MAY 1995 $5.00 £2.00

STUDIO SOUND

AND BROADCAST ENGINEERING

INTERNATIONAL PRO AUDIO AND POSTPRODUCTION MAGAZINE

DIGITAL AUDIO WORKSTATIONS

Akai DR8; Fairlight MFX3; Studer Post Trio

NAB 95 DAW developments; Open Media Interchange

Software longevity solutions

Hard Disk Systems

Digital distraction or nonlinear necessity?

Warner Bros Studio

Postproduction perfection in California

9 770144 594017 05

PRICE: THE FINAL FRONTIER

Here's SABRE***plus***, a breakthrough from DAR, the company that defined Digital Audio Workstations. Taking the original Sabre concept to new levels of productivity, SABRE***plus*** combines editing, from both hard and optical disk, with powerful mixing and processing.

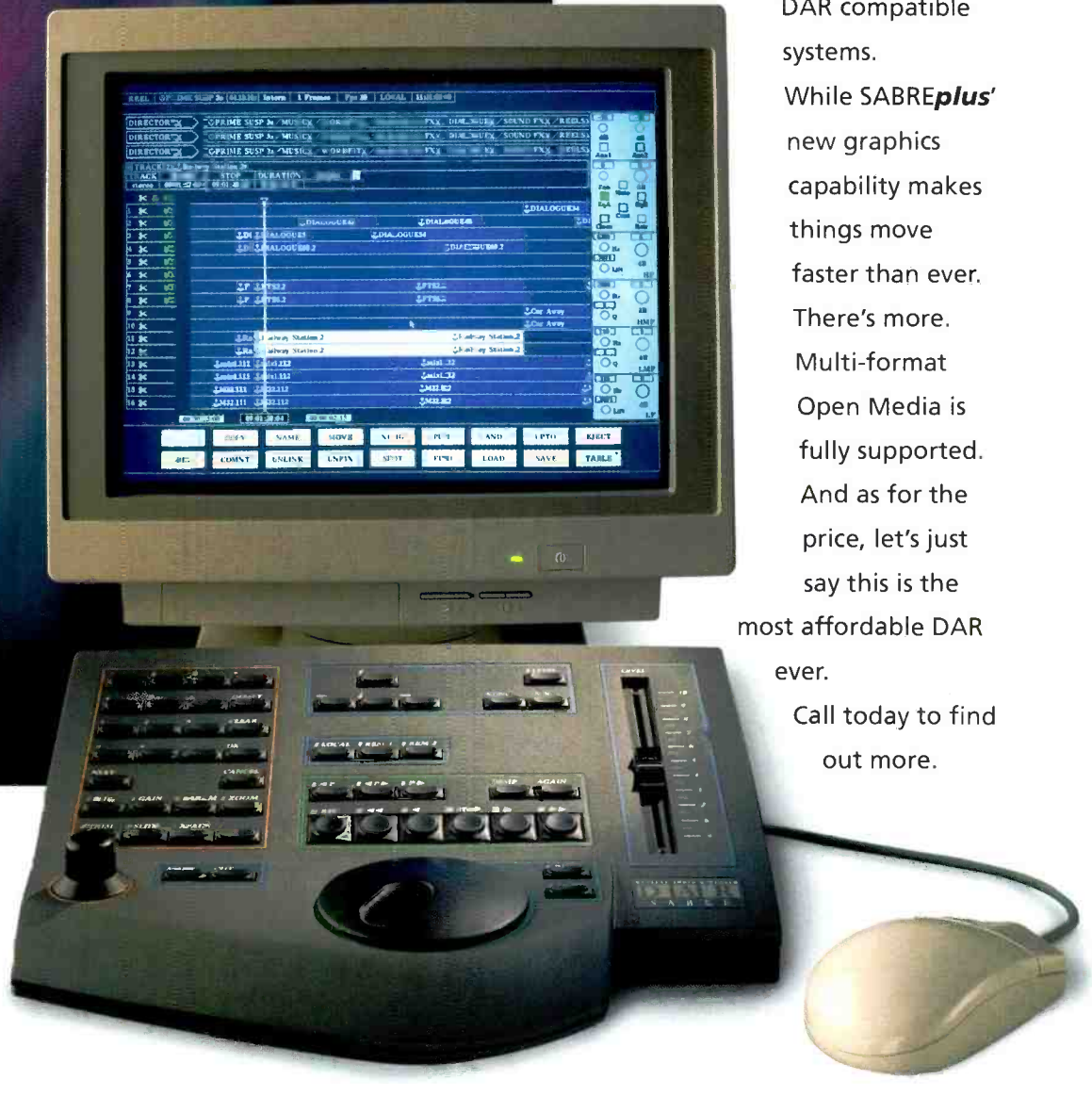
A built-in networking facility delivers true multichannel communication with other DAR compatible systems.

While SABRE***plus***' new graphics capability makes things move faster than ever.

There's more. Multi-format Open Media is fully supported.

And as for the price, let's just say this is the most affordable DAR ever.

Call today to find out more.



DIGITAL AUDIO RESEARCH

DAR

Digital Audio Research Limited, 2 Silverglade Business Park, Leatherhead Road, Chessington, Surrey, KT9 2QL, UK Tel: +44 (0)1372-742848; Fax: +44 (0)1372-743532

STUDIO SOUND
AND BROADCAST ENGINEERING

May 1995
Volume 37 Number 5
ISSN 0144 5944

EDITORIAL
Editor: Tim Goodyer
Production Editor: Peter Stanbury
Editorial Secretary: Deborah Harris
Consultants: John Watkinson; Sam Wise
Columnists: Barry Fox; Kevin Hilton; Martin Polon
Regular Contributors: James Betteridge; Simon Croft; James Douglas; Ben Duncan; Tim Frost; Philip Newell; Terry Nelson; Dave Foister; Francis Rumsey; Yasmin Hashmi; Zenon Schoepe; Patrick Stapley

ADVERTISEMENTS
Executive Ad Manager: Steve Grice
Deputy Ad Manager: Phil Bourne
Business Development Manager: Georgie Lee
Advertisement Production: Carmen Herbert
PA to the Publisher: Lianne Davey

CIRCULATION
Assistant Circulation Manager: Diana Rabôt

Managing Director: Doug Shuard
Publisher: Steve Haysom

EDITORIAL AND ADVERTISEMENT OFFICES
Spotlight Publications Ltd, 8th Floor, Ludgate House, 245 Blackfriars Road, London SE1 9UR, UK. Tel: 071 620 3636. Fax: 071 401 8036.

NEWSTRADE DISTRIBUTION (UK)
UMD, 1 Benwell Road, London N7 7AX, UK. Tel: 071 700 4600. Fax: 071 607 3352.

© Spotlight Publications Ltd 1994.
All rights reserved.

Origination by Craftsmen Colour Reproductions Ltd, Unit 1, James Street, Maidstone, Kent ME14 2UR.

Printed in England by St Ives (Gillingham) Ltd, 2 Grant Close, Gillingham Business Park, Gillingham, Kent ME8 0QB, UK.

Studio Sound and Broadcast Engineering incorporates Sound International and Beat Instrumental.

Studio Sound is published monthly. The magazine is available on a rigidly controlled requested basis, only to qualified personnel.

Subscription Rates:
UK annual subscription: £24.00
Overseas surface mail: £30.50/US:$89
USA airspeeded delivery: $70

Subscription Enquiries
UK: Subscription Dept, Studio Sound Magazine, Spotlight Publications Ltd, Royal Sovereign House, 40 Beresford Street, London SE18 6BQ.
USA: Studio Sound Magazine, 2 Park Avenue, 18th Floor, New York, NY 10016.
US Postmaster
Please send address corrections to: Studio Sound Magazine, c/o Mercury Airfreight International Ltd Inc, 2323 Randolph Avenue, Avenel, New Jersey NJ 07001.
US second class postage paid at Rahway, NJ.

ABC AUDIT BUREAU OF CIRCULATIONS BUSINESS PRESS

PPA PERIODICAL PUBLISHERS ASSOCIATION

Total average net circulation of 18,834 issues during 1993. UK: 7,357. Overseas: 11,477. (ABC audited)

un A United Newspapers publication

Border Crossing

My March leader worried around the issue of the progressive destruction of barriers—physical, social and political—and the part played by technology in this particular aspect of 'progress'. The message, like the issue itself, was not clear. It was more a collection of facts and observations than a reasoned argument, through which I attempted to bring our collective attention to an area that certainly has to be a source of trouble, yet may offer untold possibilities in days to come.

A few months on, the following incidents demonstrate that nothing much has changed.

I gave a couple of examples of how our convergent business has been wrong-footed by barriers within manufacturers organisations. I drew those from 1987, but the recent NAB convention proved that the same problems prevail in 1995—after my comments. In this case, while the US arm of one Japanese company were proudly launching equipment, other territories' branches were desperately trying to keep its existence under wraps. 'Would I cooperate with them?', they asked. 'But I'm editing an international magazine,' I replied...

Last month, in San Francisco, maverick computer programmer Dan Farmer released an Internet security testing program called *Satan* (aka *Santa*). While the original intention was to offer Net users a tool to check their own security measures, the program can obviously be used by hackers to identify system openings. While news of *Satan* has carried readily around the world on the Net, less is known of a US Government counter-initiative called *Courtney* to provide warning of when *Satan* is being used to probe your network security.

So while Farmer's motives appear honourable (*Satan* was highly-publicised to cancel any advantage it would give hackers), those network operators closer to the US Government can expect to have a lead on those still in the dark over *Courtney*.

The conclusion drawn by *The European Magazine* was that 'the Net is no place to be doing business because it is so insecure'.

In an even more confusing incident, I recently found myself at the sharp end of a complaint concerning an advertisement carried by *Studio Sound*. A Dutch female reader had complained to the Dutch ASA that she considered one particular ad to be sexist. The Dutch ASA handed the complaint to the British ASA on the grounds that *Studio Sound* is published in the UK. I pointed out that the ad was generated by an American company and that the magazine is circulated in well over 100 countries. The matter remains unresolved.

The writing is on the wall: the world is shrinking and such anomalies need to be resolved. In the case of pro-audio industry, I fear that those companies choosing to maintain 'regional attitudes' will find themselves increasingly at odds with other aspects of the business. This is much more than a PR problem—can facilities and operators reasonably be expected to be penalised for operating within particular territories? Will the situation result in facilities choosing their location with respect to that of manufacturers? Will it encourage a fresh outbreak of 'grey imports', circumventing manufacturers' internal politics at the expense of appropriate technical support? Neither of these scenaria are acceptable to me—nor, I suspect—are they acceptable to the majority of the pro-audio fraternity.

With particular examples in mind, it is apparent to me that the lesson was not learnt in 1987 any more than it was learnt in 1992 when Alesis tried to exercise some rather unorthodox control of the launch of the *ADAT*. It was certainly still here in at the time of 1995's NAB Convention. Are we ready to learn now, or are we prepared to pay the price? ■

Tim Goodyer

Cover: Screen from Digigram's *Xtrack* production-postproduction workstation

What Our New 20 Bit A/D Converter Does For Your 16 Bit Sound.

Unobstructed, the human ear is a remarkable piece of audio equipment. And, unless you've operated a jack hammer for years, chances are you can still hear all the way up in the 22 bit range.

With the Symetrix 620, 20 Bit A/D Converter, your 16 bit DAT, work- station or Modular Digital Multi-Track will come much closer to reproducing the sound quality you're capable of hearing.

But how, you ask?

The secret lies in the 620's ability to quantize 20 bits of audio. Using dither and noise shaping, you'll hear a dramatic reduction in distortion and increased resolution of low level signals. The result is cleaner, more fully imaged sound.

For an ear-opening demonstration, call World Marketing Associates for the Symetrix 620 dealer nearest you at +44 (0)1637.877170 or (206) 787-3222.

Priced at under $1,000, it's substantially more than a box of q-tips. But if you keep your ears clean, we guarantee you'll hear a world of difference.

Symetrix

MULTIMEDIA BENEFITS
•8 Bit Output
•Real Time 44.1 to 22.05 Sample Rate Conversion

RECORDING BENEFITS
•20 or 16 Bit Output
•Dither & Noise Shaping
•Multiple Sample Rates

World Events

May 1995

● May 1st, **IEE Audio Engineering Colloquium**, IEE Head Office, Savoy Place, London, UK. Tel: +44 171 240 1871 x2206.

● May 2nd–3rd, **AES Conference: The Future of Radio**, Kensington Town Hall, London, UK. Tel: +44 1628 663725.

● May 3rd–4th, **Apple New Media Forum**, Cannes, France. Tel: +33 93 39 74 39; +1 800 260 9099.

● May 3rd–5th, **Digital Media 95**, Congress Centre, London, UK. Tel: +44 171 226 8585.

● May 9th–12th, **Pro Audio, Light and Music China 95**, Beijing Exhibition Centre, People's Republic of China.

● May 13th–21st, **MultiMediale 4**, ZKM-Centre for Arts and Media Technology, Karlsruhe, Germany. Tel: +49 721 9340 0.

● May 14th, **National Vintage Communications Fair**, NEC, Birmingham, UK. Tel: +44 1398 331532.

● May 15th–20th, **Expo Comm Moscow Sviaz 95**, Krasnaya Presnya Fairgrounds, Moscow, Russia. Tel: +70 95 255 3739.

● May 16th–18th, **DSPx 95 Exposition and Symposium**, San Jose, California, US. Tel: +1 203 840 5652.

● May 16th–18th, **Internet World International**, Wembley Conference Centre, London, UK. Tel: +44 181 364 9100.

● May 17th–20th, **KOBA 95**, Korea. Tel: +44 1923 244661.

● May 18th–20th, **Conference: Lone Wolf MediaLink Development**, Claremont Hotel, Seattle Washington, US. Tel: +1 206 728 9600.

● May 23rd–25th, **Midem Asia**, Hong Kong. Tel: +44 171 528 0086.

● May 30th–31st, **Leipziger MedienMesse Hörfunk**, Leipziger Messe, Leipzeig, Germany. Tel: +37 41 2 230.

● May 30th–June 1st, **ShowTech 95**, Messe Berlin, Berlin, Germany. Tel: +49 30 3038.

June 1995

● June 5th, **BKSTS Visit: CRL**. Tel: +44 171 242 8400.

● June 5th–6th, **Apple New Media Forum**, Los Angeles, California, US. Tel: +33 93 39 74 39; +1 800 260 9099.

● June 8th–10th, **2nd Annual South American Pro Audio Expo**, Centro de Extension, Santiago, Chile. Tel: +56 2 635 1994; +1 914 993 0489.

● June 8th–12th, **China Sound Light & Music**, Beijing Exhibition Centre, People's Republic of China.

● June 8th–13th, **International Television Symposium and Exhibition**, Montreux, Switzerland. Tel: +41 21 963 3220.

● June 10th–12th, **12th ShowBiz Expo West**, LA Convention Centre, Los Angeles, US. Tel: +1 714 513 8400.

● June 13th–15th, **REPLItech International**, Santa Clara Convention Centre, Santa Clara, US. Tel: +1 914 328 9157.

● June 13th–16th, **ExpoShow 95**, St Petersburg, Russia. Tel : +70 812 271 4147.

● June 14th–15th, **Apple New Media Forum**, New York, US. Tel: +33 93 39 74 39; +1 800 260 9099.

● June 19th–20th, **Radio Festival Trade Exhibition**, International Convention Centre, NEC, Birmingham, UK. Tel: +44 1491 838575.

● June 21st–23rd, **Audio Technology 95—The APRS Show**, National Hall, Olympia, London, UK. Tel: +44 1734 756218.

● June 21st–23rd, **7th Japanese Regional AES Convention: Advanced Audio Technologies for Audio-Video and Multimedia**, Sunshine City Convention Centre, Tokyo, Japan. Tel: +81 3 3403 6649.

July 1995

● July 6th–7th, **IBC Conference: Digital Audio Broadcasting**, Marriott Hotel, London, UK. Tel: +44 171 637 4383.

● July 12th–14th, **Pro Audio and Light Asia 95**, World Trade Centre, Singapore. Tel: +852 865 2633.

● July 17th–19th, **WCA 95. Wireless Cable Association Show**, Washington Convention Centre, Washington, US. Tel: +1 202 452 7823.

● July 23rd–25th, **British Music Fair**, Olympia, London, UK. Tel: +44 181 907 8314.

August 1995

● August 17th–20th, **Popkomm**, KölnMesse, Köln, Germany. Tel: +49 221 8210.

● August 25th–28th, **Beijing International Radio and TV Broadcasting Equipment Exhibition 95**, Beijing International Exhibition Centre, Beijing, People's Republic of China.

September 1995

● September 6th–9th, **1995 World Media Expo**, New Orleans Convention Centre, New Orleans, US. Tel: +1 202 429 5350.

● September 10th–12th, **ECTS**, Olympia Grand Hall, London, UK. Tel: +44 181 742 2828.

● September 10th–13th, **PLASA**, Earls Court 2, London, UK. Tel: +44 171 370 8179.

● September 14th–18th, **IBC 95**, RAI Centre, Amsterdam, Holland.

● September 19th–24th, **Live 95**, Earls Court, London, UK. Tel: +44 181 742 2828

● September 21st–24th, **Nordic Sound Symposium XVII**, Bolkesjø Mountain Hotel, Norway. Tel: +47 2 79 7730.

● September 22nd–24th, **ShowBiz Europe**, MOC Exhibition Centre, Munich, Germany. Tel: +49 89 47 02 399.

