tracks in sync, looping of video along with audio and MIDI tracks, and the ability to export the finished project as a new AVI file. Commented Cakewalk product manager Morton Saether: 'With the advent of affordable digital video hardware and software, many of our users are making the leap to desktop video production for a wide range of multimedia and Internet-based projects. Professional 8 now provides users with an affordable, efficient way to create and edit soundtracks for these projects.'

Also on the audio front, Pro Audio 8.0 introduced 'vector-based' audio mixing, which allowed users to mix graphically by drawing volume and pan envelopes onto audio waveforms, and increased the maximum number of simultaneous real-time audio effects from four to eight. Digital video, graphical mixing and real-time effects support were also included in the less expensive versions (with up to four simultaneous effects in Home Studio).

Cakewalk also released the third, and perhaps most ambitious, of its Audio FX 32-bit DirectX real-time effects. SoundStage lets users create reverb effects by designing room environments, with up to seven walls plus ceiling and floor, and placing virtual microphones and other sound sources anywhere in the environment using a 3D graphical interface. Characteristics such as absorption and high-frequency damping can also be set. Its sophistication perhaps explains why it costs half the price of the full Pro Audio 8 package, on current UK prices.

Another Cakewalk audio development in the first half of this year was the introduction of StudioMix, an \$899 multitrack digital audio recording system resulting from a joint venture between Cakewalk and Peavey. The product integrates Cakewalk's new StudioMix software, that supports up to eight simultaneous digital audio tracks, DirectX realtime audio effects, and SMPTE-MTC tape synchronisation, with the StudioMix hardware control surface from Peavey, which features nine motorised faders, 14 'soft' buttons and 18 rotary controls.

Along with the aforementioned Guitar Studio 2, recent developments include the release of Metro 5.0, with among other new features support for ASIO-compatible audio cards, automated real-time effects processing, up to eight stereo auxiliary effects buses, audio scrubbing, and improved drag-and-drop editing of audio. In addition,

the company has become the exclusive US distributor for the popular GrooveMaker 'DJ mixing' loop-based music creation software from Italian company IK Multimedia Production, available for both Mac and PC. GrooveMaker allows users to build tracks in a variety of dance music styles by mixing preset and user-imported (WAV and AIFF) samples and loops and playing along using the Virtual Synth Arpeggiator. Finished GrooveMaker projects can be imported into the Cakewalk range and Metro. GrooveMaker at \$59 comes with a single sample CD-ROM, while a MAX version at \$99 has two additional sample discs.

Erik Tarkiainen, Cakewalk's director of product management, commented: 'GrooveMaker is a dynamic addition to Cakewalk's set of media creation tools. Now users have an easy way to create different styles of loop-based electronic music instantly.'

Continuing to push the technology envelope, Cakewalk developed and is the driving force behind AudioX, an open driver specification for the Windows platform introduced towards the end of last year, which has garnered support from many leading audio software and hardware companies. AudioX is designed to enable standardised software-hardware communication support for the more sophisticated feature sets of today's digital audio cards with their built-in mixing, effects and synchronisation capabilities.

More recently, still tuned into Internet developments, the company has announced support for Microsoft's Win-

dows Media Technologies 4.0 in Cakewalk Pro Audio, Professional, and Home Studio, with support in other programs to follow. Users will be able to export their projects directly as Windows Media files. Chris Albano, executive vice president of Cakewalk, explains: 'Our users recognise that the Internet is the future of music distribution and have been looking for a high quality solution with content protection. We feel that Windows Media Technologies 4.0 is an ideal tool for Internet delivery of music and that it will easily satisfy our users' expectations.' The company also plans to create and distribute a stand-alone Windows Media Technologies 4.0 player that will incorporate Windows Media Rights Management capabilities, and identifies the player as a key component of what it calls its Internet content strategy.

From a one-man company with a single product and a shoestring budget, Cakewalk has grown into a world-wide operation with more than 50 employees, a multimillion dollar turnover and a strong and diverse range of market-leading products which are used by more than 750,000 professional and home users. The company, which is privately funded, has always been in profit, and is steadily growing, has been able to cater to professionals at the top end of its product range while also successfully reaching beyond the purely professional market into the broader commercial arena. A company which has indeed been able to have its cake and eat it... ■

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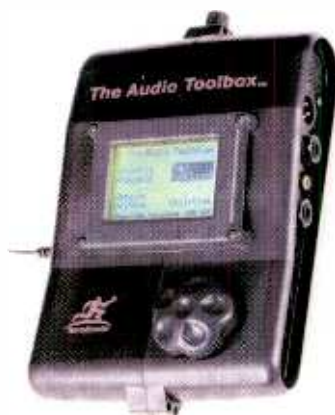
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# ATM

## in on the

# Airwaves

For a long time a buzz word, ATM's influence is finally being realised. **Wolfgang Huber** of Lawo looks at the distribution and transfer of audio signals and other services in the broadcast sector with reference to Lawo's DSN

**O**n the 14th August SAT.1 prime TV sports programme 'ran' went on the air in Berlin with a new complete Lawo installation using ATM to transfer linear audio and control signals in real-time as part of Lawo's Distributed Studio Network (DSN).

The first of two mc<sup>2</sup> mixing consoles and one mc<sup>2</sup> master control room have been installed. The control room Regie 1 includes a desk with 48 faders, 72 DSP channels and a new-look Channel Display with extended desk functions.

The audio control room is a combination of ATM switch (ATM Switch 8265-17 by IBM) and an mc<sup>2</sup>. GUI (Graphic User Interface) and control panels are available in parallel for matrix control and the areas of picture, light, camera, OFF, interpreter and decentralised VTR and 30 Lawo Interface Units are used for the integration of peripherals.

The master control room is fitted with four operating consoles and manages its tasks via two ATM-Switches with fully redundant control systems.

The distribution and transfer of diverse information, such as audio, video and control within, and also between, broadcast houses is gaining credibility as a concept. The networking and shared use of peripherals and rooms save on costs, while fast access to archives and buffer memories increases productivity. The rapid transfer of radio programme elements between radio houses has become a matter of course, it saves money and is

essential for the live coverage of events.

For the above mentioned applications various synchronous and asynchronous procedures are used. Centralised or decentralised digital distributing systems—mostly time-slot matrices—are installed in the radio house. No predominant standards exist aside from particular formats such as analogue, AES-EBU and MAD1. The presently applied network topologies, like Ethernet, Token Ring and Novelle, do not have sufficient bandwidth for the large data streams generated in a radio house and therefore cannot fulfill the essential real-time requirements. The connection points to the WAN provider require expensive format converters. Any future standard must therefore at least meet guaranteed real-time performance for the audio data with its control information; offer compatibility through interfaces with currently used network topologies and formats that can be upgraded; have problem-free and world-wide clock supply and synchronisation; extendable cabling to a central place, such as the master control room; have LAN and WAN qualities; offer high reliability and possible redundancy; and support AES-EBU format digital audio. In addition the system must be open ended enough to allow further hardware and software development and have low running costs. These demands can be met through ATM.

The basic idea of the Lawo Distributed Studio Network is to integrate every ser-

vice and application in the studio and broadcast sector on one platform. ATM is already used successfully as a backbone in networks and as the transfer medium in WANs. In the mid-eighties, the International Telecommunication Union (ITU) and other committees laid the theoretical foundations for the Asynchronous Transfer Mode (ATM). At that time, the required technologies for further distribution, especially in the audio sector, were not yet available.

Thus, in contrast to conventional computer networks, its application was not practicable, predominantly because of the costs. During the past few years ATM use has boomed and the reason is because of its distinguishing features compared to other networks.

ATM is based on point-to-point connections, it permits the assignment of defined bandwidths with clearly defined qualities, to each participant for every single connection. And now fast transfer modes and switches are appearing on the market at a good price.

These qualities have made ATM a leading choice for applications—wideband ISDN in the telecommunications sector and the backbone for computer networks and Wide Area Networks (for example the Internet). ATM connections are preferred because they can offer diverse services simultaneously via one line and this is made possible by decoding the input into data of different 'transfer qualities' and diverse 'connection modes'. With the definition of the Quality-Of-Service parameters (QOS) of ATM, the functionality of parallel data transfer has been an integral part of the specification from the beginning.

Modern ATM networks support up to five different and clearly separated transfer qualities. The lowest category applies to conventional computer >



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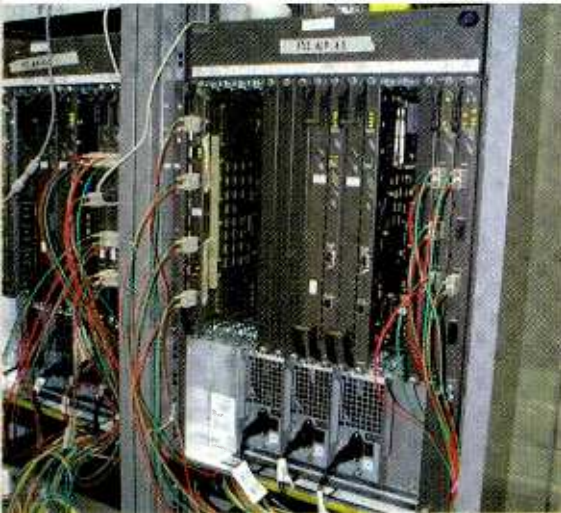
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◀ data transfer without defined delay times and bandwidths. The variety also includes the transfer of real-time data with defined bandwidths and delays.