October 1995

● October 6th–9th, **99th AES Convention**, Jacob K Javits Centre, New York, US.

● October 17th–19th, **Vision 95**, Olympia, London, UK. Tel: +44 181 948 5522.

● October 19th–23rd, **9th International Audio, Video, Broadcasting and Telecommunicationas Show. IBTS**, South Pavilion, Milan Fair, Milano-Lacchiarella, Italy. Tel: +39 2 481 5541.

● October 24th–26th, **REPLItech Asia**, Singapore International Convention and Exhibition Centre, Singapore.

● October 25th–28th, **Broadcast Cable and Satellite India 95**, Pragati Maidan, New Delhi, India. Tel: +91 11 462 2710.

November 1995

● November 1st–5th, **Audiovideo-95**, Lenexpo Exhibition Complex, St Petersburg, Russia. Tel: +7 812 119 6245.

● November 2nd–4th, **Broadcast India 95**, World Trade Centre, Bombay, India. Tel: +91 22 215 1396.

● November 7th–9th, **Wireless World Expo 95**, Moscone Centre, San Francisco, US. Tel: +1 301 986 7800.

● November 9th, **20th Sound Broadcasting Equipment Show. SBES**, Metropole Hotel, NEC, Birmingham, UK. Tel: +44 1491 838575.

● November 21st–23rd, **Visual Communications 95**, London, UK.

December 1995

● December 5th–9th, **Expo Comm China South 95**, Guangzhou Foreign Trade Exhibition Centre, Guangzhou, Peoples Republic of China. Tel: +86 1 841 5250; +1 301 986 7800.

● December 6th–9th, **Communications India 95**, Pragati Maidan, New Delhi, India. Tel: +91 11 462 2710.

January 1996

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

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

February 1996

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

September 1996

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

November 1996

● November 5th–9th 1996, **PT/Expo Comm China**, China International Exhibition Centre, Beijing, Peoples Republic of China. Tel: +52 525 592 3257; +1 301 986 7800.

February 1997

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

International News

In-brief

● ABC at KOBA 95

Audio Follow and Netia are showing at May's KOBA 95, held in Seoul, Korea. The two companies are exhibiting their full range of network products and solutions, from news-assist to broadcasting, forming what they call A B C, the Audio Broadcast Concept.

Audio Follow, France.
Tel: +33 1 46 07 26 26.

● Royal Television Society recruitment drive

The Royal Television Society are launching a campaign to encourage more television industry professionals to join, pointing out the difficulty and necessity of keeping pace with technological change. To promote the campaign a special membership rate of £35 (as against the usual £49) has been introduced for new members joining in 1995.

Royal Television Society, UK.
Tel: +44 171 430 1000.

● APT Japanese century

Audio Processing Technology have announced that they have now supplied over 100 digital audio codecs employing proprietary apt-X compression to radio broadcasters in Japan. The systems are widely used for ISDN audio transmissions between studios and for studio to transmitter links.

Audio Processing Technology, UK.
Tel: +44 1232 371110.

● Wohler extract digits

The first Wohler, powered, stereo monitor with a built-in Serial Digital Audio Extractor (SDAE) has been installed at the Premier Sports Network facility in Sydney, Australia. The SDAE option allows direct monitoring of embedded audio in serial digital-video signals. The unit is a 1U-high *AMP-1A*, which incorporates five speakers and three power amplifiers. Other options inside the unit include a separate AES-EBU input and analogue line outputs. PSN's new Wohler serves as a technical monitoring facility, and is located next to the main router serving PSN's two new fully digital on-line edit suites.

Wohler Technologies, US.
Tel: +1 415 589 5676.

● Lightworks join Tektronix

Tektronix Inc and Lightworks Editing Systems Ltd have reached agreement for Tektronix to acquire Lightworks. The deal, described as a pooling of interests, focuses on the integration of Lightworks' editing systems with Tektronix' disk storage, networking and archival systems.

Lightworks, UK.
Tel: +44 1252 794099.
Tektronix Inc, US.
Tel: +1 503 685 4038.

Ampex to be sold

Ampex Media Corporation have announced that a letter of intent has been signed by Ampex Corporation to transfer ownership of AMC and subsidiaries as part of a restructuring of AMC's debt. The new owners will be a group of international financial institutions who are AMC's existing lenders. As part of the restructuring, a portion of AMC's existing debt will be exchanged for equity.

Thomas J Wheeler, President and CEO of AMC, comments: 'We are very pleased to advise our customers, employees and suppliers of these developments. This restructuring will balance our financial resources with the requirements to succeed in the dynamic global marketplace for professional users of recording media.'

AMC will continue to do business worldwide through current subsidiaries in the United States and elsewhere. It is anticipated that a final agreement and closing of the transaction will be completed within 90 days. AMC and its affiliates will operate under new names to be announced in the near future.

Ampex Media Corporation, US.
Tel: +1 415 367 3889

Studio Accord set up TDG

The UK Studio Accord have announced the start of a series of Technical Discussion Groups (TDGs) aimed at exchanging information between member studios and identifying common technical problems. The Accord membership, currently standing at 18 studios, includes top names such as AIR, Abbey Road, CTS, Metropolis and Sarm.

The first TDG was held at AIR Lyndhurst in April, and was attended technical heads from the membership along with representatives from the Accord committee.

'It was the first time that so many Technical Heads of Department had been brought together in one room, and it was a very enlightening experience,' commented Accord co-chairman Piers Ford-Crush from Eden Studios. 'What fundamentally came out of this introductory meeting was that many of the problems studios thought were unique to themselves were in fact widely shared. By bringing issues out into the open and communicating problems, I believe these meetings will prove very valuable.'

A wide range of topics were discussed at the three-hour meeting, including interfacing, tape formats, manufacturer support and technical training. At future TDGs, the Accord plan to invite manufacturers to contribute to the discussions.

'There is certainly a lot we can learn from talking directly to manufacturers and vice versa,' said Ford-Crush. 'I think there is far less communication between studios and manufacturers than there used to be, and this will provide an ideal opportunity for us to get together and rectify that.'

Studio Accord, UK. C/o APRS.
Tel: +44 1734 756218.

SPARS code reinstated

SPARS (Society of Professional Audio Recording Services) board members have voted unanimously to reinstate the SPARS recording code which was established shortly after the introduction of the CD and retired in 1991. Initially, the SPARS code was displayed on albums, cassettes and CDs to differentiate between analogue and digital in the three stages of recording, mixing and mastering. During the introductory period of digital recording the three-letter code served to educate the public about the new technology. Never intended as a value judgement of analogue versus digital, the code was retired after a decade of industry-wide acceptance of digital technology.

Today, with both formats developed to an unprecedented degree and utilised at the discretion of the artist, producer, engineer and record company, it is felt by SPARS that the code serves a worthwhile function in accurately documenting the process of audio recordings.

SPARS, US. Tel: +1 407 641 6648.

Xmidi grows

Digital Design and Development reported growing interest in the Xmidi extension of MIDI at the Frankfurt show. Meetings at the show resulted in several companies agreeing to their interest to be made public, with official endorsement from C-Lab Digital Media, Passport Designs, Miditemp GmbH and Charlie Lab Srl; other interested names include Akai, Allen & Heath, Böhm, Emagic, General Music, Kurzweil, Lexicon, Mackie, Midiman and Penny & Giles. These are some of the 80 companies DDD have been meeting since March 1983, 28 of which have Secrecy Agreements in place while 24 evaluation and development kits are in their development labs.

Digital Design and Development, Belgium. Tel: +32 2 2702797.

Brussels: Dan Lacksman, Belgian Producer of ambient dance group Deep Forest, has installed a Sony *PCM-3348* DASH recorder in his second Synsound Studios facility in Brussels. Synsound started out as a modest home studio, but subsequent success forced Lacksman to add a new Munro-designed facility, redeveloped around an old house and a former brewery. The *3348* is the first in Brussels, and joins other Sony equipment including *C-800* and *800G* microphones. Sony Broadcast and Professional Europe. Tel: +44 1256 483646.

Singapore-UK: By the time this appears a world first should have happened: two artists in different hemispheres and time zones recording a single together at the same time via SSL's *Worldnet* ISDN link. Japanese guitarist Hotei will be at Form Studios in Singapore along with Phil Ramone, recording with Jesus Jones at Peter Gabriel's Real World. Ramone has worked extensively with ISDN, on Sinatra's two Duets albums, but this will be his first time recording and mixing a single while communicating simultaneously with two artists separated by over 7,000 miles. The result should be released the following day at SE Asia's music industry convention, IMM 95 in Singapore.
Solid State Logic, UK. Tel: +44 1865 842300.

Leitch links for Digital's *Alphas*

Leitch Technology Corporation have announced a major contract to design and manufacture a broadcast quality, real-time, 10-bit, digital, video, audio and time-code 'PCI interface' for Digital's *Alpha* 64-bit computers. The interface will process time-coded and genlocked 8-bit or 10-bit serial digital video and provide for two AES-EBU stereo audio inputs and outputs to allow simultaneous record and playback of up to four channels of monaural audio.

The video input and output is serial 4:2:2 (as per SMPTE 259M with a full 10-bit path supported in real-time uncompressed mode. If the user chooses a compression ratio, then a JPEG compression and decompression path is selected. The initial device-driver support for the module will be for the OSF/1 operating system. The full AES frame and subframe structure is maintained through the interface and is never compressed.

Leitch Technology Corporation, UK. Tel: +44 1256 880088.

ISDN from M Corporation

The M Corporation and 4-Sight International have joined forces to launch a new system for transferring digital-audio files around the world using ISDN. Intended to replace the traditional courier service, the system expects to deliver an average 3-minute digital soundtrack recorded for proofing at 32kHz from London to Los Angeles in around ten minutes, and the use of the M8 board allows a broadcast quality 44.1kHz file to be transferred in the same length of time.

The M Corporation, UK.
Tel: +44 1425 470007.

BBC log with Prism

The BBC's World Service Monitoring have ordered a 160-channel digital-audio recording system from Prism Sound, based on Prism's *Transerv* fileserver and *TR4000* workstation products. The system will log broadcast transmissions on hard disk for short-term storage and on 4Mb DDS2 computer DAT drives for archival use. It provides remote operator workstations which allow instant access to the last 16 hours of material from all 160 channels, even if the desired item is still recording, while older items can be restored if needed from the archive DATs.

The Prism Sound equipment replaces an analogue tape-based system and provides improved audio quality with both disk-based and tape-based digital storage. For retrievals within 16 hours of broadcast users will no longer have to recover recordings from tape and it will no longer be necessary to interrupt recordings when immediate processing is required. Recordings are selected by Station or Channel and the time of broadcast.

The new system can be expanded if needed by adding more recording modules and disks or by connecting more operator workstations.

Prism Media Products, UK.
Tel: +44 1223 424988.

First trans Pacific Dolby Fax

Australian postproduction facility Soundfirm have just completed the first trans Pacific use of the Dolby Fax system on the major US feature film *The Mighty Morphin Power Rangers* being edited in Los Angeles. The system was used to meet Director Bryan Spicer's need for ADR from two of the film's actors based in Australia without the cost in money and time of travel to the States. During the 6-hour session not only was two-way communication maintained but both the director and the actors were able to watch the same screen image in perfect sync by locking up the video machine in LA with the local machine in Sydney.

Since then Soundfirm have used the facility for last-minute changes to the rough mix for *A Kid in King Arthur's Court*. The changes were made at a day's notice and transmitted via Dolby Fax to the US, where the mix was recorded and reinserted into the mix in time for the audience preview that evening.

Dolby Laboratories, US.
Tel: +1 415 558 0200.
Dolby Labs, UK: +44 1793 842100.
Soundfirm, UK. Tel: +61 3 690 8488.

Contracts

● New Tokyo venues

Recent sales of EMO's *GEQ* graphic equaliser range include twenty units to the two venues in the new Ebisu Garden complex in Tokyo, supplied by MTC Japan. The equalisers, 16 single-channel *GEQ30*s and four *GEQ60* twin channel, are to control the various sound systems in the Garden Hall and the Garden Room, including one of Japan's biggest Turbosound Flashlight systems.

EMO Systems, UK.
Tel: +44 191 373 0787.

● Euphonix in Des Moines

The latest sale of a Euphonix *CS2000* goes to SR Audio and Cinemedia Productions in Des Moines. The 48-channel desk has *SnapShot Recall*, *Total Automation* and onboard dynamics, and helps the studio in their practice of spending days on commercial production, music scoring and audio post, and evenings working with local and regional artists.

Euphonix, US. Tel: +1 818 766 1666.

● Microns for Jordan

Audio Engineering, manufacturers of Micron radio microphone systems, have supplied their 6-way *MDS-2* diversity rack, together with *TX501 Series* UHF pocket transmitters and hand-held transmitters, to Jordan Radio and Television. The contract was won by local company May Electrical Engineering after competitive international tender.

Audio Engineering, UK.
Tel: +44 171 254 5475.

● Red 6 on target

Only just launched at the Paris AES, Focusrite's *Red 6* mic preamp, EQ and fader has already sold over 100 units in Europe, the States and the Far East. In addition, five ISA-315 Isomorphic Mastering EQs have been sold in the last month to Japanese facilities including both JVC and Denon's Mastering Centres and King Records.

Focusrite Audio Engineering, UK.
Tel: +44 1628 819456.

● Meyer and the Beast

Jands Production Services of Sydney have opted for Meyer loudspeakers for the Australian production of Walt Disney's *Beauty and the Beast*, following New York and Los Angeles productions with all-Meyer sound systems. This sale, direct from Meyer Sound to Jands, includes two of Meyer's latest products, the *UPA-2C* and *UPM-2* Reinforcement loudspeakers, making Jands one of the first Australian sound companies to use them. The entire system will be tested and aligned with Meyer's *SIM System II*.

Meyer Sound, US.
Tel: +1 510 486 1166.

"Obviously, These Guys Are Serious About Audio."

—D&R Orion Review, Mix Magazine

If you weren't aware of how popular D&R consoles have become, we understand. After all, we're not very good at making a lot of noise.

As thousands of D&R owners know, however, it takes more than our 20-bit-ready- noise floor to sound good. It takes more than our acclaimed Hi-Definition EQs, and our RFI-killing, welded-steel chassis and starground-ing designs.

It also takes attention to a spec few console manufacturers are willing to discuss. We're talking phase coherency—which we tackle head-on by meticulously phase correlating each and every audio stage in every module in every console we craft. The result? Virtually no audible phase shift.

Is all our trouble worth it? Yes. You see, if we settled for "industry standard" phase specs, your music and audio could suffer up to 300% more phase shift. So thanks to our trouble your D&R will deliver sonic ecstacy. Not sonic smear.

Like the magazine said, we're serious. True, maybe we'd have to settle for industry standard performance if we stopped handcrafting consoles, and started assembling them. But we assure you that's another phase we won't be going through.

D&R

EUROPE'S LEADING HANDCRAFTER OF HIGH-PERFORMANCE CONSOLES

D&R Electronica b.v., Rijnkade 15b, 1382GS Weesp, The Netherlands

D&R West: (818) 291-5855 • D&R Nashville: (615) 661-4892 • D&R Southwest: (409) 756-3737

D&R North America: (409) 583-3471 • D&R Latin America: (713) 350-4569

D&R crafts remarkably affordable consoles for music, audio, broadcast, post production, and sound reinforcement. Call us for a free reprint of the 2/94 Mix Magazine Review.

Rode *NT2* studio condenser fresh from down under

ITIS DAB system

French company ITIS now have available what they describe as 'the world's first complete industrial DAB offering, spanning a full range of broadcasting needs from radio studios (Musicam source encoding, programme multiplexing) to networks (telecommunications interfaces) and transmitters (COFDM encoding)'.

The first components in the DAB chain are the Musicam Link source encoders. They encode radio signals on the basis of the Musicam standard and take into account all Programme-Associated Data (PAD). Based on the reference technology developed by the French broadcasting and telecommunications research centre (CCETT), the Musicam Link source encoders comply with the ISO MPEG Audio Layer II standard, and are fully modular and configurable, with remote connection possible by means of a broad range of optional telecoms interfaces or via ISDN.

D-MUX multiplexers, developed in association with TDF, are now included in the ITIS range and use all the functions listed in DAB standard ETSI ETS 300.401 as well as complying with the EUREKA 147 ETI specification. The multiplexed signals and fast information channel (FIC) are merged dynamically.

The D-CAST encoders, are the result of a technology transfer and close association with the CCETT. These fourth generation COFDM encoders, according to ITIS, constitute the first industrial solution to arrive on the market in this area, and comply with both the standards mentioned above.

ITIS, France. Tel: +33 99 23 72 20.

Rode *NT2*

Newly available from Australia (European distribution through HHB)is the Rode *NT2* studio condenser microphone. Reckoned to compare favourably with expensive industry-standard models, the *NT2* features selectable omni and cardioid polar patterns, a 10dB pad switch, a switchable high-pass filter and gold-plated output connector and internal head pins. All wiring is of audiophile grade and the large capsule features a gold-plated membrane. A suspension mount is available separately.

HHB Communications, UK.
Tel: +44 181 962 5000.

MFX news

Fairlight have announced the development of a new MFX film-dubber system. The dubber is to be a dedicated product, specifically for feature film and episodic television production, and will include the ability to control multiple dubbing units from a single remote control, making it the first dubber to be able to control over 300 tracks individually. Tracks can be slipped individually and basic reconforming can be performed on the dubbing stage.