A fundamental factor for the rapid distribution of ATM has been the availability of interfaces to existing LAN topologies meaning that these could still be used and managed.

The DSN now uses ATM for real-time transfer of linear digital audio signals. This means not only the transfer of audio signals in the matrix, but also the integrated signal processing and the processing and distribution related control. Interfaces are provided by special ATM-MADI boards as well as other associated interfaces and the DSP channel boards are also completely integrated into the ATM network. The structure of ATM offers the possibility to transfer other services like digital video or computer network data via the same network.



As the development of semiconductor technology has been so rapid, there are presently semiconductor devices available that predestine ATM for its application in the broadcast sector. Reliable and problem-free performance is already possible for audio, control and all services with lower requirements and priorities.

Our DSN has been developed as a common platform for data transfer via LANs and WANs, with definite classification of bandwidth and priority of the transferred services, integrated processing (DSP) of audio data and the distribution of audio data and assignment control of the sources and the targets. It also converts ATM into common broadcast formats.

This has been achieved by the DSN being based on a core ATM Switch in which audio components are integrated. The ATM 'cloud' includes interlinked ATM switches.

Integrated in these components are the power supply and the actual switch-board. Several Lawo-developed signal processing boards (DSP) and ATM-MADI interfaces are plugged directly into the

**Lawo**  
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backplane. With this basic unit, peripherals and operational modules such as mixing consoles, multitrack machines, and interface units are linked via MADI.

Additional interfaces cover analogue, AES-EBU, TDIF-1, GPIO, and serial.

The DSN ATM Switch offers an effective data transfer rate of 25 Gbit/s, a fully redundant design in all components, support of all transfer qualities, powerful management software and a variety of common ATM I-O boards. It has 17 slots, 14 of them for user-specified boards.

The interface between ATM and the broadcaster is the Lawo-developed MADI board, which is plugged onto the backplane of the IBM switch. The board has 4 MADI interfaces that may be used for 56 channels (56-channel audio), 56 channels (52-channel audio and 4 control channels), 64 channels (64-channel audio) and 64 channels (60-channel audio and 4 control channels).

Sacrificing four audio channels allows the supply of free frames with control data for peripherals. This control data is marked by setting the 'Non-Audio-Bit'. Communication is bidirectional and permits generation of ATM cells in an interface unit and in this way return signals from connected interface units are transferred into the ATM network. The control data remains in the ATM-cell format all the time.

The DSP applications required in such a network are realised by boards that can be directly plugged into the ATM switch. It is possible to calculate 24 DSP channels—either for 24 input channels or 24 summing channels per DSP board—and 144 summing buses. The maximum-sized system manages a mixing console with 192-input (DSP) channels and 144 direct outputs with 8 DSP boards. The remaining slots of the ATM switch may be used for I-O links or the interconnection of switches. If all the DSP boards are not needed for an application, free DSP capacity may be used for other applications, for example, for another operational console. Alternatively to using the DSP boards as a mixing console they may be configured for the processing of other audio channels.

Links of control or operating systems within the ATM network are established via standard ATM interface boards.

The Sat.1 installation has permitted the removal of most of the existing external matrices and allowed studio areas 1-3, the central equipment room for these studio areas, the audio postproduction suites 1-3 in the master control room, graphics and editing suites, postproduction, and VTR to be integrated into the DSN.

The broadcasting operations department has moved from Hamburg to Berlin with the addition of its ATM system. More recently 300 journalists have relocated to Berlin. ATM has made a difference for SAT.1. ■



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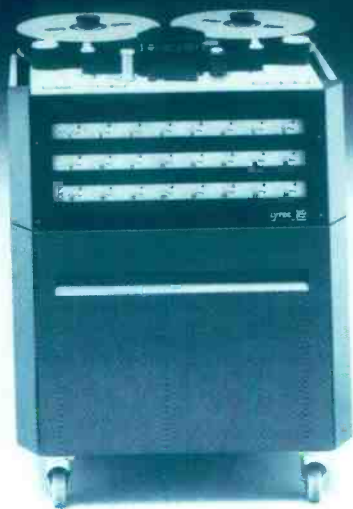


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# The Talking Machines

The history of the tape recorder is littered with anecdotes of questionable historical accuracy. Studer's **Karl Otto Bader** traces the factual development of recording

**T**HERE IS AN OFT-TOLD TALE that tape recording was invented by accident. It says that when Weber and von Braunmühl experimented in 1938 in Baden-Baden, Germany, an amplifier started oscillating and the HF generated dramatically improved the S-N compared with the DC bias technique then in use, paving the way for the next 50 years' technology. The story is not entirely true.

In 1938 tape recording was already a couple of years old. Fritz Pillemer made the first magnetic tape in Dresden that year and in 1932, Fritz Schueller made the first magnetic ring-type head. In 1934, AEG Telefunken developed the first tape recorder called the Magnetophon, which was presented at the Berlin Funkausstellung in 1935. In the same year, a joint venture between AEG and IG Farben resulted in the first magnetic tape with an acetate base and an iron oxide layer. So Weber and von Braunmühl had already a base when they made their experiments in 1938. Whether the HF bias invention was the result of a structured design or coincidence, is relatively unimportant. What is important is that they understood the impact of their discovery.

On the other side of the ocean there was a parallel development, but the medium preferred was wire, not tape. In 1939, SJ Begun presented Sound-mirror, a device for the recording of speech. In the same year, Western Electric produced the Mirrorphone, a unit with a similar principle.

Another story has it that US intelligence during World War II was surprised to hear Nazi officials broadcast from places they could not have been. Of course, their voices were tape recorded, but the quality of the recordings made listeners believe that the transmissions were live. So Colonel Ranger from the US Army issued a special order to capture this technology; in the last days of the War he and a small special unit were able to bring one of the AEG Telefunken machines to the United States for examination.

Even without this valuable acquisi-

tion, substantial research was taking place within the US. Notably Ampex, founded by Alexander M Poniatoff in 1944, was heavily involved in tape recorder development. As movies played an important role, tape machines with 35mm sprocket hole tapes (Magnetech and others) also came onto the market. At the same time, tape machines slowly moved into the private domain and became a toy for the wealthy.

Immediately after the War, steel wire machines were imported into Europe, followed by tape-based devices. In 1949 a young man in Zurich, Willi Studer, had the task of checking imported Sound-mirror units. That was the point at which he decided to develop his own tape recorder.

AEG Telefunken in Germany started again after the War with the development and refinement of professional tape recorders. With the models T8, T9, M5 and later M10 AEG gained a strong position in almost all European broadcast organisations. For reasons difficult to understand, Telefunken and the rest of the world could not agree on one main point of their technical specifications—Telefunken machines ran oxide on the outside of the reel, all others ran oxide inside the reel. Even if it was unintentional this became a strong marketing factor—with the rapidly growing archives in European broadcasting it was difficult to introduce machines with different standards. This was one of the main reasons that Telefunken kept a dominant role for such a long time.

Eventually, companies such as Otari and Studer produced models to cope with this European standard. The exception was the UK. The BBC and, to some extent, the French radio corporations followed the international standard. Hence, first EMI recorders and later Studer machines became the important suppliers for those organisations.

Almost unnoticed in the West, the Soviet Union and the allied countries developed a great need for broadcast studio equipment. In the Soviet Union alone broadcasting had to be done in 81 different, mostly internal languages. >







Neil Karsh is the Vice President of Audic Services for New York Media Group. Recently, Karsh selected LSR monitoring systems for two of his Manhattan facilities, *Lower East Side* and *East Side Audio*.

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Los Angeles



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< As production in the socialist system was planned, Hungaria took responsibility for the studio equipment. The MechLab company in Budapest (ML) became one of the largest manufacturers of studio tape recorders in the world. However, due to insufficient marketing and the difficulty of having equivalent stock of spare parts, few machines could be exported to western countries. But there was not only radio. A growing part of the business was the recording studios, and—like the pop music after the war—the technology of pop recording was clearly driven by the American way. Companies like MCI, which were already supplying mixing consoles for this market, found themselves well placed to move into tape recorders.

Until the introduction of the CD, cassette duplicating was a very important part of the business. Companies like

Gauss, Otari and Lyrec specialised in high-speed duplicating, King was the leading brand for winders, and Studer supplied most of the master recorders.

With the growing importance of television, video recording became a hot topic. It was clear from the very beginning that the standard audio tape technology used so far could not handle the bandwidth required for video signals. The differential speed between tape and head gap had to be increased. Ampex pioneered the quadruplex principle with four rotating heads contained in a head drum with a 2-inch tape format.

This principle was later replaced by the helical drive, also a rotating head drum, but with the tape following the contour of the drum almost full circle. This principle proved to be revolutionary because the transport became much lighter, the tape narrower, with the ben-



efit that the recording density could be driven to the technological limit. The idea of the helical drive survives today and is the core part of R-DAT, most video recorders, and VHS-based audio recorders like ADAT. Companies like Sony, BTS, and other Japanese video manufacturers specialised in devices using this drive mechanism.

For quite some time television and film followed different paths in the way of handling audio. Until around 1980, film tape machines were equipped with film drives, using between 16mm and 35mm wide tape. Interestingly, two Swiss companies, Perfecore from Biel and Sondor from Zurich together with Albrecht from Berlin became the major players together with a few US-based companies.

As these machines were too heavy and too clumsy for on-site recordings the standard audio tape principle became popular, because the devices were smaller, light in weight and very easy to use. Nagra Kudelski, another Swiss company, gained the world leadership in this very special area.

The use of conventional tape recorder principles, however, posed a problem: how to link the medium to film. This >

October 1999 **Studio Sound**

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lead to the development of a sync signal, called pilotone. Variations like Rangertone—a development from the same Colonel mentioned earlier—had a relative short life. The pilotone idea finally was replaced by the time-code system that is in use today. It contains not only a synchronous information (as did pilotone) but also address information allowing the automatic cueing of different machines.

Between 1950 and 1980 there was an enormous market for tape recorders for semi-pro applications. Musicians wanted to record their music; schools used tape recorders for language labs and general education; police and fire brigades needed recordings of emergency calls and other evidence; conference halls required high-quality audio systems; libraries wanted to save speech and music; and sometimes

recordings even changed the life of politicians (most of us still do remember the White House tapes). This market required high quality, but not always the operational features of professional products. Tascam, Fostex and others responded with streamlined machines. Revox, a trade name of Studer for semi-pro products, sold several hundred thousands of the successful A/B77.

From 1960 the idea of using multitracking became a hot topic. The first large desks were developed; and as a consequence multitrack tape recorders appeared on the market. In June 1966 the Beatles produced the *Sgt Pepper* album on one of the first 4-track machines, the Studer J37. The age of multitrack machines had started.

In 1970 the first Studer 8-track recorder appeared, running 1-inch tape. Two-inch versions with 16 and 24 tracks



followed in due course. MCI (Fort Lauderdale), Lyrec (Copenhagen), 3M and Scully (US) along with Telefunken were among the companies producing multitrack machines. The use of multitracks became very popular especially in recording and, consequently, in video postproduction studios. It is estimated that more than 20,000 analogue units are in use world wide.

Analogue recording was always subject to certain limitations given by the tape parameters and the physical principle. Nevertheless, some attempts have been made to improve the technical specifications. A rather old idea (HG Scott, 1938) involving a compander system to improve S-N was taken up by W Franz in 1963 (NoisEx) and shortly >

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### Influence on the home

- 1971 Tascam launches 'quadrophonic' A3340 dual-speed 1/4-inch
- 1973 Tascam A3340S with sync switches fitted released
- 1976 80.8 8-track 1/2-inch aimed at smaller commercial facilities
- 1978 The original 144 Portastudio is launched and personal home recording is never the same. 4-track recorders will emerge from Fostex, Yamaha and even Studiomaster.
- 1982 Greatly improved 244 Portastudio ships. 8-track 1/2-inch 38 ships.
- 1988 238 8-track cassette recorder launched
- 1989 Tascam answers Fostex' B16 (later E16 and G16) with MSR-16 1/2-inch 16-track and follows up with MSR-24 24-track 1-inch. Fostex counters with G24S with Dolby S which Tascam also adopts.
- 1990s Remembered as the turning point for analogue with the arrival of MDMs from Alesis, Tascam and Fostex



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Moon, Whitney Houston's Studio and Sarm, but this is something else. And I think it might be contagious.



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**Otari**

- 1965 Otari is founded in Tokyo. The first product introduced is a high-speed 8-track cartridge audio duplication system
- 1966 Development of high-speed audio cassette duplicators
- 1967 Introduction of video cassette loaders and data recorders
- 1968 Otari's first professional audio tape recorder, the MTR-60
- 1970 Start of the US operation
- 1974 Introduction of the famous MX-5050 tape recorder series
- 1976 Own manufacturing of motors and heads
- 1978 Beginning of the European operation
- 1979 Birth of Otari's world famous MTR-90 2-inch 24-track
- 1982 The DP-80 high-speed audio pancake cassette duplication series is introduced
- 1985 First DTR-900 32-channel digital reel-to-reel, in the same year MTR-90 sales exceed 2000

< after perfected by Ray Dolby. Dolby made the important step of operating the compander in multiband thus minimising noise pumping effects. The professional system was called Dolby A and worked with four subbands; Dolby B and later Dolby C were used in semi-pro and consumer applications. The audible improvement in S-N enhancement became almost a must in 24-track recording where the narrow width of a single track provided insufficient dynamic range without the compander.

Another attempt to improve S-N was to work with a higher bias frequency. Whereas a higher erase head frequency often led to temperature problems, this problem was easier to handle at the record heads; however, the improvement was worth only a few dBs.

An important step was the introduction of a 0Ω load for the playback head (Studer A80, 1970). The voltage of a playback head is a function of frequency, the current is not. Using the voltage requires frequency-dependent equalisation that in turn produces all kinds of phase and group delay problems. (This was the state of the art before 1970). By using the current instead of the voltage these problems are completely avoided. For the first time the tape was as good as the vinyl disc in terms of pulse reproduction. The most important progress for practical work, however, came through standardisa-



tion. After a time of diverging standards in the beginning the technique was now mature: Anyone could walk into any professional studio in the world with a tape under their arm and could have the tape played. There were only three professional tape speeds and two different equalisations, and every professional recorder had the ability to be switched to operate at any of these. Recording patterns were identical or at least compatible, the physical format of tapes was standardised: all open questions had >

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Otari

- 1986 Introduction of TMD (Thermo Magnetic High-Speed Duplication System) and first R-DAT loaders
- 1989 Otari introduces its first DAT Recorder, DTR-90, a 2-track time-code machine
- 1993 Otari joins the MiniDisc Format as 3rd manufacturer and announces the new MR-10 series.
- 1994 Otari signs an exclusive agreement with CTI in Canada and launches the first RADAR 24-track.
- 1997 Otari introduces a magneto optical recorder series designed around the 3.5-inch MO. PD-80 an 8-track MO-recorder is available for the first time, since 1999 also with 5 1/4-inch, followed by PD-20 a 2-track time-code machine and DX-5050 the portable successor of the MX-5050, designed for radio broadcast. Announcement of CDR-18 a professional compact disc recorder
- 1998 RADAR II the 24-bit hard-disk recorder successor is introduced

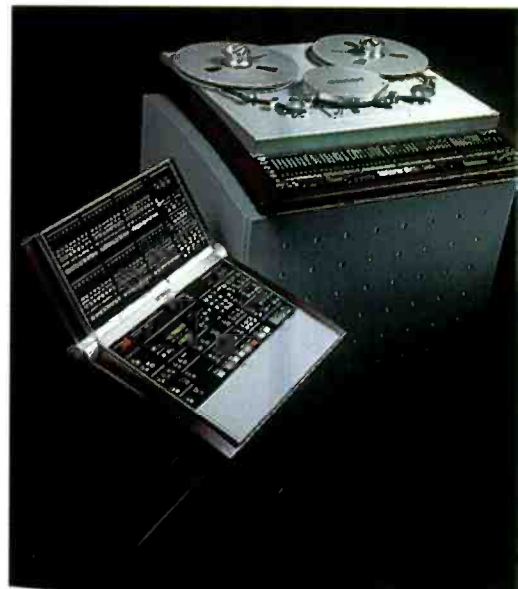
been answered. Life was easy. This all changed very suddenly when the digital age began.

From 1980, the idea of using a digital format became more and more popular. In spite of improvements, the quality of analogue recordings was regarded as no longer satisfying, so engineers started to look for better alternatives. They found the promising land of digital recording.

As helical scan video recorders with FM recording already were on the market, the first step was the introduction of additional boxes including A-D conversion allowing digital data to be stored in a FM recordable format. After early attempts with limited S/N performance (F1) Sony brought out the 1630 family which—in connection with the U-matic recorder—became the standard in CD mastering.

3M was the first company to open the field for digital multitracks. In those days convertor stability was still one of the major problems, and a lot of time had to be invested in adjusting.

The next generation of digital multitracks had a much improved stability, but followed different recording patterns which led to the fact that the systems were not compatible. On one side Mitsubishi featured the PD format with a maximum of 32 tracks on 1-inch tape; on the other side Sony and Studer agreed 1980 on the DASH format; this



led to the development of stereo machines with stationary head using 1/2-inch tape and later also to multitrack units with a maximum of 48 tracks on 1/2-inch tape.

Today tape recording is an endangered species. Magnetic and optical media in disc form have found many applications due to their nonlinear operation and near instantaneous retrieval times. The media are presently expensive for mass storage, however, with the result that there is still room for tape-based systems. ■

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The enthusiasm that fuelled the recording studio industry in more prosperous times has largely been sacrificed to commercial success.