Meanwhile the *MFX3* sees a new event-based equaliser, allowing every clip in the system to have its own independent setting. The EQ is stored for each clip, and moved with it, if necessary. The equaliser has four fully parametric bands, all selectable from 20Hz–20kHz, and settings can be copied from clip to clip or set across an entire range of audio.

This comes alongside news of the sale of a second *MFX3 Mainframe* system to Varitel Video of Hollywood, the move of Fairlight USA to Culver City, California, and a long list of sales—divided between *Mainframes* and *Minis*—of *MFX3* systems to Japanese studios and broadcasters.

Fairlight ESP Pty, Australia.
Tel: +61 2 975 1230.

360 Systems *Instant Replay*

Instant Replay is a professional digital-audio recorder that features immediate access to 500 individual audio cuts of any length. The cuts are mapped to 50 panel-mounted buttons or Hot-Keys for ready access in ten user-defined groups. All recordings are stored on a 4-hour or 8-hour internal hard disk and can be high-speed transferred via the built-in D-NET file transfer network. *Instant Replay* is completely self-contained and features sample-rate conversion, a high brightness information display, AES-EBU and S-PDIF digital I-O, analogue +4dBu I-O and a printer port.

360 Systems. Tel: +1 818 991 0360.

Motionworks *trackworker*

Studio systems integration specialists motionworks have introduced a new track management unit called *trackworker* which provides simple and reliable interconnection of any serial-based transports to utilise the console track-arming facilities on SSL *4000*, *6000*, *8000* consoles. *Trackworker* permits full track selection of all serial machines, such as *ADAT*, Tascam *DA-88*, Otari *RADAR*, DAT and VTRs, from the console, making it simple to ready tracks for recording from the individual channels on the console.

The unit consists of a single 1U-high processor and a console-specific interface module, and can interface directly to a maximum of 24 *ADAT* or *DA-88* machines with additional serial ports provided for DAT and VTR machines. Console Interface Units can be cascaded to provide up to 128 channels. An automation serial connection is also provided to allow for future connection to 'intelligent' control-surface consoles such as the Euphonix *CS2000*.

Motionworks, UK.
Tel: +44 1865 865355.

Sonic Solutions Radio Workgroup

At the NAB Conference in Las Vegas Sonic Solutions introduced their new Radio Workgroup Architecture to enable broadcasters to configure networks of radio-production systems with maximum efficiency, quality and economy for preparing news, spots and longer format radio programmes. The Radio Workgroup Architecture is based on Sonic Solutions' *Sonic System* DAW and *MediaNet*, the company's networking system for high bandwidth multimedia applications. ▶

In brief

● Portadat upgrade

In response to overwhelming customer demand, HHB communications have announced that owners of the ***Portadat PDR1000*** portable DAT recorder will, after all, soon be able to upgrade their machines to ***PDR1000TC*** specifications, equipping them to record, generate and reference to time code. The upgrade, to cost £2,250, will be available from the end of August.

HHB Communications, UK.
Tel: +44 181 962 5000.

● B&K 2812 MkII Mic amp

Bruel & Kjær have complemented their acclaimed range of microphones with the new dual-channel microphone amplifier, ***Type 2812 Mk II***. The unit uses new state-of-the-art operational amplifiers to achieve low self-noise and a claimed dynamic range of up to 140dB. It carries both electronically-balanced and single-ended line-level outputs, and quotes a frequency range of 15Hz–200kHz [sic] within 0.5dB.

Danish Pro Audio, Denmark.
Tel: +45 48 142828.

● Studer *D827-MCH* upgrade

Studer are offering worldwide to all their ***D827-MCH*** users an upgrade kit (hard and software) that gives access to new and enhanced features like DASH lock, configurable digital I-Os via channel remote, and an even faster tape transport. The offer is valid until the end of June 95.

Studer Professional Audio AG.
Tel: +41 1 870 7511.

● Piranha Cables

A new name in cables, Piranha manufactures a comprehensive range of high-quality cables for musicians, studios and hire companies. All are made using oxygen-free cable with high-density, spiral-braided, shield for good hum-and-noise rejection and extremely flexible PVC covering, terminated with black Neutrik connectors or on 100m reels. Standard colour is black, but other colours can be supplied at no extra cost, and names can be printed on the cable itself, also at no extra cost on bulk orders.

Piranha Cables, UK.
Tel: +44 1435 868186

● Virgin M-O disc

Virgin Euromagnetics have announced a range of 3½-inch and 5¼-inch magneto-optical rewritable disks to complement the company's diskette and tape cartridge product series. The single-sided 3½-inch disk comes in two versions, 128Mb and 230Mb, while the double-sided 5¼-inch disk offers up to 1Gb. ▶

Virgin Euromagnetics, UK.
Tel: +44 1293 776252.

● **Otari MiniDisc**

Now available from Otari is the ***MR-10*** MiniDisc recorder-player series, featuring switch-selectable SPDIF, mono-stereo switching, optional RS422 for integration into existing broadcast automation systems, and an extra large LCD window with four lines of 16 characters to show program time and title simultaneously.

Otari, Germany.
Tel: +49 2159 508613.

● **Schoeps microphone preamp**

Following the success of their ***VMS 02 1B***, a preamplifier and matrix box for their ***Colette Series*** miniature stereo recording system, Schoeps have introduced a second version with XLR inputs for use with any condenser microphone. The unit provides switchable gain and fully adjustable width from its built-in MS matrix.

Schoeps, Germany.
Tel: +49 721 943 200.

● **TEAC mini-RAID drive**

TEAC have announced a miniature disk-array unit offering fault-tolerant hard-disk recording. The ***TEAC-STOR TR-405*** measures 82mm x 146mm wide and is small enough to fit inside PCs and specialist studio drive equipment. It comprises five removable hard drives which can be configured to offer RAID Level 3 and Level 5 support (see 'Hard Disk Systems' feature in this issue). Using a fast SCSI-2 interface gives a data transfer rate of up to 10Mb/s, and if a problem should occur the system recognises it with both visual and audible alarms.

TEAC, UK. Tel: +44 1923 225235.
Tascam, US. Tel: +1 213 726 0303. ■

The advantage of the new system is that multiple digital-audio workstations with different capabilities—from small, low-cost journalist news systems to large multitrack editing and mixing systems—can be linked together in a seamless production ring. Users can share common sound files and access them simultaneously in real time as well as sharing hard disk space, I-O devices and system processing resources. The production network can be bridged to a playlist management system so that finished projects can move from production to on-air without passing to another medium.

Sonic Solutions' success continues with credits on films including *The Lion King* and the *Forrest Gump* orchestral score, and the claim that more than half this year's Grammy-nominated songs were edited and mastered using the Sonic System. Sonic's *NoNoise* is also being used by CBS to clean up the audio feed from the O J Simpson trial, reducing background courtroom noises before the feed is distributed throughout CBS.

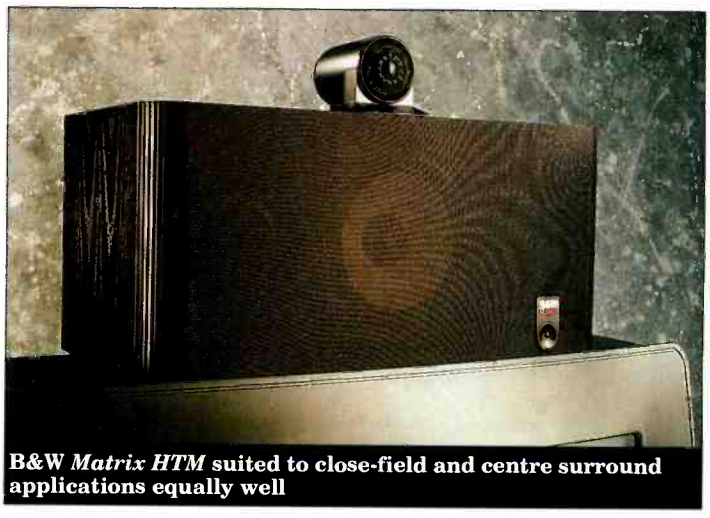
Sonic Solutions, US.
Tel: +1 415 485 4800.

Cooper ENG

New at NAB was an 'over the shoulder'-style ENG mixer from Cooper Sound Systems. The 4-channel mixer is housed in an all-metal chassis with a machined, anodised aluminium front panel, and all controls are located on the front and two side panels. The channels can be linked for stereo applications.

High-quality components include Jensen transformers for the balanced inputs and outputs, gold-plated connector and switch contacts and multiple balanced and unbalanced output connectors for maximum versatility in the field. The mixer will operate for up to 12 hours on eight internal AA cells or on a 6-24V DC external source.

Cooper Sound Systems, US.
Tel: +1 714 248 1361.



B&W *Matrix HTM* suited to close-field and centre surround applications equally well

Conford interfaces

Conford Electronics have introduced a range of three 'useful boxes' comprising a headphone amplifier, a phantom-power box and a balancing box. The *Headphone Amplifier Box* handles balanced or unbalanced signals and has selectable sensitivity and a loop-through facility, and the *Phantom Power Box* uses a high efficiency DC to DC convertor for extended battery life. The *Balance Box* features true floating, transformerless, balanced input and output and will operate in either direction with both microphone and line-level signals. All three run from internal PP3-type batteries or an external regulated 9V source.

Conford Electronics, UK.
Tel: +44 1428 751223.

B&W *HTM*

B&W's *Matrix 800 Series* has been expanded to meet the demands of home cinema, in the process producing a loudspeaker that B&W expect to be equally at home in the studio as a near-field monitor. The *HTM* was created primarily as a quality centre-channel monitor to match existing *800 Series* models, so is naturally suitable for positioning close to video monitors. It houses a single Kevlar cone bass/midrange unit fitted with a high temperature voice-coil wound on a Kapton former, with an externally mounted metal domed tweeter which is magnetically fluid-cooled.

B&W UK. Tel: +44 1903 750750. ■

SOUND CONNECTION

SOUND PERFECTION

Sound out the UK's top interconnect range

Deltron's DGS range of pro-audio products covers every interconnect application you could ever need.

Think of it this way. Between where sound goes in and where sound comes out - we've got the product. XLR, phono, Gotham cable - you name it.

More than that, Deltron's got the know-how. We've worked with top professionals throughout the world, and we can help you too; one-man band to broadcast mega-star.

DELTRON DGS PRO-AUDIO

CONNECT WITH DGS
write for our catalogue now or call today on

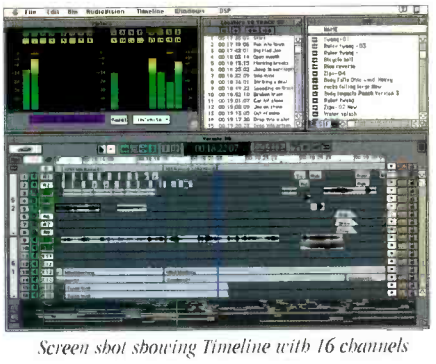
0181 965 5000

or fill in the coupon and fax it to 0181 965 6130

Please send me the DGS pro-audio catalogue
Name
Position
Company
Address
Post Code Tel. No.
Deltron Components Ltd., Atlas Works, Atlas Road, London NW10 6DN

SS/01

AudioVision™ is a complete multi-track audio editing system with sync-locked random-access pictures. **AudioVision**™ enables you to work creatively, accurately and above all, extremely quickly. **AudioVision**™ belongs to Avid's ever-growing family of audio editing, mixing and sound design systems. For applications not requiring pictures Avid's **AudioStation**™ is the cost-effective alternative. Both systems are fully compatible with Avid's **Media Composer**™ family of nonlinear film and video editing solutions and can be used with other digital systems via the **Open Media Framework**™ (OMF) **Interchange.**



Screen shot showing Timeline with 16 channels

- **24 virtual tracks with 4, 8, or 16 inputs and outputs (analogue and digital)**
- **flexible storage media, such as optical, fixed and removable hard disks**
- **specialist tools such as ADR (Automated Dialogue Replacement), time compression/ expansion and pitch shifting**
- **ATM fibre optical network option**
- **Trackit! dubbing chart printing options**

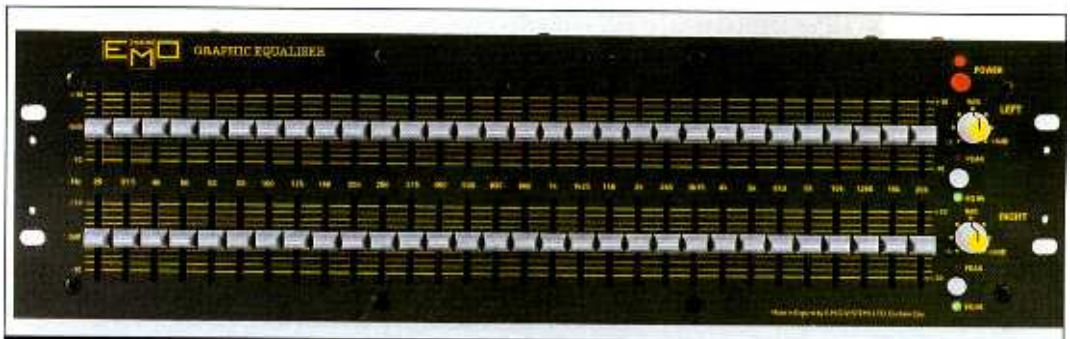
European Headquarters: Tel 44 1753 655999 Fax 44 1753 654999
United Kingdom: Tel 44 171 434 0122 Fax 44 171 434 0560
France: Tel 33 1 41 34 03 03 Fax 33 1 47 57 02 83
Italy: Tel 39 2 4801 2398 Fax 39 2 4819 5651
Germany: Tel 49 811 552 00 Fax 49 811 552 099

Visit us on stand B431/B405 at ITVS, Montreux

A · V · I · D

COURTESY OF WIRED LONDON

EMO *GEQ60*

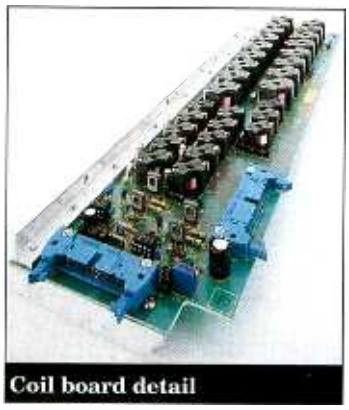


EMO *GEQ60*—impeccable design heritage

Over the years, EMO have established an enviable reputation for what might be termed Useful Black Boxes. Without doubt, this UK company are best known for essential but unexciting paraphernalia such as microphone splitters, DI boxes, mains distribution and switching, rack lights and so on. As a result, their graphic equalisers, the *GEQ* range, have attracted little attention outside their original touring market, being seen perhaps as 'me-too' products from a company whose real expertise lies elsewhere.

The origins of the three *GEQ* models go back some time. They were originally designed with a third party in mind, and since that third party was primarily involved in touring rigs, EMO's traditional values of rugged construction and reliability were to the fore. In the fifteen years since, little has changed in the design of the filter section itself, but the input and output electronics have received several updates, and the whole range has become a fully-fledged EMO unit in its own right.

The *GEQ60* under consideration here is the largest equaliser in the range in terms of bands and channels, although not in terms of size as all three are 3U high. The *GEQ30* and the *GEQ1515* use 60mm sliders to achieve one 30-band channel and two 15-band channels respectively, while the *GEQ60* squeezes two channels of 30-band third-octave EQ into the same size by using 30mm controls. The result, while no more prepossessing than any other graphic equaliser, is certainly not cluttered; the GEQs were designed to be graphics pure and simple, on the assumption that other facilities would be available on consoles and elsewhere. There are therefore no high-pass or low-pass filters or any other extras, each channel having only its 30 filters plus an overall gain control (-infinity to +6dB) and a BYPASS switch with associated LED.



Coil board detail

What the *GEQ*s lack in external frills they make up for with thoughtful, practical internal design and options. All the inductors in the filters are encased in mu-metal to keep out interference, as is the mains transformer to keep it in. Several sets of internal jumpers allow the unit to be configured for the situation it finds itself in; Pin 2-Pin 3 hot switching far each connector, for instance, and the possibility of operating the equaliser completely ground-free. The basic model is unbalanced out and electronically balanced in, with balancing transformers offered as an optional extra—if these are fitted the unit can still be run unbalanced by means of further jumpers. The jumpers are not the easiest to find or to reposition—tweezers are more or less essential—but this is hardly a criticism as access to them will rarely be needed once the unit is installed. Opening up the top to get at them, however, reveals the very high standard of construction, board design and component selection—this is obviously a thoroughly professional, no-compromise piece of kit.

This shows itself too in the all-important sound quality it produces and in its operational ease. The sliders are smooth with a distinct yet not too stiff centre detent, and when set to those detents give a response which, to the ear at any rate, is indeed flat (EMO quote a response within 1dB, 20Hz–20kHz, with the controls in but flat). The results when they are adjusted are everything you could hope for from a graphic. Early experiences with less august graphic equalisers have left me less than favourably disposed towards the breed as a whole, but the EMO unit seems to lack the peaky, phasy, lumpy side effects which can let down so many designs. The range of the filters is a modest ±12dB, and this fact, coupled with the sensibly-chosen filter shapes, means that it is difficult to achieve anything other than smooth, musical, unobtrusive equalisation even at the difficult bottom end.

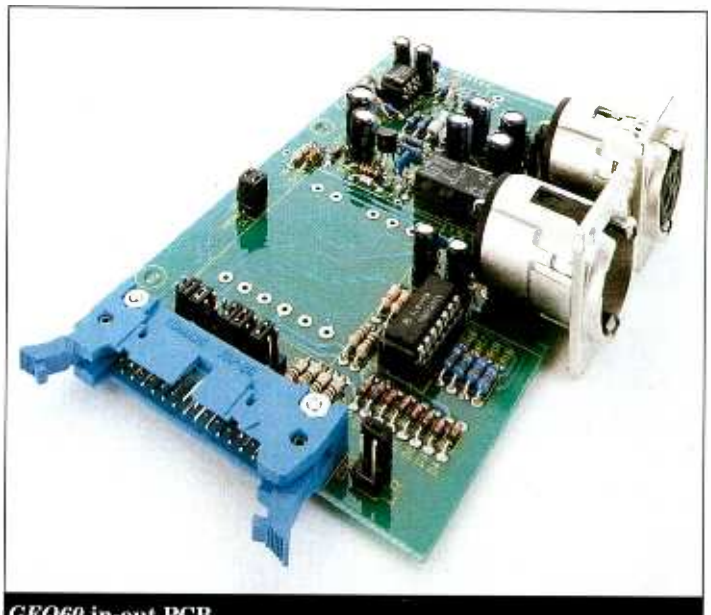
It is most likely that a 2-channel over-and-under graphic like the *GEQ60* will be used to EQ a stereo signal, and here a balance must be struck between the convenience of having both channels in such close proximity and the fiddliness of the necessarily short-throw sliders. On the EMO unit it is not easy to be absolutely sure that the two channels are set identically since the travel of the controls is so small and so little of the calibration lines shows between them, but it does seem that if they can be reliably placed in the same mechanical position then they will indeed be at the same electrical setting—the calibration is good.

Because of the likelihood that a graphic will be carrying the entire signal on a job—console outputs to amp racks, for instance, or corrective EQ on a monitor system—manufacturers are always keen to push the all-important noise specification. EMO's figure is -90dBm, which with a maximum output level of +20dBm gives a very healthy dynamic range. The noise level is subjectively very low indeed, with no tendency to add its own contribution as the higher bands are raised.

This is to my mind a very desirable equaliser, which does its job smoothly and competently without any of the typical drawbacks. Its sonic integrity is unquestionable, and it has the vital characteristic of having no characteristics other than ease of use and high quality, neutral, controllable sound. ■

Dave Foister

EMO Systems, Durham Road, Ushaw Moor, Durham City DH7 7LF, UK.
Tel: +44 191 373 0787.



***GEQ60* in-out PCB**

Tape To Tape / London | Record Plant Studios / Hollywood | Townhouse Studios / London | Advantage Audio / Los Angeles | KLOS-FM / Los Angeles

THEY SAY IT'S THE BEST SOUNDING STUDIO DAT RECORDER IN THE WORLD

THE INDUSTRY STANDARD PANASONIC SV-3700

Legendary sound quality has established the Panasonic SV-3700 as the industry-standard studio DAT recorder, with countless hit records, movie soundtracks, TV and radio productions to its credit. Many of the world's leading audio facilities will not contemplate mastering to anything else. In addition to sonic superiority, superb build quality and an uncompromising list of professional facilities, the SV-3700 also features an extremely competitive price tag – thanks to HHB, the world's leading independent supplier of DAT technology. We'll even give you more than 40 hours of free recording time on HHB DAT Tape when you buy an SV-3700 or SV-4100 from us, or one of our authorised dealers, between February 1st and December 31st 1995*. If that sounds good to you, visit your nearest HHB DAT Centre or mail the coupon below.

FREE TAPE OFFER
20 x HHB DAT122
More than 40 hours of free recording on the world's leading professional DAT tape when you buy an SV-3700 or SV-4100 from HHB or a participating dealer between 1/2/95 and 31/12/95*. Call HHB or mail the coupon below for full details.

INTRODUCING THE NEW PANASONIC SV-4100

Just think of the new Panasonic SV-4100 DAT recorder as an "SV3700 on steroids", with dedicated additional features for video post production and broadcast users, including video and word clock sync, quick start with trim and rehearsal and frame-accurate indexing and assemble editing.

*Certain conditions apply. Conditions available on request from HHB Communications Limited

For full details of Panasonic SV-3700 and SV-4100 DAT recorders, and the free tape offer, please mail this coupon to HHB Communications

Name: _____

Address: _____

Post Code: _____ Tel: _____

HHB

HHB Communications Ltd. 73-75 Scrubs Lane, London NW10 6QU, UK. Tel: 0181 962 5000 · Fax: 0181 962 5050

SS

DAT Digital Audio Tape

Oram Sonics *Vu-More*

As mentioned in the recent review of his equaliser, John Oram's company does not have a huge product range at the moment, but everything he does is that little bit different. What we have here is that rarity, a box with a New Idea in it (although no doubt someone will write in and tell us it's all been done before). The *Vu-More* (sorry about the name) looks like nothing more than a pair of vu meters on a characteristic sculpted Oram blue panel, but a couple of interesting features make it a good bit more than that.

The meters themselves are not without their advantages. They are big and brightly lit, and almost certainly closer to the vu standard than the cheap meters fitted to many consoles, particularly lower down the market, some of which are not fit to measure anything but steady tones. The ballistics are good, with not too much overshoot, a fast rise time and a notable lack of wavering about on its way back down. The scale calibrations are not standard, however, which is the first indication that the meters do more than just show signal levels.

Below the normal scale are two unfamiliar sets of figures, one from -70 to -47 and one from -80 to -57. These come into play for the *Vu-More*'s other role, that of measuring the residual hum and noise levels on the lines on to which the unit is patched. As soon as the signal falls below an internally adjusted preset threshold, the meter illumination changes colour from its normal bright yellow to a distinctive green, and an LED at the end of one of the extra scales shows which one to read. The more sensitive, for use in normal professional situations, has vu corresponding to a noise level of 60dBu, while the other range is 10dB higher. Selection between the two ranges is accomplished by moving jumpers inside the unit, which is something I would like to see reconsidered. In the first place, the potential usefulness of this box makes it worth carrying about from installation to installation, particularly on tour, and the ability to select sensitivity on the front panel would be almost essential for this in order to deal with the different situations one is likely to encounter. In the second place, the way the boards are arranged means that moving the jumpers is just about as awkward as it could possibly be; it also involves removing the bottom cover and half the front-panel screws, and having done it once, believe me, you would avoid doing it ever again if at all possible.

The unit switches between normal signal and noise-measuring modes automatically, without, of course, having any effect on the signal path through it—the *Vu-More* is designed to be inserted between a source and destination, effectively bridging the lines, so any side-effects would be unthinkable. The effectiveness of it buffering is proved by it lack of clicks even when switched on and off. It does, however, make a mechanical noise as its relays switch over to change the function; this almost turns to a clattering as the signal hovers around the threshold and the meters flip backwards and forwards between their two roles, making it worth giving its location serious thought before installation. As supplied, the switch over happens as the background noise and hum level approaches -60, which is obviously well clear of any wanted signals the standard meters would be capable of showing. The remarkable thing is how steadily it shows such low-level signals, making it easy to see when a problem has been solved or at least improved. Its nature also means that it is not possible for sudden clicks or signal to pegstop it while reading noise—it simply reverts to its normal mode.

In between the meters are two large rectangular LEDs, one red and one green, which indicate the phase correlation between the two channels, green being in phase and red out of phase. Normal stereo musical material flashes the green LED distinctly and the red one dimly, and this flashing of the red initially made me wonder how much use it was going to be; deliberately introducing a problem, however, showed how clearly it was displayed, with the red LED unmistakably showing something amiss.

The phase indication can be used to check the phase integrity of individual lines, in conjunction with the *Vu-More*'s other main feature, its built-in oscillator. This can be used to inject signal into a device whose output is then compared with the original source, immediately showing out-of-phase lines or inverting electronics. The oscillator is switched on and off from the front panel and has a level trim control and its output appears on Bantam jacks on the front panel alongside similar jacks for patching into the meters, overriding the rear-panel connectors. For those with bantam patchbays this is fine, particularly if the unit mounted near the patchbay, but I can't help feeling it would have been even more useful to have duplicated the oscillator outputs on the back so that they could more easily be patched as required.

The build of the unit is reassuringly solid, with the unusually thick contoured front panel giving good support and protection to a cabinet which contains more air than anything else. As with Oram's equaliser, the appearance of the whole thing, with its unusual colour and sensible recessed for everything on the front panel, is sufficiently different from the norm to be both distinctive and potentially not to everyone's taste. Its usefulness, however, should appear to most people, particularly anyone who ever has to troubleshoot for hum loops, noisy electronics, or dodgy wiring (somebody else's of course). ■

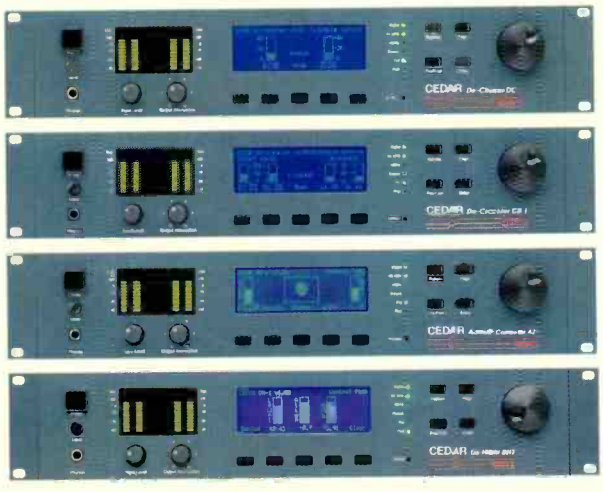
Dave Foister

Oram Consulting, 2 East Terrace, Gravesend, Kent DA12 2DB, UK.
Tel: +44 1474 535888.
Fax: +44 1474 560250.

Oram Sonics' *Vu-more*—new ideas on signal metering

FIRST CAME NOISE REDUCTION NOW COMES NOISE REMOVAL

The CEDAR DH-1 real time stereo de-hisser



Call today for details of important SERIES 2 upgrades to CEDAR's world beating family of real time audio restoration devices. The constantly expanding CEDAR range now includes the DC-1 De-Clicker, the CR-1 De-Crackler, the AZ-1 Azimuth Corrector and the revolutionary new DH-1 De-Hisser

The new DH-1 De-Hisser from CEDAR Audio is the most important breakthrough in the fight against hiss since the advent of noise reduction.

It removes the broadband noise from hissy recordings virtually instantaneously, restoring the original signal in real time with little or no loss of transients or ambience. It's that easy – there's no need for spectral fingerprinting or encoding / decoding, and with both analogue and digital I/Os, it's easier to use than a reverb.

The DH-1's ability to transform noisy recordings makes it invaluable for use in mastering, film, broadcast, archiving and industrial applications.

For full details of this unique new processor and the full range of CEDAR audio restoration systems, call HHB today.

CEDAR

HHB

Leading The World In Real Time Audio Restoration

HHB Communications Limited, 73-75 Scrubs Lane, London NW10 6QU, UK Tel: 0181 960 2144 · Fax: 0181 960 1160
Independent Audio, 295 Forest Avenue, Suite 121, Portland, Maine 04101-2000, USA Tel: 207 773 2424 · Fax: 207 773 2422

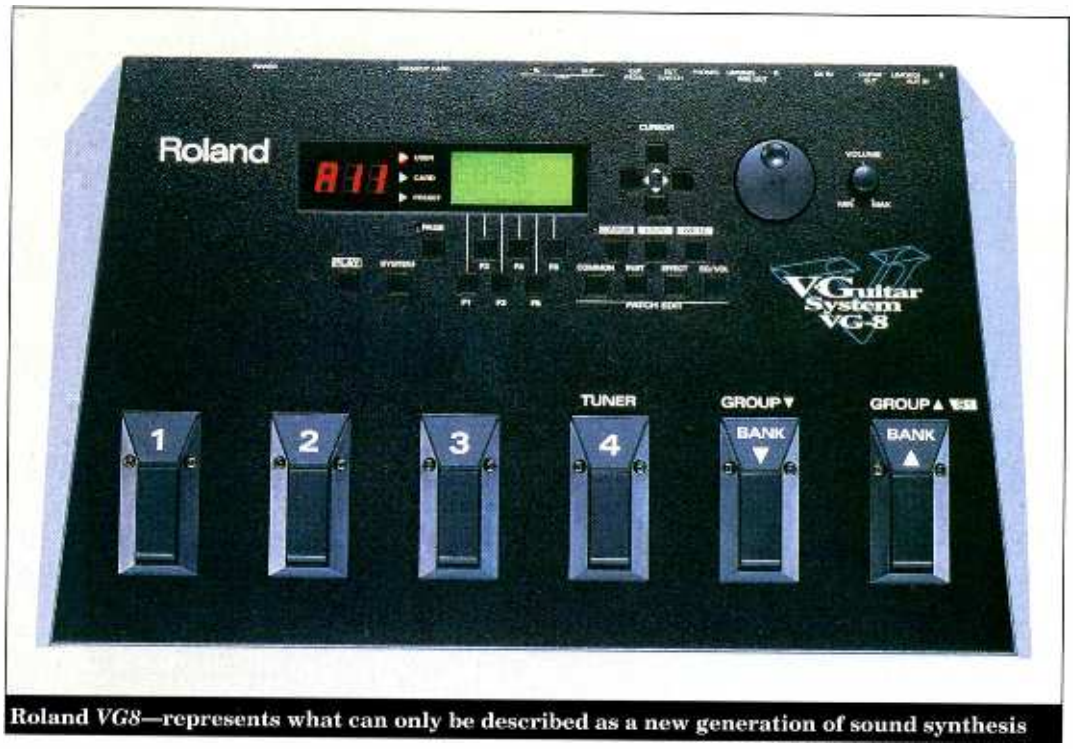
Roland *VG8* Guitar System

The search for the ultimate guitar synthesiser-controller goes on. However, with the release of Roland's *VG8* guitar system we encounter something of a new direction for the role of the guitar as anything other than just a generator of traditional twangy tones.

Previous attempts at using the 6-stringed instrument as a means of controlling MIDI tone modules have run up against a number of pitfalls —although, in my opinion, the Zeta systems have come closer than any of the others. The problems always centre on the not unreasonable request of telling the module which note is being picked and how hard it is being plucked. MIDI guitar controllers can be judged easily on their ability to generate such information quickly, dependably and sensitively—because most cannot, even before we get into the realms of the string bending, vibrato, hammers-ons and snap-offs that can be encountered even in rudimentary playing techniques. The matter is made all the more frustrating by the seemingly ideal nature of the guitar as a means of MIDI control because of its high degree of variability, playability and inflection, but this only serves to underline the inherent limitations and inappropriateness of the guitar for this task with the current technology and the approaches being taken.

Roland have come at it from a refreshingly different angle with no MIDI controller data output. The *VG8* is actually closer to the pure concept of a guitar synthesiser than anything in this area has been since the weird and uncontrollable instruments of the late-1970s. Since the arrival of MIDI, attention has been diverted, perhaps wrongly, to the guitar's contribution as a controller.

With the *VG8* you are presented with a lot of features that are not even contemplated on the average controller. Roland's *GK2A* divided pickup serves as the input to the system and senses each string individually and permits each to be processed individually. The system uses the vibrating string as its source, so we are already talking about something higher than the triggering of an external tone box by deriving the pitch from this vibration. The string vibration is used as the source for modelling one of two basic types of sound called Variable Guitar Modelling (VGM) and Harmonic Restructure Modelling (HRM) using a process called Composite Object Sound Modelling (COSM).



Roland *VG8*—represents what can only be described as a new generation of sound synthesis

HRM takes the guitar waveform and restructures the harmonic content in real time. Any variation in the waveform due to playing technique is registered because it is part of the source material. In fundamental terms, the guitar becomes the oscillator for a synth sound chain. Because of the level of interaction between the sound generation and playing technique Roland are confidently expecting new techniques to arise from the combination in order to exploit the sound generation possibilities to the full.

In VGM, exactly the same signal source is used to model every element of the sound-processor chain for a guitar. You can model body shape and the pickups—not only their type but their position up to and including fret 12. The pickup can also be split to pan diagonally from the bridge to the neck, along with in-phase and out-of-phase switching. Each string can be panned individually in stereo and electronic models of popular Boss effects pedals are included with global reverb, delay and chorus.

The next part of the chain to be modelled for an electric guitar is the amplifier and the speaker cabinet. There are models for vintage 2 x 12s, British stacks and even a *JC120*, and you can also choose the type of mic used and where it is positioned. Everything is achieved digitally and internally. A number of all-new derivatives from this the core unit are to be expected, the first of which is the *GP100* guitar preamp, amp simulator and effects unit which uses the COSM technology.

The brain of the *VG8* is housed in a pedal-board-type floor unit with editability controlled by foot pedals or from a display that is icon-based and very graphical—when you move the position of your virtual pickup on your virtual guitar you see a depiction of what you are attempting on the display. The editability of the *VG8* is potentially extremely powerful.

MIDI is restricted to the output and reception of patch commands, and the device is intended to be totally self-contained. Like a lot of Roland systems these days, the *VG8* uses flash memory to store its operating system and consequently can be updated using standard MIDI files rather than chip swaps. Version 2 software is expected to follow once user-feedback has been harnessed and analysed.

At around £2,000 (UK) including the pickup, it does not appear to have immediate mass appeal although if you compare this price to what you are saving, according to Roland, by not having to buy the endless varieties of guitar and amp combination, then you have a bargain even before you throw in the unique synthesis and sound potential.