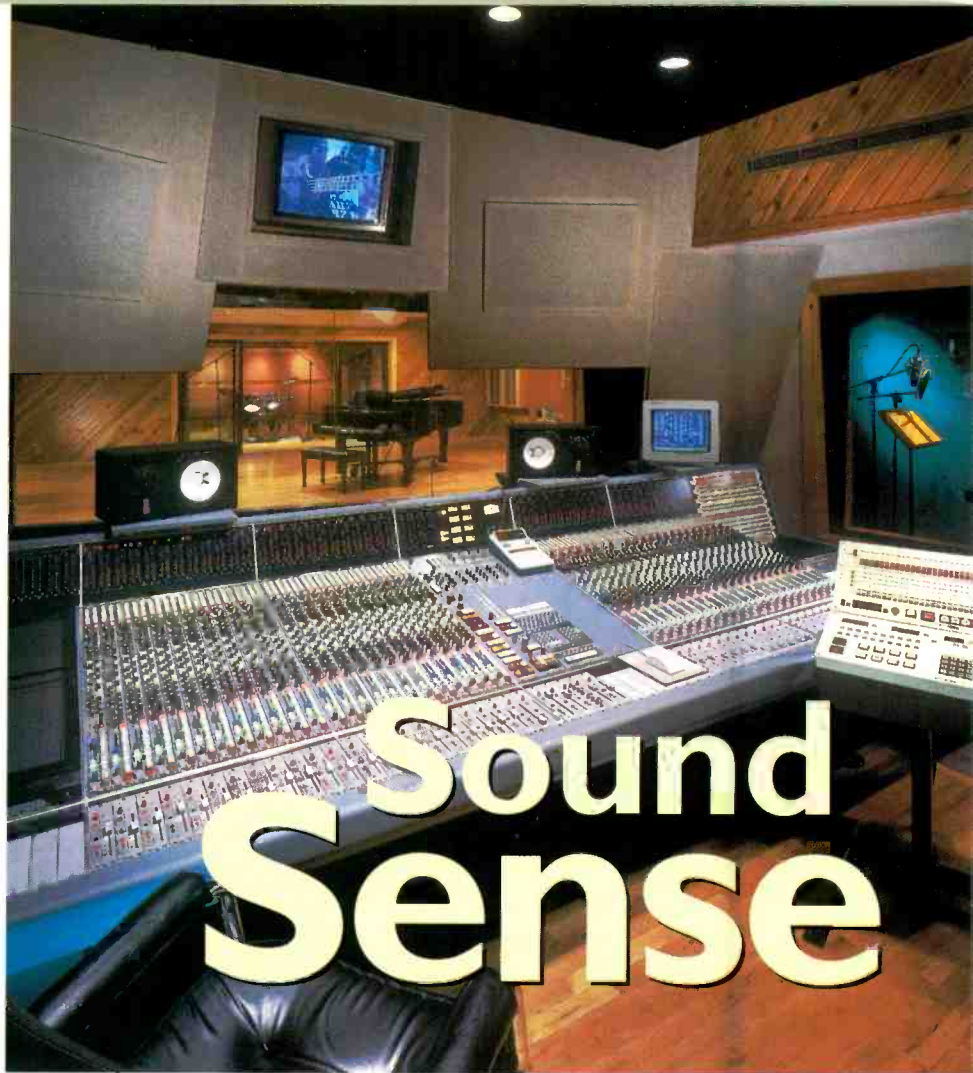
**Tim Goodyer** discovers what happens when your project studio takes over your life

**I**T IS IMPOSSIBLE to meet Dave Amlen and not be infected by his enthusiasm. It is easy to see in him the kind of character that once dominated the recording studio business—before economic reality made them an endangered species. And yet Amlen is not simply surviving, his Sound on Sound studio is thriving in central Manhattan. More than this, his evident grasp of business and politics at the core of the Big Apple's recording scene has more in common with university graduates than musos.

Born out of earlier musical aspirations, Sound on Sound first shared Amlen's living space in 1985 as a forerunner of what's now called the project studio and it's immediate growth proved to be as problematic as it was unexpected. 'I was a musician but the passion of making my own stuff led me to become more interested in the studio than in performing,' he confirms. 'It became very obvious to me that if I wanted to keep my sanity I had to separate my living and my professional environments, so I scoped around and found this raw space and dived in without really knowing what was before me. I thought it would be fun to build a studio, that it shouldn't cost too much money and it shouldn't take too long. Well, I'm not the first person to discover that that's hardly the case. But it's been steady growth ever since...

'One of the things I did to kind of ensure some built-in business from the word go was hire a real acoustics designer—Francis Daniel, one of the unsung heroes of the recording industry—rather than presupposing I knew something about acoustics when I did not. I think it's a mistake a lot of up-and-coming studios make is to look pretty but to sound real awful. The statement "you get what you pay for" is all too true in the recording industry. So I hired a top-notch designer in order to help design this place and we also had a lot of input from the other people involved who had come from other places. We'd say, "Okay, this is what we really want to be able to do with the room..." and he'd alter the design to accommodate that.'

Work on the commercial studio began in 1986, but the fact that its doors did not open until the following year was an early part of Amlen's education. 'The opening coincided very nicely with the market crash a couple of months later,'



# Sound Sense

he smiles. 'I went into this with the traditional "big studio" approach,' he continues. 'Even though I hadn't apprenticed in a big studio a lot of the people who helped me put this together in the early days had. The large commercial studio model was what I had—doing the corporate stuff during the day and the more free-spirited stuff at night. That was definitely the model here in New York. Up until maybe ten years ago advertising was a huge part of the marketplace, but as project studios and home recording have taken over so much, most of the advertising agencies don't really have to go out of house any more. Why spend big dollars when you don't have to? But that was our model.'

The original Neotek-equipped 24-track overdub and recording room grew to cater for mixing with an SSL 4000 G-series console, the second to appear in New York. A Neve VR was installed in 1990 and the facility grew to 48-track a couple of years later, the earlier SSL being replaced by a 9000j-series console. This August he opened a Capricorn mixing room, making Sound on Sound after a bust July spent wiring.

'It's funny but when this was all pieced together late in '86, it wasn't so much that you had to have a Neve or an SSL or something similar in order to be considered serious,' he recalls of the early days. 'You could go with other brands—Trident was very respected, people were still making records on

MCI's—there were lots of alternatives. We went with a Neotek console, something that sonically we were very happy with but, as it turned out, probably wasn't the best choice, but it didn't kill us. I'm not going to say anything bad about the company, but if they'd made the desk better, it wouldn't have left so early. At the time I could have bought a used Neve for the \$50,000 but I didn't know that it would be a better choice. One thing that was good about the Neotek was that it wasn't forgiving in terms of engineering mistakes so if you weren't good you knew about it pretty quickly. Those of us who cut our teeth here were forced to really develop sound engineering practices, and in that regard it was a blessing.'

Sound on Sound's ascendancy was built only partly on technical merit, however, as Amlen's business sense was maturing rapidly.

'Within about a year of opening we realised that without an automated console we weren't going to do any serious work here,' he recalls. 'It took me about a year to work out the dynamics of the industry. Let's say that in certain areas there is an exponential return on linear investment, so you can start at a certain point with a few dollars and get low dollars back. You put in a little more and you get bigger dollars back; you put in a little more still and you start getting really income generated in a studio. I know that seems like an oxymoron >



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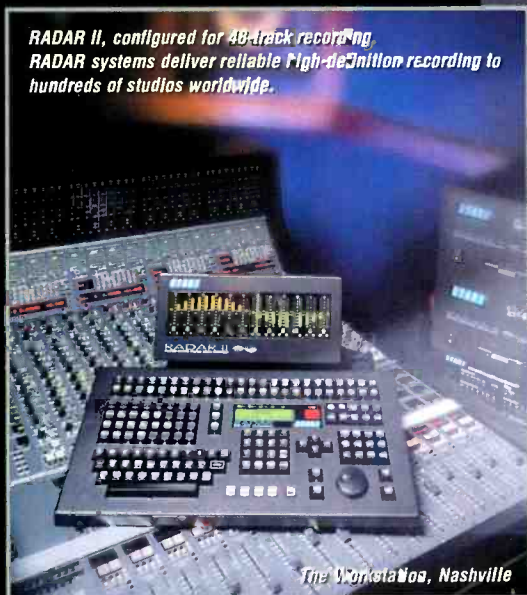
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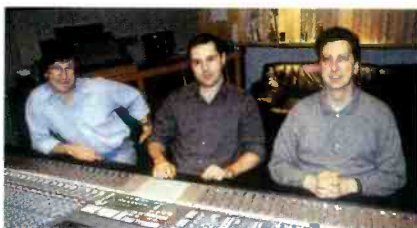
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< with what everybody writes about the industry, but it really is true. Everybody is fixated on saving a couple of dollars here, a couple of dollars there, but what I have learned is that the more you try to save the more you end up spending very quickly. There is a rule of thumb in PR where every bit of bad press you get, you need ten bits of good press to make up for it and this industry is no exception to that rule.

“What precipitated our move up to a Neve VR was that I was looking around at the industry and I started to see that, just like in other industries, people in the middle were disappearing. It was becoming the case that either you were low-end and it was all about price and nothing else, or you were high-end and it was all about quality and price was a secondary consideration. So it was a very deliberate choice to head into the higher end where there seemed to be a little bit more of a safety margin. We actually went into it in stages—we started with a short-loaded console, larger frame but with only 48 modules, and then within a year it grew to 60 modules and this year it's grown to 72.

“Then last year we got the 9k. I guess there's no mystery that the 9k in its early incarnation had some serious software bugs so I sat on the sidelines waiting for those be ironed out before I went with it. But universally, from the word go, all the engineers I respected were



Left to right: David Amlen, Jason Standard and Harvey Goldberg

saying, “It's amazing, once you hear this you're gonna have to have one”. So I waited until the software was fixed and I had enough equity in my other console and then I made my move. To give you an idea how busy the room has

been, I've been able to log just three hours on that board since I put it in. And in order to do that I had to come in early in the morning or at the weekend before a session began.