Along with Yamaha's *VL1*, the *VG8* represents what can be only be described as a new generation of sound synthesis both loosely similar in attempting to recreate and mimic other instrument types. The *VG8* does for the guitarist what the *VL1* does for the keyboard player and more pertinently the wind player. Its introduction is a very exciting and interesting one as it integrates the playability and diversity of the guitar, which has so baffled many regular MIDI guitar controllers, into its very method of synthesis. ■

UK: Roland (UK) Ltd, Rye Close, Ancells Business Park, Fleet, Hampshire GU13 8UY.
Tel: +44 1252 816181.
Fax: +44 1252 812692.
US: Roland Corporation US, 7200 Dominion Circle, Los Angeles, CA 90040-3639. Tel: +1 213 685 5141. Fax:+1 213 722 0977.

Music News is compiled by Zenon Schoepe

24 BIT DIGITAL, 100% MUSICAL.

You've been using digital tape for years. Now digital mastering makes your final CD sound even better. But often it doesn't sound like your studio mix — the one you love, the one the artist approved.

The advantages of staying digital in the mix are obvious — you avoid multiple analog and digital conversions. CAPRICORN,

the digital mixing console proven around the world, keeps

your mix digital and the sound — phenomenal. For the warmth and depth your projects havebeen missing, it's time to get the Capricorn edge.

AMS NEVE

A SIEMENS COMPANY

UK Head Office Tel: (44) 1282 457011 Fax: (44) 1282 39542 **USA** Siemens Audio Inc., Hollywood, CA. Tel: (213) 461-6383 Fax: (213) 461-1620 New York, NY. Tel: (212) 949-2324 Fax: (212) 450-7339
CANADA Rupert Neve Inc., Toronto Tel: (416) 365-3363 Fax: (416) 365-1044

WARNER BROTHERS

Warner Bros have always enjoyed an enviable reputation for lack of compromise in both the look and sound of their film and television productions. During the past several decades it has operated the extremely successful Warner-Goldwyn lot in central Hollywood, which is equipped with several state-of-the-art film rerecording and dubbing stages, as well as editorial facilities. When, in the late-1980s, the Sony Corporation purchased Columbia Pictures, discussions centred on the fate of The Burbank Studios. At that time, the production and postproduction complex was co-owned by Columbia and Warner Bros. Following a series of protracted deliberations, it was eventually decided that Sony would secure total ownership of the former MGM-Culver City complex, and Warner Bros ended up with 100% ownership of the large Burbank Complex. During the past several years, Warner Bros have been refining a series of renovation schemes for the 42,000-foot postproduction facility, culminating in the completion last August of Phase One. The eventual completion date for Phase Two is currently described as being 'on a temporary hold'.

Scheduled for completion during Phase One were the renovation and upgrade of four rerecording stages—two for feature films, and two for remixing television shows—an ADR stage, a Foley stage, as well as 25 digital-sound editorial suites. Phase Two will involve a fifth rerecording theatre, a second ADR stage, plus the refurbishment of the facility's large scoring stage. Other renovation plans include a situation-comedy sweetening stage, and refurbishment of the sound transfer department.

Dubbing Stage 6 with 'wraparound' 60-input Neve *VRP* console and companion 64-input 'consolette'

According to Don Rogers, Senior Vice President of Postproduction Services for Warner Bros Studio Facilities: 'Everyone has made such an incredible effort to put together a postproduction facility that will provide unbeatable service for our clients, and keep [our] studio facilities competitive in the postproduction market. Warner Bros is committed to having an in-house facility that is on-line with the highest industry standards. Our new facility is technologically competitive with other studios and post houses for both in-house assignments, and work for outside clients.'

During its first months in operation, the revitalised complex handled rerecording for such films as *Maverick*, *Black Beauty*, *The Unforgiven* and *Demolition Man*, as well postproduction for a variety of television series, including the Warner-Bros-Amblin coproduction of *ER*, the hospital emergency-room drama written by Michael Crichton, *Great Defender*, *Lois and Clark—The New Adventures of Superman*, and *Cosby Mysteries*. Recent films completed at the facility include *Batman Forever*, *Outbreak*, *Under Siege II: The Dark Territory*, *The Little Princess* and *Bridges of Madison County*. Television series' mixed in the various dubbing stages include Warner Television's *Family Matters*, *Friends*, *Living Single* and *Step by Step*, plus *Seinfeld*, *Ellen*, *Roseanne* and *Home Improvement*.

'When you consider how difficult it was to operate a facility while under construction,' considers Barry Snyder, Vice President of Postproduction Services, 'last year we had a very successful season. Our creative and technical staff did an incredible job to keep the facility operational with absolutely no loss in quality or service to our clients.'

Film-video stages

The pair of remodelled film rerecording stages, Dubbing 1 and Dubbing 2, house identical, custom-designed Solid State Logic consoles that comprise an array of basic *SL-8000G* input channels mated to three *SL-5000* monitoring sections. The *SL-8000*'s routeing capabilities have been heavily modified to provide discrete outputs for today's multiple rerecording formats, including DTS, SR-D and SDDS. The console's conventional LCRS, four stereo buses, A–D,and 24-track routeing have been replaced with independent access to eight local buses, complete with inserts and returns, laid out for 6-handed mix sessions; a reassignment matrix handles connection of these buses to the multitrack-dubber outputs.

Each hybrid *SL-8000/5000* console features 80 channel strips, for a total of 160 input sources, laid out as 24 channels within the left-hand music-mixing section, 24 channels in the central dialogue section, and 32 effects channels to the right. An outboard bank of three rackmounted SSL Predub Mixers provide an additional 48 line-level inputs for the music, dialogue and effects mixers, with routeing to eight output buses per console. A custom interface connects the automation and master faders on each submixer to the primary *Ultimation* computer that controls the *SL-8000*'s moving-fader and related automation functions. Also available are automated joystick panners; automated graphic equalisers for the dialogue section; plus custom-designed PEC-DIRECT switching for pickup recording during a film mix.

Monitoring on each of the custom boards is described as being particularly flexible. Utilising modules from the *SL-5000* Film Series, a 56 x 8 matrix is available for loudspeaker assignments. The 56 available inputs to the monitoring matrix include three, 8-track stems from each section; the master 8-channel mix output; an 8-channel M&E stem; a spare 8-channel source; plus a pair of 4-channel sources (possibly LCRS or a related format).

'SSL offered us the flexibility of customising the *SL-8000*,' explains the facility's Chief Engineer, Claus Wiedemann. 'Our consoles are tailor-made to suite the particular way in which we need to work.'

'One of our first commitments is to digital technologies,' offers Barry Snyder, 'but there isn't a digital console on the market that offers the flexibility of an SSL board—and we know that Solid State Logic is a strong company that will be around to support us in our future expansion.'

The monitor loudspeaker system installed in each of the SSL Dubbing Stages was custom designed by Warner Bros' engineers, based on designs that

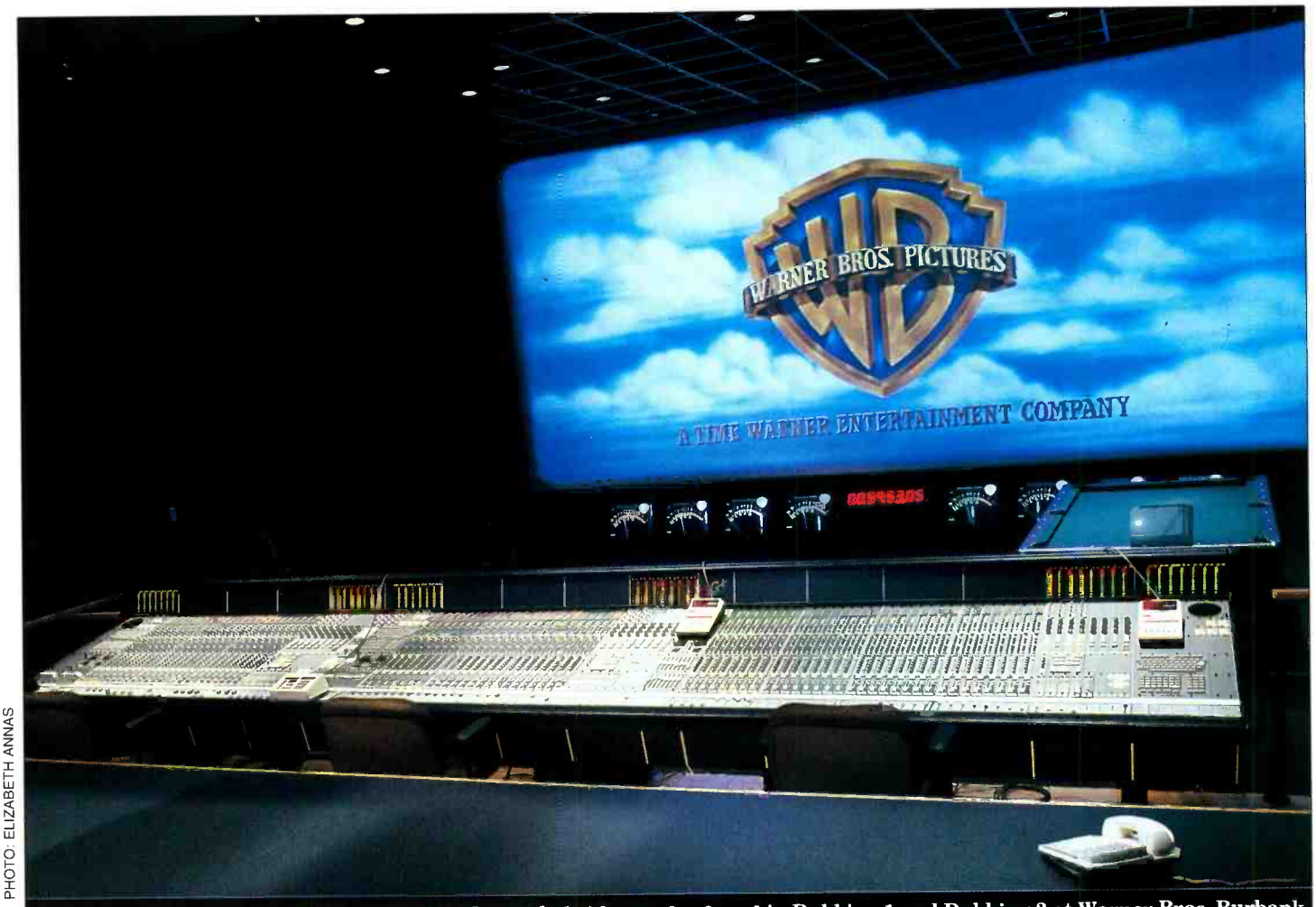


PHOTO: ELIZABETH ANNAS

One of the identical custom SSL *SL-8000G-SL-5000* hybrid consoles found in Dubbing 1 and Dubbing 2 at Warner Bros, Burbank

originated at Paramount Studios. The custom 3-way monitors utilise JBL HF components, Community MF drives and Turbosound LF systems mounted on a solid wall located behind the projection screen. (A high-resolution video projector is also available.) The playback system is currently set up for LCR and split-surround mixes; future plans call for the addition of left-centre and right-centre playback channels to accommodate SDDS mixes.

PHOTOS: JAMES DOUGLAS

Postproduction Senior Vice President Don Rogers with one of the first microphones ever manufactured

In addition, both rooms incorporate a pair of interesting video-based features. Colour monitors that relay automation information to the music, dialogue and effects mixers are mounted face-up behind the SSL consoles. Half-silvered mirrors are arranged above the respective VDUs to project the on-screen information directly in the respective mixer's line of sight to the screen. In this way, they can continue to focus on the on-screen action as they mix, while still viewing the data being displayed by the SSL *Ultimation* computer system. In addition, Warner staff have developed a series of large-sized VU meters displayed on large video monitors located just below the screen, and capable of being switched to monitor a variety of signals.

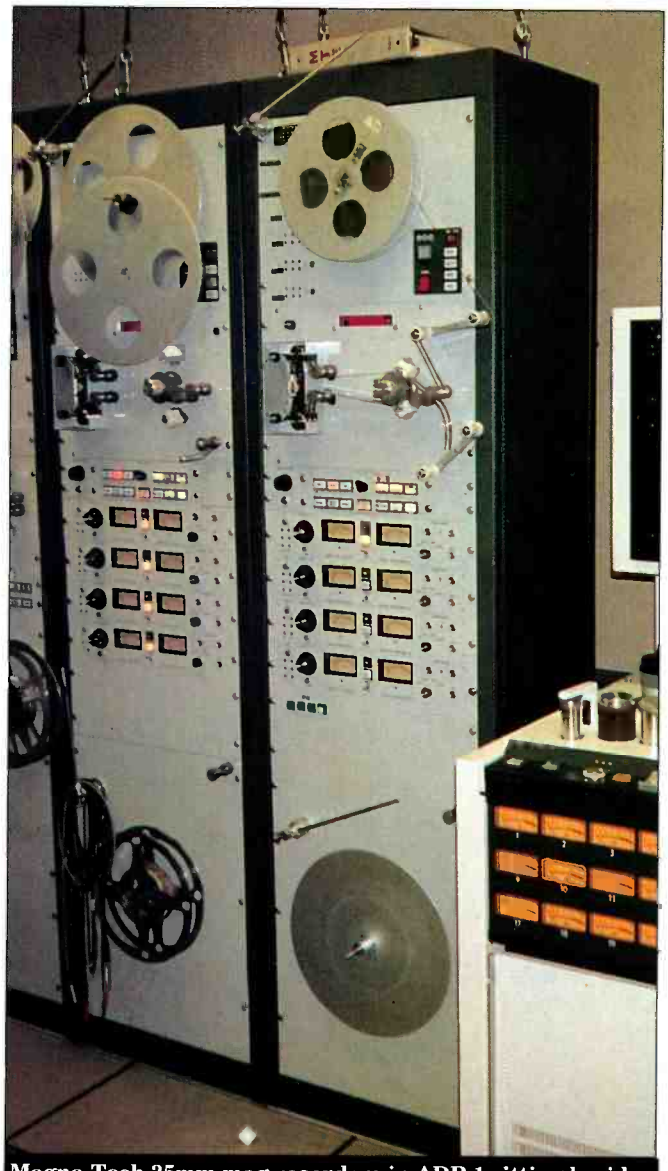
Mixing for television

Also important to the facility's creative future are the provision of rooms that can handle the increasing number of episodic, drama and situation comedy TV shows being completed by Warner Bros' Television Division, and for outside clients. The refurbished Dubbing Stage 6 houses a wraparound 60-input Neve *VRP* console with *Flying Fader* automation, and a companion 64-input consolette. The room is home to seasoned Mixing Engineer Charlie McDaniel III, who joined the facility from 4MC, Burbank, just under a year ago. Assisting Charlie McDaniel in the companion machine room and audio-preparation area is Recordist and Assistant Engineer, Robert Bradford III.

Originally, Rerecording Mixer McDaniel recalls, his room was built as a scoring stage for small orchestral sessions. But the film and TV industry has been through a number of dramatic changes during the past few years. 'Scoring work became increasingly polarised between large orchestral feature-film sessions that require a traditional scoring stage, such as Warner Bros' Scoring 1, and primarily electronically-produced sessions that are often done almost entirely in the composer's own MIDI-based facility.'

And with increasing client demand ▶

There are fewer higher-tech audio facilities than those operated by giant American film and TV studios. James Douglas visits Burbank to report on the latest innovations at Warner Bros' renovated postpro complex



Magna-Tech 35mm mag recorders in ADR 1 sitting beside an Otari *MTR-90* multitrack

created by the runaway success of their production sound department, Warner Bros decided to convert the room into a dubbing stage. Under the supervision of Claus Weidemann, an extensive retrofit was completed just prior to last autumn's television season, which began in August.

'My first project when I joined Warner Bros Studios in the summer of 1994,' McDaniel continues, 'was to make sure the room was ready to handle the mixing of 15 or more sitcoms per week. This included hardware additions, such as *Pro Tools*, *Studioframe* and CD-R mastering equipment for creating custom loop-and-fill CDs; hardware modifications, such as retrofitting the Neve *VR* console with a 5-stem film-style recorder controller; and software additions such as adding a library of production sound effects.

'One blessing from inheriting a scoring stage is the luxury of having a large recording area for pickup Foley and ADR recording, which now form part of almost every mix session we do. The room's acoustics are so similar to the stages where our shows are filmed that matching-in loop lines is a breeze. Speed is important since we mix so many sitcoms per week, including a number of the top-rated, prime-time shows such as *Coach*, *Ellen*, *Family Matters*, *Friends*, *Home Improvement Roseanne*, *Seinfeld*, and *Step By Step*.

'During the preparation period last year, we developed flow charts and communication procedures between this room and Warner's Video Operations, so that audio laydowns and laybacks would be handled in a consistent manner. We also spent time fine-tuning our sound effects and dialogue editorial rooms. Time parameters are much tighter for half-hour sitcoms than for episodic or dramatic series. An hour-long show might be allocated a day or two for the mix; normally, we have four hours!

'Everything that comes to us must be in its proper sequence, otherwise we spend a lot of time just sorting out the elements. Sound arrives in a variety of formats. Music is usually in *Pro Tools* format on an M-O or removable hard drive. Sound effects built here at Warner Bros are usually delivered on *DAW-80 Studioframe* M-Os and-or multitrack. Sitcoms are also getting bigger! A recent *Family Matters* episode, which had the characters visit Disney World, involved 60 tracks of dialogue, music and effects. Original production sound comes to us on either Tascam *DA-88* digital multitrack, half-inch, 4-track or time-code DAT.

'Currently, all our mixes are done in stereo. We look forward to making the move to Dolby Surround for most of our shows, but a persistent problem is: "What should go into the surrounds?" Because for a live, sitcom—just like a conventional play—the actors are performing on a stage in front of an audience. If the studio audience is placed completely or mostly in the surround channel—to replicate their actual location relative to the actors —then we loose mono compatibility.

'In practice, of course, if the audience is positioned in the left and right front channels—rather than hard assigned to the surrounds—then by virtue of the room acoustics and phase relationships inherent in a stereo recording of the audience, a natural-sounding room environment is created automatically. The main challenge is to have our clients become acclimated to the changes required when mixing in surround-sound.'

Dubbing 3 currently houses a vintage 50-input *Quad-Eight* console equipped with GML Moving Fader automation. The room is used mainly for mixing hour-long television drama series, including *ER* and *Lois and Clark—The New Adventures of Superman*, as well as predubs for feature films that will be mixed in the SSL-equipped Dubbing 1 or 2.

ADR 1 is used for looping and dialogue replacement sessions, and houses a small Neotek console. A separate machine room is home to several Otari *MTR-90* multitracks used to build dialogue reels, as well as conventional Magna-Tech 35mm mag recorders. Picture playback in the voice-over studio is handled by a video projection system that can also be linked to a custom telecine video scanner for film-based projects.

Foley 1 houses a variety of performance areas, props, costumes and surfaces. The companion control room houses an automated Sound Workshop fitted with six input-channels routeing to 24 multitrack buses. ▶

Rerecording Mixer Charlie McDaniel III (left) with Recording-Assistant Engineer Robert Bradford III in Dubbing Stage 6

The Ultimate Analogue Console 9098

by Rupert Neve the designer

Photo courtesy Lisa Stansfield's Gracieland Studio, Rochdale, UK.
Configuration shown has 48 9098A Mono Inputs, 24 9098K Dual Monitor Inputs and 4 9098I Stereo Inputs. Console has full complement of AMEK SUPERMOVE automation controlling 106 servo faders, 116 channels of VIRTUAL DYNAMICS and comprehensive SYSTEM RECALL.

Rupert Neve's 9098 console is manufactured in the UK by

AMEK

Head Office, Factory & Sales:
New Islington Mill,
Oldfield Road,
Salford, M5 4SX, U.K.
Tel: 0161 834 6747
Fax: 0161 834 0593

AMEK US Operations, Inc.:
Tel: 818 508 9788
Fax: 818 508 8619

AMEK Germany:
Tel: 06721 2636
Fax: 06721 13537

AMEK Asia, Singapore:
Tel: 65 251 1629
Fax: 65 261 1287

AMEK South America:
Tel: 55 21 437 6329

Digital editorial suites

Warner-Burbank has made a major investment in digital editorial functionality. A total of 25 virtually identical rooms can handle a variety of sound-editorial and predubbing functions, for both film and television projects. Each room is equipped with either a TimeLine *DAW-80* digital audio workstation, or one of the firm's older *WaveFrame 1000*s. (Recall that TimeLine purchased rights to the *WaveFrame* system from Digital Effects Corporation, from which it developed the current *DAW-80* system.) The newer generation *DAW-80* systems are used during all aspects of postproduction for editing dialogue, ADR, effects and Foley—Warner-Burbank currently operates 17 such rooms—while the *WaveFrame 1000*s with their RAM-based sampling functionality are used, in the main, for editing sound effects and music. All *WaveFrame 1000*s and *DAW-80*s now run the same Revision 6.0 of TimeLine's powerful *Studioframe* editing software.

Regarding the choice of digital audio workstations for Warner-Burbank's sound-editorial rooms, Barry Snyder reflects that 'Technology is a tool:

ADR1's small Neotek console handles looping and dialogue replacement duties

Foley walkers in Foley 1, recording clothing and foot movements for *Bridges of Madison County*

something that should push creativity to a higher level, and accomplish tasks that we couldn't achieve before. We found the TimeLine systems to be faster and more cost-effective than anything else we had seen.'

But Snyder is insistent that technology should serve the user's needs, and not force the individual to change his or her ways of working. 'Whatever system you use, you should know conceptually what it is you are trying to achieve, and then choose the best tools. Our clients don't really care about the tools we have selected to use —analogue or digital; tape or film—just so long as we can achieve the required result for them: the best-sounding mix that we can produce. When the project reaches the mixing stage, they will ask: "Does it sound the same?" If it is the same or better because we have used a particular workstation, they like it. If it doesn't sound the same, then they don't want to use it. It's that simple.'

Prior to joining Warner Bros, Snyder was with the Sony-Columbia Culver City facility through its various transitions, where he gained a great deal of hands-on experience with the earlier *WaveFrame* and *CyberFrame* workstations. 'At Sony, we liked the sound quality of the *WaveFrame* system. While it might not have offered as many options as, let's say, the Synclavier or Fairlight systems, and maybe wasn't as inexpensive as *Pro Tools* or *Dyaxis* units, we appreciated the *WaveFrame's* 24-bit audio bus architecture, and its powerful DSP.

'And I have found TimeLine to be a great firm to deal with. [Company President] Gerry Block is committed to the film industry, and has developed some powerful workstations and synchronisation systems. Most importantly, the company listens to its customers, and produces user-friendly systems. Let's fact it: film-sound editors have faced the hardest transition from analogue to digital technologies. With companies like TimeLine and the *DAW-80*, we have some good allies in making that transition as painless and cost-effective as possible. Also, with such a large existing installed base of *DAW-80*s and *WaveFrame 1000*s, finding trained staff for our new rooms that were already familiar with the systems' operation was a whole lot easier.

'And we have also been working with TimeLine during the firm's development of a "digital dubber" that will dramatically reduce the amount of time required to load the multiple sound elements we need to have available for a film or TV mix, and also speed the process of reconforming temporary dubs.

'For the money, I don't think that you can buy a better system than the *DAW-80*. To remain competitive with our room rates, with regard to editing systems the *DAW-80* fits our budget nicely, and is powerful yet very easy to use.'

Summarising his vision of the future for the new Warner Bros Studio Facilities, Burbank, Barry Snyder has no illusions about failing to react to the customer's needs. 'We are a full-service facility that has to provide the type of equipment that will attract the client: the best quality people; the best quality service; and the best quality hardware. Our editorial rooms are currently working double shift, and we recently completed six, one-hour and eight half-hour pilots for the coming season. That type of success only comes when you select people and equipment that can handle the workload.' ■

Warner Bros Postproduction Services, 4000 Warner Boulevard, Burbank, CA91522-0381, US.
Tel: +1 818 954 2515.
Fax: +1 818 954 4138.

Plug in To The Possibilities

Peavey Architectural Acoustics announces the all-new **MMA™ Series Modular Mixer Amplifiers**, packed with more features and occupying only two rack spaces. Flexibility abounds, with eight modular ports and an auxiliary input for a total of nine inputs, two mute busses, Peavey SPS™ (Speaker Protection System), and signal activity illuminators. More security is afforded by the recessed EQ Bypass and Contour Switches and optional tamper-resistant caps.

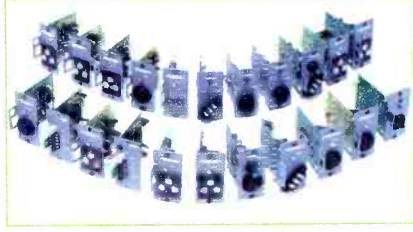
With nine inputs available, the MMA Series Modular Mixer Amplifiers from Peavey give you plenty of options in designing your sound system, and the ongoing flexibility to alter that design for future needs. To customize your MMA Amp, Peavey Architectural Acoustics has a full line of quality plug-in modules, from mic preamps with compressors to various auxiliary inputs to telephone paging. And with the Peavey exclusive AUTO™ modules, you get an eight-channel powered automatic mic mixer.

For your sound contracting needs, plug into all the possibilities the MMA Series Modular Mixer Amplifiers have to offer.

Only Two Rack Spaces!

Peavey Plug-In Modules

AUX R+	Line Level Input w/ RCA Jacks & Muting
AUX S+	Line Level Input w/ Screw Terminals & Muting
AUX SR	Line Level Input w/ Screw Terminals & Remote Volume
BTM S	Bridging Transformer Input w/ Screw Terminals & Muting
GEN S	Signal Generator w/ Screw Terminals
MPE S	Electronically Balanced Mic Input w/ Muting w/ Screw Terminals
MPE SO	Electronically Balanced Mic Preamp w/ Screw Terminals
MPE X	Electronically Balanced Mic Preamp w/ Muting & XLR
MPE XO	Electronically Balanced Mic Preamp & XLR Connector
MPT S	XFMR Balanced Mic Preamp w/ Muting & Screw Terminals
MPT SO	XFMR Balanced Mic Preamp w/ Screw Terminals



MPT S1	XFMR Balanced Mic Preamp w/ EQ & Screw Terminals
MPT S AUTO	XFMR Balanced Automatic Mic Preamp w/ Screw Terminals
MPT SR	XFMR Balanced Mic Preamp w/ Remote Volume & Screw Terminals
MPT X	XFMR Balanced Mic Preamp w/ Muting & XLR Connector
MPT XC	XFMR Balanced Mic Preamp w/ Compression & XLR
MPT XO	XFMR Balanced Mic Preamp & XLR Connector
MPT X1	XFMR Balanced Mic Preamp w/ EQ & XLR Connector
MPT X AUTO	XFMR Balanced Automatic Mic Preamp & XLR Connector
TLO S	XFMR Balanced Line Output & Screw Terminals
TLO X	XFMR Balanced Line Output w/ XLR Connector
TPM S	600Ω Input Paging Input w/ Muting & Screw Terminals

PEAVEY ARCHITECTURAL ACOUSTICS®

Peavey Electronics (U.K.) Ltd. • Hatton House • Hunters Rd. • Weldon Ind. Est. • Corby
Northants • NN17 5JE • England • Tel: 0536 205520 • Fax: 0536 269029

Exploring the Scope of Sound

AUDIO TECHNOLOGY 95

The APRS Show

NATIONAL HALL OLYMPIA LONDON 21 - 23 June 1995

London is the home of the UK's most prestigious professional audio event - organised by the APRS.

For 1995, the 28-year tradition of the APRS Show has evolved into an exciting new event at an equally impressive new venue - reflecting the changing dynamics of the audio industry.

Audio Technology 95 - a unique opportunity to explore the full scope of sound, covering equipment and services for every aspect of your working environment. The new venue is The National Hall at Olympia - gathering all the exhibits onto a single level, as well as giving you even easier access from the Underground station. London is a prime centre for the professional audio industry and is also renowned as one of the most exciting locations for theatres, concerts and general entertainment.

At **Audio Technology 95** you will see the latest audio technology for every application:

- recording studios
- project studios
- post-production
- radio and television broadcasting
- sound reinforcement
- film sound
- location recording
- duplication and replication

Our free Workshop and Seminar programme will keep you up to date with key practical issues and runs throughout each day of the show.

Put the dates in your diary now for the UK's one and only professional audio event with an unmatched heritage! Wednesday 21st June to Friday 23rd June 1995 - open every day from 10.00 till 18.00. And call our Ticket Helpline to ensure your pre-registration for free entry: **+44 (0)1734 31 22 11**.

APRS, 2 Windsor Square, Silver Street, Reading, Berkshire, RG1 2TH, UK Fax: +44 (0) 1734 756216

NAB LAS VEGAS 95

James Douglas surveys the developments in DAWs on show at this years mighty American NAB Convention

Of the myriad developments observed during this year's Las Vegas NAB Convention, connectivity and file-exchange between workstation platforms figured strongly during discussions with broadcast and postproduction users, setting the agenda for forthcoming R&D efforts. Meanwhile on the Convention floor, Digital Audio Workstations (DAWs) were abundant, with much that was new and newsworthy.

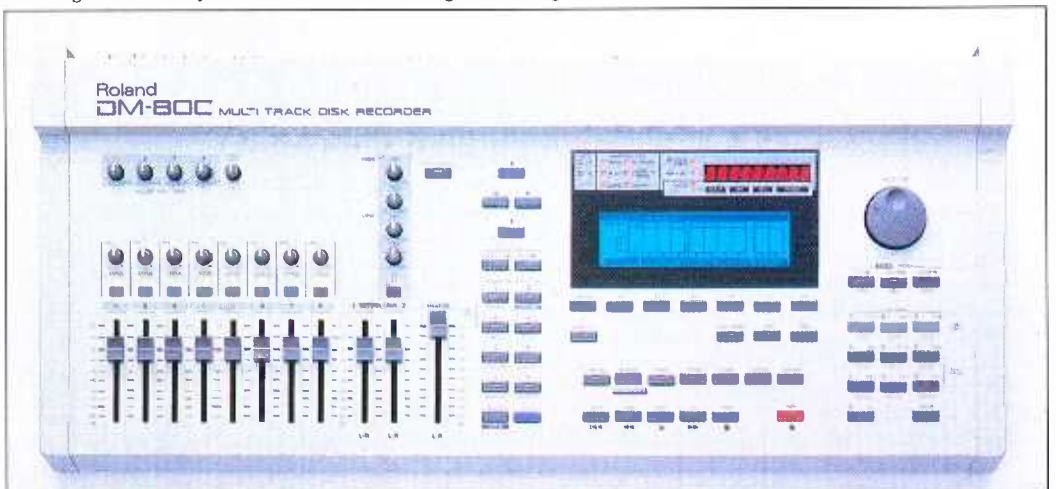
Akai Digital unveiled the new *DD1500* modular recorder-editor, which provides up to 16 tracks of record-replay from M-O or conventional hard drives. System components include the *DL1500* controller, *DD1500m* mainframe processor, *DD1500x* drive housing the *DD1500a* A–D and D–A I-O conversion units. Each drive unit accommodates up to two 1.3Gb hard drives, and each I-O chassis can handle up to eight analogue I-O pairs; in this way, users can assemble system formats to suite specific input, output and recording requirements.

The *DD1500m* mainframe provides digital I-Os, MIDI, wordclock, video sync, RS422 serial time-code and other connections. The *DL1500* controller features dedicated transport controls, scrub wheel, level trim, autolocator, edit-profile buttons and other functions. A separate VGA display provides colour graphics of track layouts and waveform profiles. Future expansions will offer RAM-based sampling plus real-time EQ, time-stretch, pitch shift and other DSP-intensive operations. Also on show was the new *DR8* Multitrack Hard Disk recorder (see review in this issue), which extends the functionality of Akai's existing *DR4d* systems to provide 8-track recording from a single drive, plus a built-in 16-channel mixer.

AMS-Neve unveiled details of v12 software for the *AudioFile* workstation, and which will now provide real-time display of audio waveforms plus the ability to ripple tagged events. Key to the new enhancement, the British firm claim, is WorkFlow, a concept that allows *AudioFile* projects to be connected to other stages in the production process. Version 12 software is described as furthering this cause through enhancements to Open Media Format (OMF) handling, and via live direct replay from Lightworks media. Also to be seen was a 16-fader version of AMS Neve's *Logic 3* digital Mixer-Editor, with full surround-sound facilities. Other features include 24-bit resolution for recording and editing (existing 16-bit files can also be replayed on the upgraded *AudioFile* systems); up to 24 tracks of replay from large format drives; the addition of virtual tracks (to provide 24-track functionality from an 8-track *AudioFile*); and loop editor; direct compatibility with media from the Lightworks editing system (allowing replay of up to eight simultaneous outputs); feet and frames display; multitransport machine control (9-pin serial and ES.Bus-compatible synchronisers); and the ability to save events lists to Exabyte or diskette.

The American **Avid Technology** operation unveiled v3.1 software for their *AudioVision* and *AudioStation* systems, which provides extra features and enhanced compatibility with the firm's *Media Composer* and *Film Composer* editors. Shipping with the new release are Digital Player-Recorder (DPR) models for recording, digitising, transferring and integration with digital and analogue mixers, including the Yamaha *DMC1000* console. Users can now store and retrieve automation data and browse *DMC1000* setup parameters, as well as recall and assign effects directly from the workstation software. Version 3.1 also enables users to playback clips digitised with Avid's 2-field video resolutions, AVR26 and AVR27, by converting them to AVR5, the firm's highest single-field resolution. VTR emulation is now also supported, enabling Avid audio systems to be commanded directly from edit controllers. Also to be seen was enhanced connectivity with Digidesign *Pro Tools* systems via OMF and native file structures; plus AvidNet-ATM high-performance networking configurations, which can now be expanded to WAN (Wide Area Network) topologies utilising Sprint Communication's Drums service to provide 'drag and drop' media access from central servers.

Avid's sister company **Digidesign** demonstrated v3.1 of their *Pro Tools III* software, which now offers up to 48 tracks of record-playback and 64 channels of I-O capacity in 16-track and 8-channel increments, respectively. A QuickPunch feature allows punch-on-the-fly capability, while PostView random-access digital video and a new OMF function offer exchange between *Pro Tools* and Avid *Media Composer* files. PostView's machine control, via 9-pin and V-LAN protocols, enables spotting and layback of audio from within *Pro Tools*. Also to be seen was Session Software v2.0, which provides software-based multitrack recording, editing and mixing for more simple ▶



The Roland *DM800*—8 tracks, 100 layers per track, dynamic automation, MIDI integration and time compression

Fairlight *MFX3* with new EQ

multimedia and related applications, with 4–16 tracks of playback, parametric EQ, synchronisation to *Quicktime* video and other features; PostConform, which enables EDL import and autoconformation; and DPP-1, a TDM-compatible plug-in that provides digital pitch shifting.