“When the 9000 went into Studio B it raised the profile of the studio several notches. The term “world class” is such a BS term, but in this case... So I brought in a manager who is better equipped to deal with the higher grade of clientele—not to say that our older clients aren't great, but in terms of market recognition a lot of the people we're dealing with now are a lot better known. We had our stars, but by and large the bulk of our clients were people who were >



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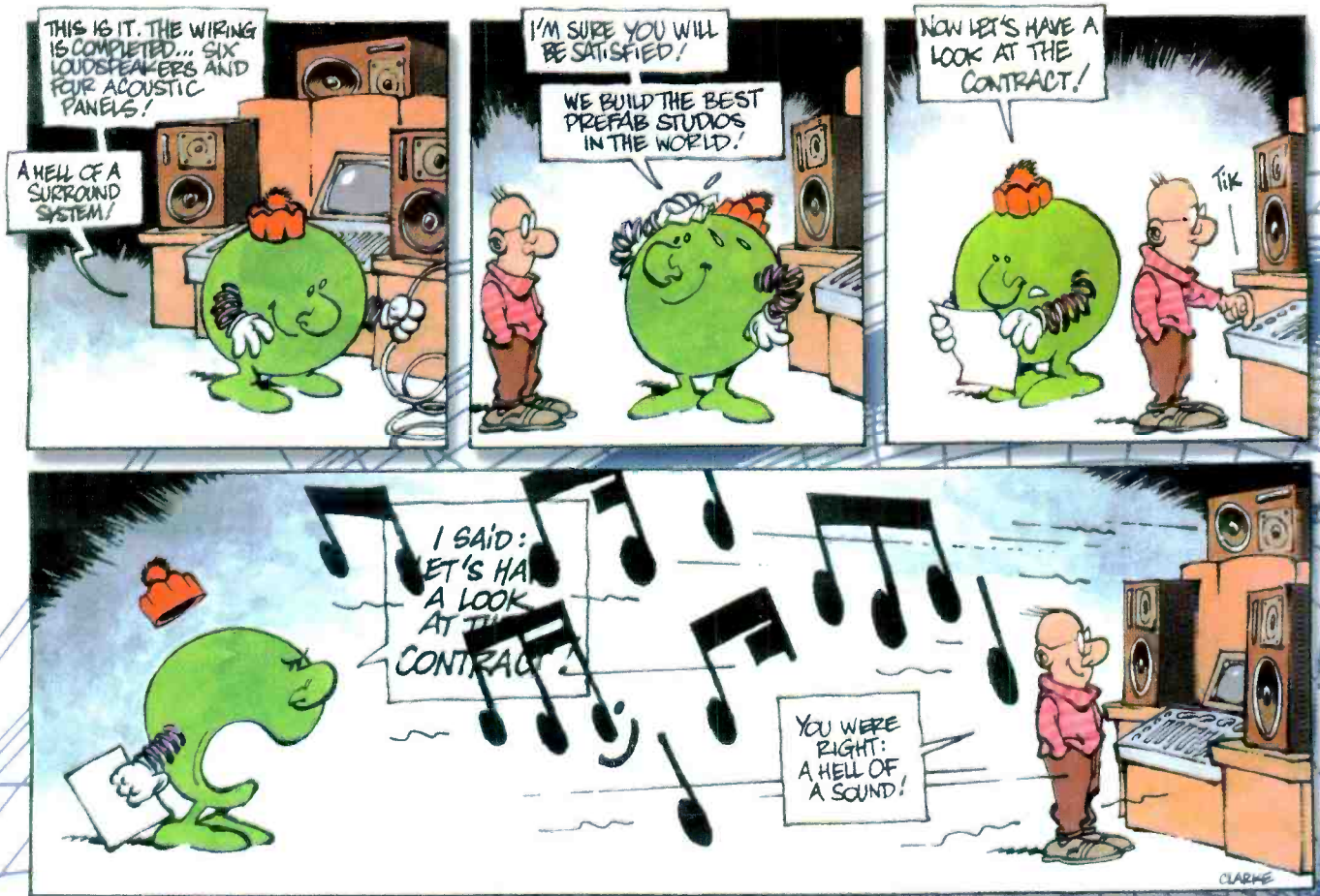
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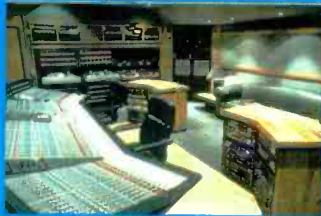


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< successful enough to pay for quality, but the average man in the street probably hadn't heard of—people like Dave Valentine. There is a little bit of hype involved in building the profile of a studio and there's also what I said before about a little more money.'

The choice of the Capricorn for Sound on Sound's newest room is based on Amlen's current appraisal of his market, as he explains: 'We're regarding the Capricorn pretty much as a mixing desk at this time,' he begins. 'As with all the digital consoles that are out there, there is something of a phobia that engineers have of doing a live session on them. I think that maybe that will change in a couple of years or so, but I don't know.'

'We evaluated the other contenders and we felt that at this time it is the furthest developed product. There were other factors too. Right now the landlords in the Times Square area are high on the biggest market boom they've ever seen, so we didn't want to take on any more space—according to the Times and Wall Street Journal that boom ended earlier this year, but if you're looking for space that's not reflected in the asking price.'

'I'd previously been letting about 1000ft<sup>2</sup> of space including some to a guy called Shane Faber who's doing trip hop music on a 56-channel Mackie and a guy called Elliott Fetterman who was running two mastering rooms upstairs. As they were both leaving, I looked at the space, rented some more within this building and hired in John Storyk—who had designed my B room—to get Studio C ready.'

'The room is being designed from the word go as a surround room but we've installed a movable Genelec 1031-1092 system until we get some sort of consensus on positioning.'

For main stereo monitoring, Amlen favours George Augspurger monitors. 'I looked at Neil Grant's speakers,



David Amlen

I looked at Roger Quedstedt's, I looked at Genelecs. The problem is that with most of my clients here, it would be quieter to sit on the main runway at JFK and I need speakers that can do that without dying every other day. We had an experience with the Ureis we had that were being re-coned once a week. It's not just here, I heard the Hit Factory had 20 sets of speakers out being re-coned at one time. R&B and related music is what drives the pulse in New York. It provides 80% of the business in town, so if you want to be in business...

'If you look at dance music, something that has a drum and bass feel to it then dance music, R&B, jazz and advertising are the basis of what drives New York music economy. If you want the glamorous side of pop, you go out to la-la land, 'cos that's where it's done, along with all the Hollywood stuff.'

Amlen's immediate aim is to complete his current programme of improvements without disrupting the work going on in Studios A and B. Asked about future developments, his answer is typically pragmatic: 'We will open more rooms if that's where the business dictates we go.'

And wherever the business wants Dave Amlen to go, it can be assured he will do it with his old enthusiasm and a keen sense of survival. ■

#### Contact

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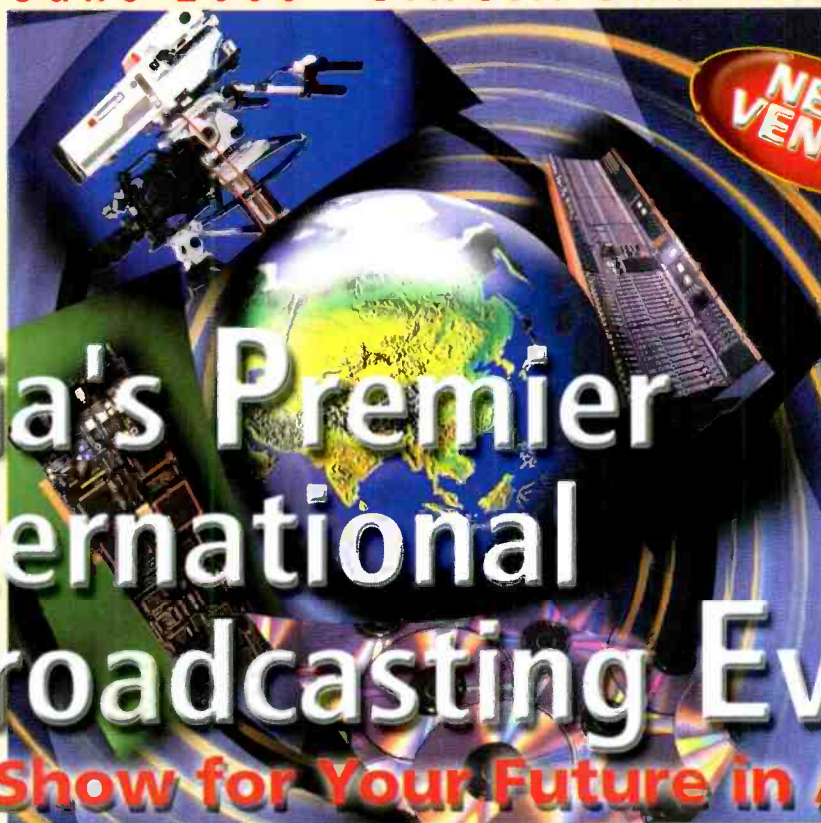
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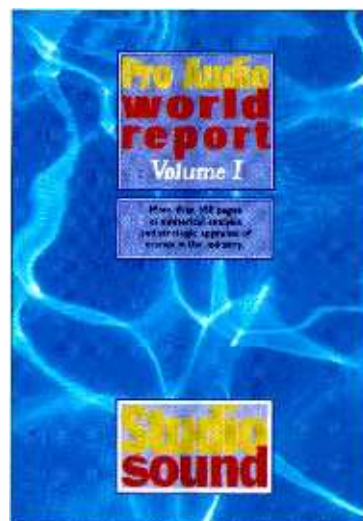
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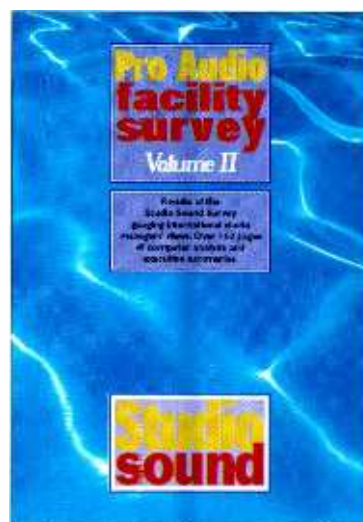


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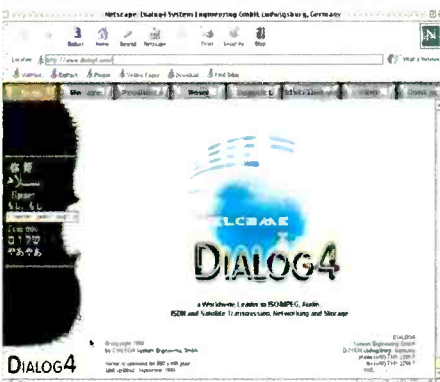


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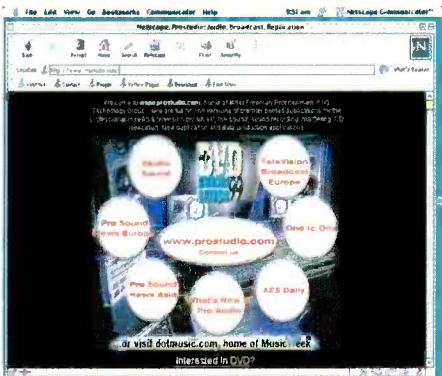
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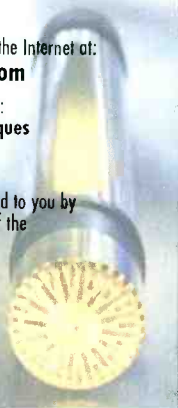
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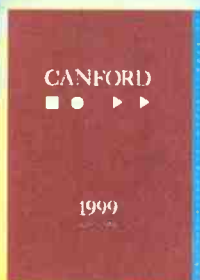
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## US: Rates of change

Gauging the health of the recording studio market as it approaches a next millennium is harder than it seems writes **Dan Daley**

**S**TUDIO RATES is a nasty subject that tends to bring out the worst in some otherwise very nice people. Rate discussions—the ones that are held on the record, for journalistic purposes—tend to be defensive exercises in the States, and a bit of cultural background is useful to frame that observation. Though politically incorrect to note, America's motivating geist is the Protestant Work Ethic, a model that dates back to colonial times and, despite waves of immigration from shores other than those of Western Europe in the 200-some-odd years since then, is still a strong force throughout the psychology of the American economic infrastructure. Ever notice how many corporate CEOs are white Christian males in this country? And the ownership of studio business tend to be overwhelmingly white males of similar backgrounds. (Both are changing, but it will take a while for true multiculturalism to make itself manifest in these destinies.)

One of the basic tenets of this heritage is the notion that if you are a good person, God smiles upon you. The implication of this, of course, is that if you are doing well, God must be smiling upon you. This makes for a very competitive way of life, because

your perceived level of success in life then becomes a barometer of your very being. Frankly, it is a lousy way to live your life but it is a more deeply held model than many of us care to admit. But the result, when applied to the issue of studio rates, is that getting a clear picture is impossible—no one wants to be perceived as doing badly, because who wants their place in Heaven called into question?

Measuring studio rates is like those numbers the government puts out every quarter that tell us how we are doing economically: GDP is up so much, productivity has increased; thousands of new jobs have been created, and so on. And the indicator of average American incomes never fails to increase at each of these pronouncements. At least, it seems to. Another indicator—sneakily dubbed 'real' income—is slipped in at the end and it often seems at odds with the first number, since it's been going steadily down for most years. That's because, even though we've been in a virtually no-inflation/low-interest-rate environment for eight years, things still cost more and—here's the kicker—there's simply more stuff to buy. It's not that Americans are ridiculously conspicuous consumers

(okay, we are—if it ain't nailed down, we'll buy it); it's just that there are more things necessary to life in these times than ever before, from cell phones to microwave ovens to Playstations. So when an American boasts about his or her income, what he or she is often not telling you is what's left at the end of the day after all the good stuff has been bought.

The same goes for studios, which now have more stuff to buy than ever before, most of it quite necessary to remain competitive. Even if the price of it comes down fairly steadily, which digital equipment is wont to do, sheer volume eats away any

The real point is that rates are a poor indicator of the overall health of the studio

advantage that that brings. At the end of the day, as with every other Joe Six-Pack in America, there's less left after the bills have been paid.

The surveys sent out by the magazines tell us that operating revenues are up, and that many facilities have been able to raise rates. The hidden conclusion in these seemingly sanguine reports, however, is that the bottom lines continue to drop. And that's borne out in the off-the-record conversations that take place after the telephone tape recorder has stopped running and in bars at the end of trade show days. It's also reflected in a published survey in Nash-

## Europe: High water marks

The tides of the watermarking debacle continue to turn, threatening to drown out musical quality writes **Barry Fox**

**T**HE IFPI NEVER released the results of its EU-funded Muse audio watermarking tests. But the SDMI, Secure Digital Music Initiative, has done. And the winner is Aris Technologies of Cambridge, Mass, with MusiCode. Paul Jessop, the IFPI's Technical Director, is 'delighted', so you can take that as a pretty fair indicator of what the Muse results were. The SDMI chose MusiCode to control music downloads from the Internet onto solid-state portables like the Diamond Multimedia Rio. The same system has been adopted for DVD-Audio. And this is where the story will really begin...

The mark has to be robust and withstand transmission, to-and-fro conversion between the analogue and digital domains, recording and playback. It must be indelible, so that hackers cannot strip it out. But it should not degrade the sound. This is a tall order, and there have been many competing proposals. Some spread a thin layer of modulated noise under the audio; others suck notches from the music and add modulated noise to the gaps.

The awful CopyCode system once proposed by the RIAA and IFPI to control copying onto DAT worked on the notch

principle. The RIAA and IFPI said it was inaudible, but even cloth ears could hear it. CRL, the Central Research Laboratories that spun off from EMI, has improved on notching by making the system dynamic; it continually analyses the music and only sucks a notch where it is likely to be masked by the musical content.

The RIAA subsequently backed a new system called BBN (developed by US acoustic consultants Boulton, Beranek and Newman). BBN tracks the original sound and adds modulated noise which is always 19dB below the music. Like CopyCode, BBN was promoted by David Stebbings.

The SDMI testing was organised by 4C Entity, a consortium of IBM, Intel, Matsushita (Panasonic) and Toshiba, with 'golden ear' panels listening for audible artefacts with methodology from the IFPI-Muse project. All the major record companies played music in their studios to audio experts listening to marked and unmarked music without knowing which was which.

In publicity dated 1997 Aris refers to a David Moulton, producer of training series for recording engineers assuring that 'we were unable to detect any colouration or artefacts'. But no-one will

say who 4C's 'internationally recognised golden ears' were. Are they worried about losing face if MusiCode is discredited?

Music from the Internet, which has been heavily compressed using MP3 and similar systems, is of necessity low on the fidelity scale. But in choosing MusicCode for DVD-Audio, 4C has exposed it to a bandwidth of 100kHz (compared to 20kHz for CD and less for Internet audio) and a 24-bit dynamic range of up to 144dB (compared to 96dB for CD and much less for the Internet). Aris has always been secretive about its technology, and is now even more so, perhaps for fear of providing ammunition to critics who feel in their bones that you cannot mess with a pure audio signal without introducing audible artefacts.

A barrage of Aris press releases say nothing about how the system works. The company's Web site, [www.aristech.com](http://www.aristech.com), just contains a wish list of cotton-wool puff, with no hard facts on how MusiCode works. The company's spokespersons ducked and dived, took me for a fool and wasted my time when I asked for a simple description of how MusiCode works.

Fortunately there is a source of solid information. Thanks to quirks in international patent law, descriptions of the technology which inventors Rade Petrovic, Kanaan Jemili, Joseph Winograd, Jack Woloszewicz and Eric Metois filed with Patent Offices outside the US in 1997 and 1998 (WO 98/53565 and 97/37448) are open for anyone to read, if they can find them and hack through the jungle of



ville's *Music Row* magazine, which in August showed a full 10% drop in profits in that city. It has become clear that while the numbers in the rate game have continued to climb, the value of those numbers has continued to decline.

There are solutions, some of which have been discussed in this space over the years, including the benefits of paying off equipment and opting out of the technology arms race which, like the real one of the Cold war, bankrupted several of its participants and brought others to the brink of it. (It was, after all, paying for all those SS-20s and MiGs that turned the ruble into rubble.) The most promising avenue for studios out of this spiral seems to be diversification. Internet-based markets all need audio, and some studios are rising to the task of addressing them. In my opinion, that's the strongest strategy of them all at this point.

The real point is that rates are a poor indicator of the overall health of the studio business at this point in time. I am loathe to report them as a useful barometer in articles since I find them increasingly misleading, partially because, as I mentioned before, there is a natural, culturally induced tendency to bull heavily. But more because they are increasingly irrelevant to how things are actually going. The only real rate I find myself concerned with is the rate of change. And that is one indicator that is never going to stop moving upwards.