Doremi Laboratories introduced *DAWN II/16*, a replacement board for the original *DAWN II* processor, which is capable of repaying up to 16 tracks from a single SCSI-2 chain. The new plug-in board is fully compatible with existing *DAWN* workstations. Also to be seen were Sync II and Out II, a pair of add-on boards for the *DAWN* systems that provide, respectively, synchronisation with lower clock jitter, VITC time-code reader and sample rate pull-up/pull-down, and built-in DSP to provide digital level and fader control. The new *DAWN IImx* is described as a low-cost multitrack recorder-editor that offers fully integrated on-board digital mixing. Record media is either removable M-O drives or conventional hard drives. A basic system offers eight tracks, two input ports, a mixed stereo output, two auxiliary sends and returns. Input-output file formats are fully compatible with existing *DAWN* as well as .AIFF and OMF structures.

The US leg of the Australian **Fairlight** company unveiled a powerful new event-based equalisation tool for the firm's *MFX3* series of workstations. Now every clip in the system can now possess its own independent EQ setting, which are now stored and carried forward even if the segment or any part of it is copied or moved to another location. Each of the four EQ bands are fully parametric with adjustable frequency (20Hz–20kHz), gain and bandwidth. Settings can be copied from clip to clip, or set across an entire range of audio. A unique feature of the *MFX3* equaliser is said to allow an operator to select an entire range of clips and edit an individual band for the entire section. Having adjusted the individual band, all other settings within the range remain unchanged, even if they are all different. The firm also provided details of a new *MFX Film Dubber* system for video and film postproduction that will provide control of up to 300 individual tracks with basic reconforming on the rerecording stage. Storage will be to magneto-optical or conventional hard drives.

The Japanese **Fostex Corporation** were demonstrating the promised *DFM* Dancing Fader Mixing System for the *Foundation 2000*, which comprises an assignable mixer-control surface fitted with moving faders and automation of all mixer-DSP settings. The *DFM*—which was first discussed in Studio Sound's *Foundation 2000* review in February 1994—houses 10 servo-driven faders. These comprise eight Channels, plus L-R and Monitor Masters with individual LED read outs of each fader's current function and assignment. A set of mode switches enable any *Foundation* mixer parameter, such as channel strips, monitor, aux sends-returns and mix-bus outputs, to be recalled and reset. An LED menu screen provides more detailed control of DSP and mixer automation modes. Seven rotary encoders provide access to assignable parameters such as parametric EQ, panning, and compression-limiting. DSP and mixer parameters can be saved in one 999 snapshots; all fader and pan positions can be continuously automated against MIDI-based timing references. Current software provides 3-band parametric EQ; a planned update will offer four bands of parametric EQ with high-pass /low-pass filters. Also shown were TimeFlex time-expansion and time-compression algorithms that allow users to stretch-shrink program material to fit a desired length of time. Release 4 software now includes support of Event Grouping and Patch Bay routeing functions for the *Foundation*'s digital mixer, and also supports *SLink* file transfer and translation software codeveloped by the US-based Fostex Research operation (who were responsible for the *Foundation 2000*) and The Synclavier Company.

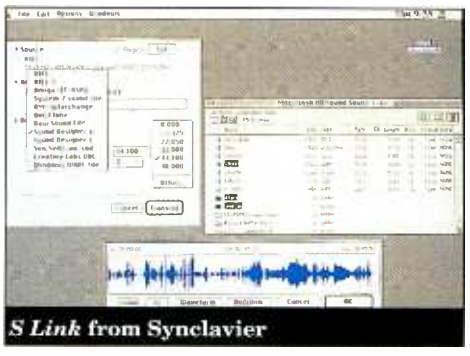
Orban unveiled v5.0 software for the *DSE-7000* Digital Audio Workstation, which now offers TimeFit time compression and expansion of up to 25%. Other features include pitch shifting, 2-octave varispeed copy, 2-octave varispeed play (which keeps the output sample-rate constant), reverse audio and enhanced help functions. The *DSE-7000* is now fully compatible with the ENCO *DAD486x* Digital Audio Delivery Systems, enabling files from individual systems to be accessed via a local area network. Radio sports produced a *DS-7000*, for example, can now be saved directly in a DAD File Server, and be immediately ready for on-air execution via and DAD workstation.

The **Otari Corporation** unveiled the new *Radar View* software for their *RADAR* hard-disk recorder, available in 8-track increments, that provides visual display of the contents and timing relationships of materials recorded across multiple system components, and which is said to greatly simplify the editing and 'slipping' of individual track-elements recorded into the system. Also being shown by the Japanese company was the *UFC-Universal Digital Audio Format Convertor*, which handles up to 24 channels of Alesis *ADAT* Optical, Tascam TDIF-1, ProDigital PD, SDIF2 and (optionally) AES-EBU-format I-Os. Multiple units can be interlinked to handle larger configurations. Front-panel routeing buttons provide channel rerouteing; up to six routeing tables can be stored and recalled from nonvolatile RAM.

Pacific Recorders unveiled the *ADX Ensemble*, a workstation that comes complete with an automated mixing surface. Configured specifically for radio production studios, the *ADX Ensemble* comprises an 8-channel version of the Doremi Labs *DAWN II* recorder-editor, linked to a moving-fader mixing-control surface with dedicated transport and editing functions. All 20-bit mixing, 3-band parametric equalisation and waveform editing functions are performed digitally within the workstation's signal-processing unit. Full time-code compatibility is featured, along with time compression and expansion; 32kHz, 44.1kHz and 48kHz sample rates; AES-EBU-format digital I-Os; plus 18-bit delta-sigma A–D and D–A convertors.

The US section of the Japanese **Roland Corporation** showed the *DM-800* Multi Track Disk Recorder, which combines is a single chassis an 8-track recorder-player and a 12-channel mixing system that weighs just over 12lb. The *DM-800* provides 100 layers-per-track recording, dynamic automation, MIDI integration and time compression. The system is now available with a direct interface for the Tascam *DA-88* digital multitrack recorder that provides eight channels of digital I-O plus full bidirectional machine control; the *DM-800* can operate as either a master or a slave. The new RS422/*DA-88* Interface also allows direct connection to a video editor, with the *DM-800* appearing as a slave to the editor. The interface is a single space rack mount device that can be connected directly to the *DM-800* via an RMDB bus cable. A complete set of *DA-88* interface connectors are provided for digital audio I-O and machine control. The serial port connects to any device that supports a standard 9-pin protocol in either a master or slave configurations.

British stalwarts **Solid State Logic** unveiled the new *Axiom Preparation Station*, a desktop unit which provides shared access to *Axiom*'s *DiskTrack* for audio recording, editing and prelay, plus video recording. The *APS* system can select up to 24 audio tracks from the maximum of 128 available with *DiskTrack*. Use of an *APS* unit as an extension to *DiskTrack* is said to free up the master *Axiom* ▶



***S Link* from Synclavier**

How to Succeed with a Sonic

Edit and mix a Grammy® winner

Analog or digital in—Grammy out! It's no coincidence that the majority of the 300 plus recordings nominated for 1995 Grammys were edited on Sonic systems.

Record of the year *All I Wanna Do* by Sheryl Crow: edited and mastered by Dave Collins, A&M Mastering

Our precision editing, high-resolution recording (all Sonic systems support 24-bit data), and superb sound quality yield stunning results and kudos all around.

Just Cause: Sonic System dialog and background editing supervised by Michael Kirchberger, 20-bit music editing by Tom Drescher, Wonder Dog Music

Create big sound for the big screen

Bullets Over Broadway, Hoop Dreams, Just Cause, Pret-a-Porter, The Jungle Book, Apollo 13—what do they have in common? The Sonic System—of course!—because it delivers power and speed for dialog, music, and effects editing for film and video. Our new UltraSonic Processor provides up to 16 channels with full DSP on a single board making multitrack work streamlined and affordable.

Beatles Live at the BBC: editing, NoNOISE, and premastering by Peter Mew, Abbey Road

Restore priceless recordings for a release

NoNOISE® is used around the world to tackle the problems of tape hiss and ambient noise, clicks and pops, and distortion and crackle. Engineers, artists, and producers wouldn't trust their masters with anything less.

Cut radio programs without a reel to reel

"I haven't touched a reel to reel in months," says Bob Carlson from KCRW in L.A. That's because building radio programs with his Sonic System is fast, easy, and affordable. Stay tuned around the globe for promos and features prepared on the Sonic.

Tune in to ABC Radio, the BBC, the CBC, CBS, Danish Radio, Dutch Radio, KCRW, KIIS, NPR, Premiere Radio, WDR (Germany), WETA, WGBH, and dozens of others

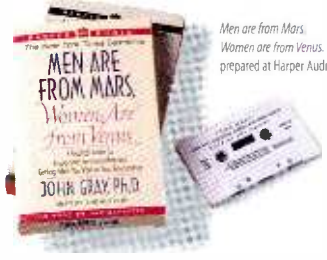
Blast out music and effects for multimedia

The biggest explosions, the clearest narration, the richest music—the Sonic brings life to audio for CD-ROMs. For multimedia pioneers, handling hundreds of soundfiles is all in a day's work for the Sonic. And with a native AIFF file format and OMFI compatibility, the Sonic is the CD-ROM producer's choice.

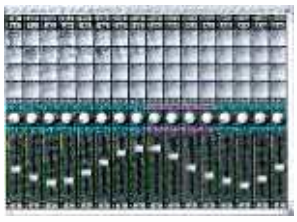
Star Trek CD-ROM: editing by Mark Waldrep, Pacific Coast Sound Works

Put the next best-seller on tape

It was a dark and stormy night...the project deadline was approaching...the talent was restless. With my Sonic, I recorded readings directly to hard disk, edited alternate takes, layed up effects, and slapped down a multi-track music bed. "No sweat," I said handing over the finished tape. "My Sonic always delivers a happy ending."



Men are from Mars, Women are from Venus. prepared at Harper Audio



The Ultimate in Power: USP
The USP (UltraSonic Processor) delivers more digital signal processing power than any other workstation – a single USP card includes up to 16 channels of digital I/O, 32 channels of playback, 32 EQ sections. No kludgy expansion chassis or multi-board cabling required.

The Ultimate in Affordability: SSP
Starting at under $4000, the SSP-3 (Sonic Signal Processor) card is the best DAW value around! Each SSP card offers 2-4 channels of I/O, 8-12 channels of playback, and 16 EQ sections.

MediaNet: The Digital Media Workgroup's Data-Bahn
MediaNet, our high-speed FDDI/CDDI network, links Sonic systems (or any standard Macintosh or NFS application) in a seamless network. MediaNet is the only network that allows multiple users to share processing resources and hard disks (even the same soundfiles!) at the same time.

SEE OUR DISTRIBUTOR LIST ON PAGE 74

SONIC SOLUTIONS

1891 East Francisco Blvd. San Rafael, California 94901
Telephone 415.485.4800 Fax 415.485.4877

Production System for large scale mixing projects, while allowing program preparation to be conducted in a cost-effective manner through shared resources. As SSL point out, one of *Axiom*'s major feature is the built-in, hard-disk, multitrack recorder and editor. While full-scale recording and mixing is central to the system's *Axiom*, for a number of applications, such as video and film postproduction, there exists a need to record, edit and prelay audio independently of the mixing process. Hence the new *APS*, which also provides audio conforming and reconfirming to standard EDLs, plus Open Media Interchange via import-export of audio in both .AIFF and .WAV formats. Also to be seen was v4.0 software for the *Scenaria* Digital Audio-Video System, which now offers cycle-based automation, fader trim, auto glide and snap automation, off-line editing of automation moves, additional EQ curves; events-list editing, multichannel audio waveform display, and use of remote mic preamps and I-Os. *OmniMix* Digital Surround Sound Audio-Video System also features new v4.0 software, plus enhanced Hierarchical SubMix displays and HSM presets, phase reversal on individual HSM mix elements (to create mix-minus feeds and so on), enhanced spatial processing, and enhanced reverb control.

Sonic Solutions demonstrated real-time connectivity and file exchange between a *Sonic System*, a Silicon Graphics system, Radius *VideoVision* and a Data Translation systems via MediaNet, the US firm's high-speed network. Also on display from the Americas were the new UltraSonic Processor (USP) card for the *Sonic System* that offers 16 channels of I-O, up to 32 tracks of disk playback and full DSP up to three cards fit into a *Macintosh* controller, providing a total of 48-track record-replay. A low-cost *Sonic Power Station* now offers 2-4 channels of digital I-O, 8-12 channels of disk playback, background loading and on-board DSP. In addition, A new Sonic Radio Workgroup Architecture allows broadcasters to configure networks of radio-production systems for preparing news. commercials, trailers, IDs, jingles, PSAs and longer format programming.

Fellow Americans, **Spectral Inc**, showed the new *Prisma* music workstation , which has been optimised for music and related production. The system's Edit Panel simultaneously displays from two to 16 tracks, each of which comprises four Layers; the foremost layer is the one currently capable of replay mode. Up to 99 Virtual Tracks are available on the system; up to eight assigned tracks can be replayed together while mixing down to any pair of tracks. The Mixer Panel provides a full-colour visualisation of an 8-input stereo console. with moving faders, EQ sections, aux sends, panning and related functions. Full object-orientated or waveform-orientated editing is provided, with up to 10 levels of undo. Alternative controllers include the JL Cooper *CS-10*, or any full-featured MIDI-based systems. Also to be seen was the new Translator 8-channel digital audio format convertor, that sports Alesis *ADAT* optical (LightPipe), Spectral SMDAI, Tascam TDIF-1 and Yamaha Y2 formats.

Studio Audio and Video unveiled v2.2 software for the *SADiE* Disk Editor, which adds an automatic speech editor for time-domain processing of spoken materials (and described as being specifically applicable to radio production); direct interface to SCSI-based CD-R units for creating fully-compatible *Red Book* masters via DDP to 8mm tape and Exabyte; a MIDI-based hardware controller card for the JL Cooper *CS-10* system, which provides faders, transport controls, mute, solo, scrub and programmable function keys; support for Exabyte 8mm archiving at up to five-times playback speeds; and connection to M-O disks for 20-bit stereo editing and instant backup.

Studer-Editech unveiled *Dyaxis IIbv* (broadcast version) that offers the major features of the existing *Dyaxis* systems, but without synchronisation and expansion capabilities. The *IIbv* version features a built-in digital mixer that provides dynamic level control, panning, 5-band EQ and level metering. The systems' unique VirtualMix feature is said to allow a large number of virtual tracks to be output simultaneously, thereby eliminating the playback restrictions imposed by disk bandwidth or dense edits. Also to be seen was *Post Trio*, a new integrated system that has been optimised for postproduction, with from eight to 24 tracks of simultaneous record-replay, 16 to 72 freely assignable I-O channels and 16 to 48 automated mixer strips; a new Edit Controller for the *Dyaxis* series of workstations with a dedicated edit-scrub wheel, transport functions and edit buttons; plus VideoMix, a new option based on the Radius *VideoVision Studio* system that offers up to 60 minutes of full-motion, synchronous digital video playback in both NTSC and PAL formats.

The Synclavier Company unveiled *SLink* 2.0, a batch audio-file transfer and conversion utility for *Macintosh*-based workstations, and which is compatible with different sampling rates, file formats and resolutions. SLink 2.0 supports .WAV, VOC, AIFF/AIFF-C, *QuickTime*, *SoundEdit*, MOD, IFF/8SVX, .SND/.AU, *Sound Designer I* and *II*, plus Open Media Framework (OMF) formats. Also to be seen: EditView 4.0 Cross-platform Audio Interface; and a version of AutoConform 3.0 for users of Digidesign products, including *Pro Tools*, *Pro Tools III*, *AudioMedia* and *Sound Tools*.

TimeLine Vista demonstrated several new developments for its StudioMaster v6.01 software and *DAW-80* system, which is now supplied with a faster Pentium-based processor. Available in configurations that provide up to 24 tracks of record and replay capability, each disk drive provides access to four tracks with real-time punch-in/punch-out functionality and full graphics-based editing. Currently under development is a version of the *DAW-80* that incorporates Peavey Media Matrix channel assignment, DSP and mixing firmware, and which will provide an enhanced graphic interface for the system. The *DAW-80* will also be available in the near future in a 'digital dubber' format for use in video and film postproduction. The Player comprises a stand-alone rackmounted unit capable of accepting removable media (M-O or hard drives) in TimeLine or OMF formats. Each *DAW-80-Studioframe*-based unit will play back eight

Orban *DSE 7000* with v5.0 software

channels; multiple Players will synchronise together via *Film Lynx* and, through networking, will provide a virtually unlimited number tape tracks, both forward and reverse, plus advance-retard of individual tracks or groups of tracks from a remote PC. In addition, the network software will also allow the firm's editing software to be used to access any of the on-line units, allowing editing operations. Elimination of the transfer operation prior to dubbing—to either mag film or audio tape—will improve flexibility because copy-loop operations can be performed on-line. Also, the ability to perform single-track or multitrack editorial changes or picture conformation on the dub stage, if necessary, should also dramatically enhance film-video postproductivity.