#### techno-legal jargon.

The MusiCode encoder starts with a library of symbols (digitally coded letters of the alphabet, numbers and so on) that are represented by predetermined patterns of a musical waveform, such as transient peaks. The encoder then analyses the music, looking for patterns that are similar to the library patterns. When a close match is found for a symbol that is to be buried in the music, the encoder modifies the music peaks so that they exactly match the library symbol. On playback, a decoder looks for peak patterns in the music and uses them to display symbols that build up a copyright message. The symbol data rate varies depending on the music content, but is typically between 10 and 100 bits per second. So it takes a few seconds for the decoder to recognise all the symbols needed for a copyright message or copy-control signal.

US mastering and recording engineer Bob Ludwig, of Gateway Mastering in Maine, warned earlier this year that although watermarking might be inaudible on lo-fi Internet music, its effect on super hi-fi DVD-Audio would be noticeable. He said he was wary of any reassurances from the RIAA which had argued in the 1980s that the CopyCode notch system was inaudible.

Ludwig now says 'my fervent hope is that digital signal processing has improved to the point where watermarking can be totally inaudible under all reasonable circumstances'.

## Dog and Bone TV

Telcos embrace new technologies and spread their tentacles into broadcast and virtual reality. **Kevin Hilton** phones in from the IBC

**A**RTHUR C CLARKE once said that virtual reality would not merely replace TV, it would eat it alive. Much as it pains me to disagree with the world's most famous resident of Sri Lanka—after all, I am not the one who conceived the geo-stationary satellite or wrote *2001: A Space Odyssey*—but I think that the great man got carried away. It is too much of a sound-bite—hardly surprising as the comment appeared as part of the blurb on a book cover.

Virtual reality is just one of the many new technologies that can, will or might be merged with what already exists to create new forms. Interactivity is exactly the same; it is also probably a more realistic add-on than VR. The front-end of television—and broadcasting media in general—is beginning to change irrevocably. Despite the impact and importance of this, the real changes are happening elsewhere. The real aggressor in all this is the telecommunications industry. While the word 'broadcasting' implies that it is a big market, in real terms it is merely wide. Telecoms is a huge industry and makes broadcasting look small by comparison. A business does not grow without recognising the potential of other markets and expanding into them. Which is exactly what telco operators have done.

The relationship was always there: the post office—which later became the PTT—provided the landlines used as programme or contribution feeds. As ISDN became more widespread, broadcasters came to question the expense and administration that land-lines involved, but telcos already had a new toy with which to tempt their old customers.

In the early days, Telstar and Early Bird showed that satellite communications would be crucial as the world grew bigger and faster. The uplink—whether fixed or mobile, fly-away or in a van—is now a fundamental broadcaster weapon as broadcasters tussle to get pictures and sound on the air more quickly than their rivals. Telecoms providers saw the potential, some earlier than others.

France Telecom, which owns already GlobeCast, is behind a recent deal that sees a further consolidation between broadcasting and telecoms. The French telco has become the largest shareholder in NTL, the UK TV/radio transmission and satellite uplink provider that was once merely the dusty technical division of the old Independent Broadcasting Authority. The deal has enabled NTL to move towards acquiring the consumer cable telephone, Internet and television operations of Cable & Wireless Communications.

NTL expanded into the consumer sec-

tor when it was bought by the Canadian conglomerate CableTel. While a spokesperson emphasised to me that broadcasting is still the company's primary focus, it has undertaken an expensive advertising campaign in the UK, selling itself as a solver of problems in the new technology age. If the acquisition goes through, NTL will become one of the largest telecoms providers in Britain and Ireland. And telecoms covers everything from 'phone lines to television. Michel Bon, chairman and chief executive of France Telecom, explained FT's involvement by saying, 'Our investment in NTL is consistent with France Telecom's international strategy, within which Europe is the main priority. It is a unique opportunity for France Telecom to participate in the development of innovative and convergent services combining telephony, digital TV and the Internet with one of the largest alternative telecom companies in the UK.'

Another telco that has positioned itself within the broadcast market is Kingston, the Hull-based company that was for many years the only competitor (albeit in its own area) to BT and its predecessors. At the end of last year, Kingston took over TLI, the former

uplink, studios and broadcast systems division of the Services Sound and Vision Corporation (better known as BFBS). The general feeling was that the telco only wanted the satellite services, something that was confirmed when staff were made redundant from the installation department and the outside contracts operation was seemingly set to run down.

There is still doubt as to Kingston TLI's intentions regarding systems and studios but it appears that commercial tenders are still being made, while the head of the studios division was seen talking to all the major automation companies at IBC. This implies that there is still support for the nondistribution departments, but the situation raises an important question: just how interested are telecoms companies in broadcasting itself?

The dichotomy between the production and technical aspects of broadcasting has always existed but there was an understanding. Engineers knew that they were working in a creative environment; telecoms staff just deal with the transfer of data and the more that digital systems make audio and video just two more data streams, there is the danger that broadcasting could shift too far from its roots.

To regard something as merely a data stream is to dehumanise it. Virtual reality has a dehumanising effect, which means that, in a way, Arthur C Clarke could be right after all.

Telstar and Early Bird showed that satellite communications would be crucial as the world grew bigger and faster



# Research

When used properly, the most essential scientific tool available is experimentation.

**John Watkinson** traces the line between valid research and false conclusions

**I**F WE WANT to make things, for example useful audio equipment, it is always useful to know the principles or to have some model of the process. If the principles are understood, it is possible to predict what will happen in given circumstances, and this avoids wasting time building things that don't work. Although anyone can propose a model of a process, it has to be proven by repeatable experiment. Once that proof exists, the model can be relied upon within the conditions under which it was proved.

So it comes down to the validity of the experiment. Most often experiments are performed to see if one thing does or does not cause another. More formally we want to know if the outcome is a result only of the stimulus. The design of the experiment has to be such that the probability of the outcome arising for some other reason or even by chance is insignificant. If this is not the case the experiment is invalid. In serious research, the results of an experiment will always be accompanied by a discussion of the design of the experiment and a description of the steps that were taken to prevent bias or chance. Fig.1 shows some of the factors involved in experimental design.

The avoidance of bias is particularly important, as people participating in an experiment can often subconsciously give the decisions they are expected to give rather than what they would have chosen freely. For this reason it is important that test subjects don't know the purpose of the experiment. It is also possible for the operator of the experiment to introduce bias, and so the operator should not know the purpose of the experiment either.

Test subjects may tire as the experiment progresses and this can cause later results to vary with respect to early ones. This can be overcome by randomising the order of stimuli from one run to the next.

While few industries have squeaky clean research, the audio industry in general has difficulty with experimental design and the hi-fi industry cannot even spell it. In fact one definition of hi-fi may be that it is a branch of audio in which scientific reasoning is positively unwelcome. There is no shortage of examples where only the results are published and we are expected to assume that the experiment was well designed, when we should assume the reverse.

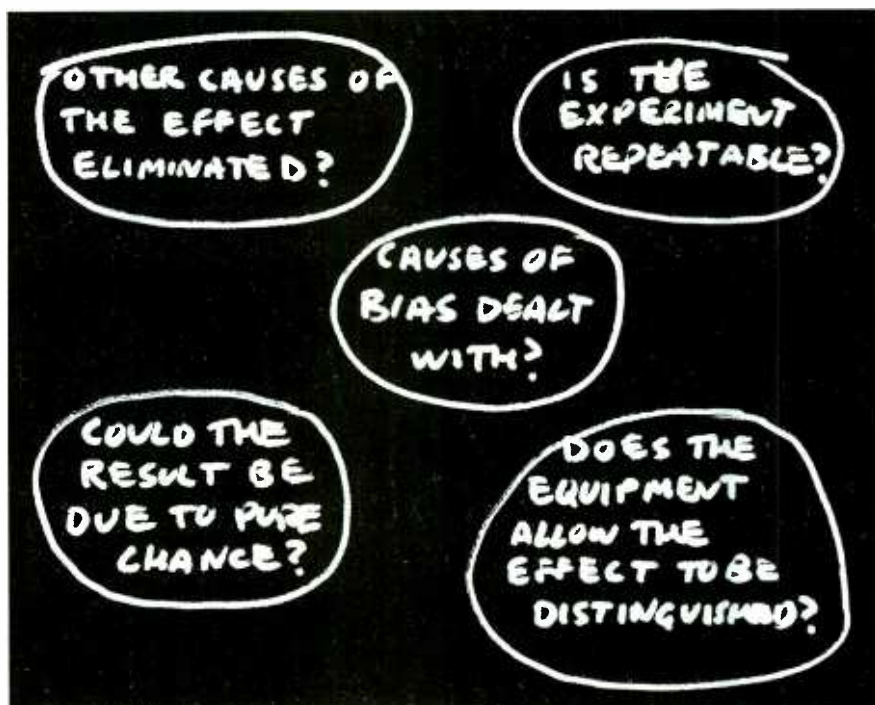
The adoption of MPEG audio coding was aided by experiments which

'proved' the inaudibility of the coding. Fig.2 shows the experimental setup. Various types of programme material were played through a codec into loudspeakers. The assumption was that any quality loss in the codec would be heard by the listeners. Unfortunately that assumption is not true because it requires the loudspeakers to be ideal.

Audio compressors work by exploiting auditory masking to prevent the ear detecting the noises caused by reducing the bit rate. If the noises were too

published of how the speakers were tested to avoid this.

It is actually a relatively straightforward matter to test the information capacity of loudspeakers. One approach is the straightforward speech intelligibility test used by acousticians. No coincidence, then, that speakers which score highly in intelligibility tests are more revealing of compression artefacts. On such speakers the artefacts of MPEG and AC-3 audio coding are obvious even at the highest bit rates.



**Fig.1:** If all these factors are not covered, experimental results are meaningless

great, they would not be masked but would become audible. However, conventional loudspeakers also cause masking. In the time domain, transients are extended by ringing and delayed resonances. In the spatial domain, stereophonic images are extended by smear. Thus a poor speaker adds to the masking effect of the ear.

In Fig.2, codec and speakers are in series and clearly either could cause loss of quality. How then do we know whether the speakers are testing the codec or whether the codec is testing the speakers? If the loss of quality due to the speakers is not negligibly small, losses due to the codec will be covered up.

These experiments were flawed because steps were not taken to ensure that the information capacity of the loudspeakers was high enough to reveal the compression artefacts. No details are

Another classic experimental error is to discover an effect and then to attribute it to what the experimenter wants without eliminating other causes. The expectation of the experimenter should not be allowed to bias the results. Dave Blackmer committed this sin in this hallowed journal in January. On testing some loudspeakers, one with a resonance at 30kHz was found to sound different. Blackmer then concludes that we can hear 30kHz. Unfortunately he can't be sure because he failed to eliminate other causes which do not require bat-like hearing.

The nonlinearity of loudspeakers is well known and ordinary boring intermodulation is quite capable of mixing a 30kHz resonance with the rest of the spectrum to give products within the 20Hz-20kHz band. There is nothing new here. When analogue tape recorders were common it was well



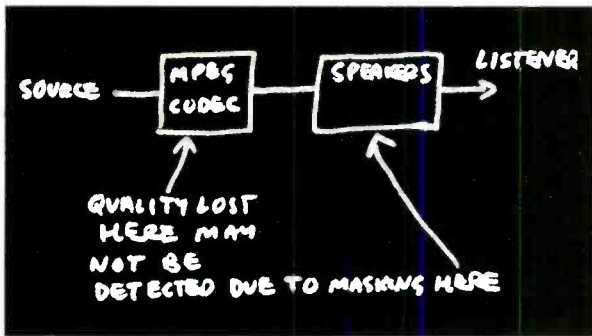


Fig.2: Is the codec testing the speaker or the speaker testing the codec?

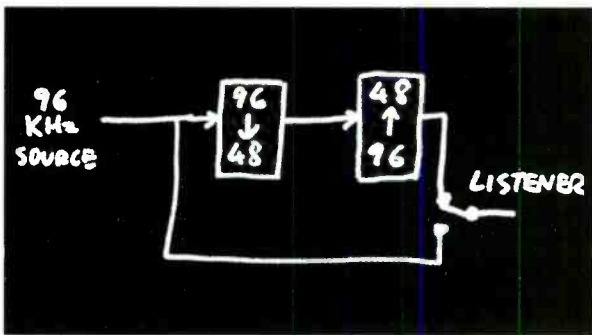


Fig.3: Flawed test 'proves' 96kHz is preferable to 48kHz

known that the bias generator had to have very low distortion to prevent the same problem. The difference is that back then concluding that the bias frequency of an audio recorder was audible would result in mirth.

Another possibility is that resonances can cause phase shifts at frequencies octaves away from the fundamental. A poor microphone might use resonance to boost its failing output at 20kHz. A microphone flat to 40kHz would have a better phase response at 20kHz and might sound better, but that does not mean we can hear 40kHz. Did Blackmer eliminate these possibilities by comparing the outputs up to 20kHz? How many of the criteria of Fig.1 did he meet?

The most famous bandwidth red herring is the fact that it is possible to hear the difference between a 10kHz sine wave and a 10kHz square wave when the difference between the two starts with the third harmonic at 30kHz. If we could only hear 20kHz it would not be audible, but it is. The reason again is nonlinearity in practical equipment. Even if the signal system, speakers and air were perfectly linear, so we could inject a 10kHz acoustic square wave into the ear, we would still hear the difference because the ear itself isn't linear. The ossicles in the ear are a mechanical lever system and have limitations.

Of course if we neglect the alternative explanations, we can prove anything. I myself must be able to hear 470kHz, because if I change the position of a slug in the IF can of an AM radio I can hear the difference. As it says in the text books, the student will be able to show that this is tosh.

Another classic I've come across recently is the experiment shown in

roundoffs in series and the phase response of the filters should also have been present in the 96kHz path. Tests should have been made to ensure that both paths were identical in all respects up to 20kHz. Unfortunately they were not and the conclusions are meaningless because the experiment was not properly designed so that the only difference between the two stimuli was the bandwidth.

Another cardinal sin is to confuse marketing with science. This is the argument that some characteristic must be essential because it is present in a commercially available product. Sorry, but it simply does not follow. Manufacturers will make what they believe they can sell, however over-specified, and the uninformed make wonderful targets.

Ben Duncan seeks in the March issue of *Studio Sound* to justify an extension of audio bandwidth by relating that Japanese speaker manufacturers have been making super-tweeter drivers for many years, some with responses that start above 20kHz. I am sure they have, but it does not prove anything about human hearing. Does the existence of DC coupled amplifiers mean we can hear DC? Does the existence of 24-bit audio mean our threshold of hearing is 144dB down?

Finally, it is important to assess the power of coincidence. Correlation between two occurrences does not prove that one caused the other. In the year 664 there was a total eclipse in England and an outbreak of bubonic plague. Many *Studio Sound* readers living in the path of the recent eclipse could be at risk. Have you bought your anti-plague pills yet? These are available from any hi-fi shop. ■

Fig.3. This takes a 96kHz source and allows monitoring of the source directly or through a decimation to 48kHz followed by an interpolation back to 96kHz. This is supposed to test whether the difference between 48kHz and 96kHz is audible. Actually all it proves is that the more stages a signal goes through the worse it gets. The decimation and interpolation processes will cause degradation of the signal within the 20kHz band, so it is no wonder that the subjects prefer the 96kHz path.

What the experiment should have done was to replicate the degradation of the decimate-interpolate path. In other words the elevated noise floor due to two arithmetic

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## Sound advice

Are you certain there's no problem with your hearing? **Adam Shulberg**, managing director of leading independent hearing aid audiologists, Cubex, raises his voice

**I**N TODAY'S SOCIETY we are all at risk from over exposure to noise. But while most of us know that our hearing may be damaged by regular visits to rock concerts, clubs or even a personal stereo, RNID research reveals that a staggering 1.3m employees in the UK are exposed to clinically dangerous levels of noise (85dB and over). This is because hearing loss not only depends on the loudness or intensity of the sound but also length of exposure to it. Consequently those of us working in the sound industry are in a high-risk category.

Hearing loss is actually caused by the nerves in the sensitive inner ear being damaged by continuous noise. Once damaged these nerves are irreparable. In my experience, a large number of sound engineers and musicians simply refuse to wear ear protection—either because they find such devices cumbersome, uncomfortable or unsuited to the environment in which they work—studios, clubs, large auditoria and so on.

Hearing protection can be as sophisticated as some of the hearing aids we prescribe when damage has occurred. At the Cubex Hearing Centre we see many patients from musical backgrounds for whom we design and fit tailor-made hearing protection. These include custom-moulded earplugs, that can be integrated with a special filter to attenuate all sounds by 15dB.

Often, because people who work in the music industry understand sound, they can prove to be their own worst enemies. They sometimes think that,

by adjusting or controlling sound levels in the studio or on stage, noise damage can be prevented. Sadly this is not always the case.

While most musicians generally appreciate that their profession or hobby exposes them to potentially hazardous noise levels, it is often difficult for them to tell if damage has already been done. The only certain way is to have a hearing assessment—and I believe that if you work in the sound industry it is advisable to have a hearing assessment at least once a year—but there are a few simple questions you can ask yourself to establish whether an assessment is necessary:

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Have you noticed a ringing in your ears hours, even 24 hours, after being exposed to loud sounds? Do you need to raise your voice significantly to be heard during studio work? Does music, sound slightly distorted by the end of a busy day? Do you sometimes feel as though you are hearing through cotton wool? Do voices sound muffled after you have been playing or listening to music for any length of time?

If the answer is 'yes' to any of these questions, you would be well advised to seek advice from an independent hearing specialist, who will give you a hearing assessment that is relatively

quick and straightforward.

If damage has already been done, it need not necessarily mean the end of a career in the sound industry. Hearing aid technology has come along way since the ear trumpet. There are now over 500 different hearing aids on the market. Some, of the latest are so small they can hardly be seen and yet have as much processing power as a desk-top computer.

Hearing devices can be inserted deep into the ear canal, or placed behind the ear and toned to the colour of the skin or hair type. And for the fashion conscious they come in vibrant colours, bright red, yellow, green and even purple. In-built digital software can be individually programmed to adjust to different noise environments. Loud sounds can be softened, and quieter sounds amplified, while unwanted background noise can be significantly reduced.

Here again, independent and qualified help is essential. Some hearing aid consultants may be tied to a particular manufacturer and offer only a limited range of aids. An independent hearing aid audiologist will have access to a comprehensive selection.

One final astounding fact is that around 8.7m adults in the UK are either deaf or hard of hearing. With only 2m hearing aid wearers, this leaves a staggering 6.7m who either do not realise they have a problem or choose to do nothing about it—and this is bound to include a significant percentage of you. ■

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