The Japanese **Yamaha Corporation** unveiled the modular, low-cost workstation system, based on the new *CBX-D3* Digital Recording Processor, a 4-channel system that provides two channels of simultaneous recording and four of playback. System operation is controlled from a *Mac* platform, running third-party editing software (E-Magic *Logic Audio CBX*, Mark of the Unicorn *Digital Performer*, Opcode *Studio Vision Pro* or Steinberg *Cubase Audio*). The *DBX-D3* features an integral sample-rate convertor, and can be connected directly with the firm's *ProMix 01* 16-channel digital mixer, to provide an integrated recorder-editor-mixer. Also available is the new *CBX-D5* upgrade which, in addition to the—*D3* features, adds balanced XLR analogue I-Os; AES-EBU, SPDIF and Y2-format digital I-Os, plus parametric EQ and a collection of digital reverb and special effects. ■

Production Directors. Engineers. Even newsroom people swear by the DSE. Which is probably why these stations with one DSE soon wind up with two. Or even three. Learning is fast. Editing is easier. Everybody is more productive. Because not only do your station's multiple personalities get up to speed faster, they stay up there. To see it in action yourself call 1-800-622-0022 for a demo. The DSE 7000. The New Speed Of Sound.

The Only Digital Editing System Created For Multiple Personalities.

"My advice: if you're gonna buy one, buy two. Or you'll never keep the peace."
John Buffaloe...Chief Engineer
KSON, San Diego

"As quickly as you can conceptualize it, the DSE can do it. Or undo it."
Bill Schultz...Production Director
103.5 WYNY-FM, New York

"Radio lives by critical deadlines. With the DSE, time is on my side."
Barbara Sherry...Production Director
KQQL FM, Minneapolis

"It's the only digital system in radio that lets you edit by ear. What a concept."
Ross Wilson...Production Director
K101, San Francisco

"You install it, it runs, the production department is happy. Next problem."
Dan Mettler...Chief Engineer
WNDE/WFBQ, Indianapolis

"It gives our air talent so much creative freedom, they won't use anything else."
Byron Swanson...Chief Engineer
KKRZ, Portland

orban®

H A Harman International Company

For a demo in the U.S. call Harris Allied Broadcast Center: 1•800•622•0022
Or contact Orban: Phone 1•510•351•3500 Fax 1•510•351•0500

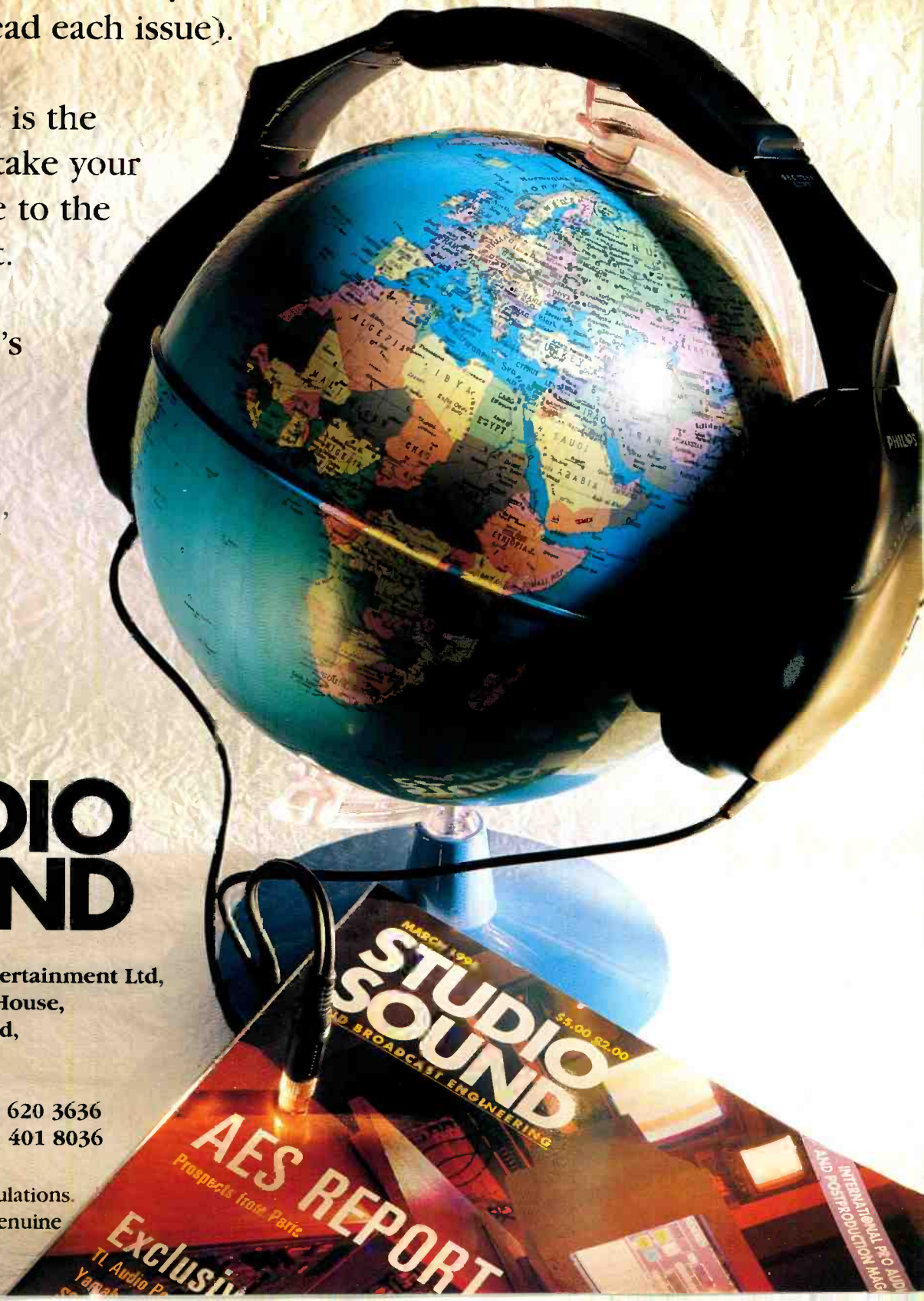
We Know Who's Listening

ABC Guaranteed*

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

Studio Sound is the magazine to take your sales message to the world market.

Studio Sound's circulation is higher than any other 'international' pro-audio magazine.



STUDIO SOUND

Miller Freeman Entertainment Ltd,
8th Floor, Ludgate House,
245 Blackfriars Road,
London SE1 9UR.
United Kingdom.
Telephone: +44 171 620 3636
Facsimile: +44 171 401 8036

*Audit Bureau of Circulations. Your guarantee of a genuine circulation figure.

FAIRLIGHT MFX3

Tokyo's Image Studio 109 *MFX3* console close-up

During the late 1970s and early 1980s, the name Fairlight was almost a synonym for elite digital sampling keyboards. Even so, it is still mind-boggling to learn that the Australian company have been building computers for 20 years, and celebrate their anniversary this year. Although there is still a strong historical connection with the significance of the *CMI* (Computer Musical Instrument) of 15 years ago, Fairlight have survived commercial problems and established themselves in the postproduction market.

Now properly known as Fairlight ESP (Electric Sound & Picture), the company introduced their dedicated audio postproduction workstation, the *MFX*, in the late-1980s. It was around this time that Fairlight experienced business troubles, eventually being bought out by some of its founding and key members. Since then, the company have worked at the postpro sector, recently establishing an American operation and restructuring the UK company.

'As a marketing enterprise, we see three main areas: the Americas, Asia, and Europe,' observes John Lancken, Head of Sales and Marketing. 'We've also been investing in people, which makes sense because we have a new product that we aim to do very well with.' The new product is the *MFX3*, the third incarnation of Fairlight's digital editor and storage workstation which has already notched up 15 sales in Europe, including WDR, ORF, Zoo Studios, Essex Radio, the BBC, and facilities in Russia and Spain.

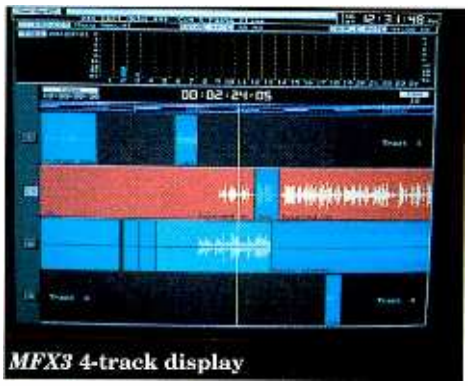
'Sales are a mixture of TV, postproduction and radio at the moment,' says Lancken, 'but the European market is difficult because it is very much public broadcasting orientated. The US has more private stations, while Japan is a mixture of both. We're finding that customers in Germany are using the *MFX3* for radio drama, something that it is showing a major strength for.'

The *MFX* family was the result of a lengthy period of development; Lancken observes that it was two years before the first products appeared. 'It was the late-1980s when we started the move into postpro and disk recording,' he says. 'Culturally we had to address a wider recording market, something more than just music, which we were in with the *CMI* sampler. That's how we got into film and post work.'

Early versions of the *CMI* featured a disk-recording facility, the *Rev 6*, which can be seen as a precursor to the *MFX* of today. 'We're not new to recording sounds and playing them back direct from disk,' says Lancken, 'we've been doing it since 1985-86, and we've been building computers from the ground up since 1975.'

In that time, Fairlight have identified the four basic elements for a workable, efficient and ergonomic Digital Audio Workstation (DAW). These are: a graphic interface; a user interface; software allowing the recording, editing and manipulation of material, or 'clips' (audio segments) as Fairlight prefer ▶

Meeting more orders than press calls, Fairlight's digital workstations are attracting increasing attention in postpro circles. Kevin Hilton evaluates the *MFX3*



MFX3 4-track display

to call them); and external machine control. 'The way these are put together is crucial,' says Lancken, 'otherwise DAWs can be disjointed. By including control of external units, we can show that all these things go together.'

User interface

The *MFX3*'s graphic interface presents seven user screens, some of which share the display, taking either the upper part of the display or the lower. Whatever the functions selected, there will always be one upper and one lower page on screen at any time. These will change automatically according to the recording, editing and transport control commands, but they can also be selected by a user command.

The displays are: Arm (showing the amount of recording time remaining on the current disk, length of present clip, and input-output meters); Patch (showing the type of input selected and to which track is going); Track; Takes (displays information about clips, including mono-stereo, audio level, duration, and source file); File; Device (contains a box for each storage device used, showing amount of available storage capacity); Marks (numerical list of named Go To and Edit points); Waveform (a list of all Master Recordings in the project); and System (displays changes to setup parameters).

Of these, the most important are Track and File. Track information (along with the Arm and Takes displays) is contained on the Disk Recorder Page, which is always on-screen unless other displays are selected, either automatically by the function being performed or from the Numeric Keypad by the operator. The main elements are the 4T screen (showing four tracks), track names, clip names, selected clips, the audio waveform, selected track, and the Takes screen. This provides data on the clips currently being used, including previously recorded layers of clips that still exist 'underneath' the last recorded item but which cannot be heard.

The File page appears on the same display as the Device page, showing information about each storage medium at a time, plus the files that it holds. Devices can be operated by 0S9.DOS or MDR.DOS; the method of tabulating and selecting each file is very similar to running a PC in DOS, including the scrolling up and down of lists. Once highlighted, a file can be opened, copied or manipulated in any other form. Only files relevant to the editing mode selected at the time are shown, and the display will automatically appear on screen if a file is being opened or deleted.

Patching and level information is paired on a single display; the Patch page shows which input is routed to which track, and what options have been made on each input. The Meters page gives 24-track metering, showing the output levels of every physical output of the system. When a track is armed (ready to record), the relevant meter will show the input to that track, while small red rectangles indicate which input is patched to each track. The Patch page is shown whenever the input submenu of the Arm menu is in use, while the Meter page is automatically brought up on entering the Arm menu.

Explaining the thinking behind this graphical system, Lancken says, 'The operator always has the ability to zone in and out on something—it has that tactile element to it. You tell the graphics what you want to see, because the multitasking nature of the unit can accommodate that. There are several CPUs within the system, and there is one solely for the graphics.'

The recording waveform is constantly displayed on the screen, and can show eight hours of available time across the display. By zoning in, the operator can work in fragments of this, even getting down to individual frames. 'It works on the principle of a 24-hour "doughnut",' says Lancken. 'Each disk has a 4Gb driver, with a 12-hour capacity. When material is recorded, the disk does not fragment, it places the clips, going for the biggest continuous chunk, which allows for instantaneous movement of segments.'

It is the way that segments are moved that has been concerning both DAW designers and the people who use them. Although the storage capacity and applications are crucial in the choice of a workstation, ease of use is now seen as a primary concern, and most manufacturers are concentrating on what is clumsily called the human interface.

Like a great many DAWs, the *MFX3* console looks like a standard computer keyboard. This is initially off-putting, because this usually means that the physical operating system is not going to be either intuitive or easy to manage. The difference is, although there is an on-screen cursor system, the *MFX3* does not rely on a mouse controller, the main objection of sound editors to DAWs. Using a mouse on a WP just to move text around is bad enough, but many have found that manipulating blocks of 'audio' with one is just about impossible.

The manual pre-empts this attitude by stating that the console 'has been designed to offer the same type of flexibility as a mouse and pull-down menus, but is faster and less stressful to use'. While is undoubtedly fast, 'less stressful' is a subjective statement, depending on the project and the amount of shouting it involves.

The *MFX3* console is based around a QWERTY keyboard (so far, so conventional), a Jog Wheel, allowing the device to imitate a tape machine, and a series of keys for a variety of operations. Despite taking up the most space, the main keyboard, here known as Alpha Keys, is purely used for naming tracks and projects; the important keys are those around it.

Macro keys are used for editing and enabling keyboard macros; Function keys control macros (keystroke recorders); the numeric keypad accommodates time-codes and other numeric entries (fade times, pre-roll points); the ENTER key executes commands and enters numbers; the ZOOM key enables the Jog Wheel to expand and contract the on-screen time-scale from six frames to eight hours; FROM and TO keys select the in and out points on an edit, loop or Auto Record; JUMP keys locate the transport to clip head and tails; TRANSPORT MODE keys open the Autolocator menus; TRANSPORT keys are as you would expect, plus a JOG-SHUTTLE key and the Play menu for transport 'smarts'; Soft keys select commands from the menu; DISK MODE keys open editing menus; TRACK keys select tracks 1–24 for recording and editing. The remaining key, UNDO, is self-explanatory.

Many of these functions will be displayed on the console's LCD screen, which also contains the menu choices for the Soft keys. It was these keys, which offer a number of differing applications, that gave me concern. I have often thought that a single key doing several things can be rather confusing: where are we, where are we going, what mode are we in? Lancken counters this doubt by saying, 'The buttons refer to an operation, but they are always "now" intuitive.'

Operation

Intuitive is a word much bandied about in this computer dominated society. *Windows*-based programs are seen as better than DOS because they're 'intuitive', allowing the operator to get straight into them without too much prior knowledge or a degree in advanced computing analysis. The new generation of audio editors are computer-literate, but still around is the generation that learned the trade with quarter-inch tape and razor blades rather than a mouse and cursor.

This is not the sign of a Luddite, rather it is a question of practicality. Editing is a tactile activity—sometimes you need to 'feel' the words or music as they go over the play heads. The *MFX3*'s Jog Wheel reproduces this quite well. The other crucial point is: how easy is it to get started? A piece of work on the Disk Recorder is called a Project, and to begin one the operator presses the PROJECT key on the console. The computer will then ask for a name and to which storage medium the Project is to be stored.

Once a Project has been opened, Master Recordings are created within it. Up to 24 at a time can be laid down; this work starts every time you drop into record, ending when you drop out again. The Master Recording is made up of a series of clips, which are displayed on the recording tracks. Each one of these has a time-code reference contained within it, triggering it at the right time. In this way, the Disk Recorder will only record the audio it needs, rather than all the silences that would be contained on a conventional tape machine if the clips were some distance apart.

One of the more fiendishly clever aspects of the *MFX3* is its ability to record a number of different clips onto the same track, even overlapping ▶

At last. Affordable direct-to-disk video editing that won't give you the jitters.

No jitters

No jumps

No stutters

No dropouts

No lost frames

Just ultra smooth video and pure, uninterrupted, digital sound.

It's the Microdisk AV storage system from Micropolis.

Ultimate 'direct-to-disk' performance for digital video editing, multimedia and sound recording.

Micropolis Microdisk AV.
The logic stacks up.

Micropolis
European headquarters
Tel +44 734 751315
Fax +44 734 868168

MICROPOLIS

Specialists in hard disk drives, audio/video storage and disk array technology.

them. In this way it is possible to use the first part of one take, and then overlay the second half of another to create a totally new take. The new clips are recorded or pasted on top of earlier ones, which still exist underneath but are not heard. It is possible to retrieve the 'buried' information by trimming off the upper clip.

The present main function of the *MFX3* is editing, so, consequently, the Edit menu is the most powerful of all the menus run by the device. Just like many other DAWs, or, indeed, documents on a WP, material is cut or copied to a clipboard, until it is replaced by cutting or copying again. The waveform on the graphical display gives a visual representation of what is being heard, and makes it possible to work out where to make the edit point.

By using the Edit menu, clips, or parts of clips, can be placed anywhere within a Master Recording. By using different tracks, it is possible to match material that may later be replaced. For example, a new reading of a section of dialogue can be matched alongside the original during an ADR session. This, however, does call for skilled revoicing and accurate cutting, and does not have the same technological cachet of the *WordFit* option on DAR's *SoundStation*. But it is possible to build up speed working this way, and the ease of the Edit menu does give some flexibility. The *MFX3* also has the ability to crossfade on the same track in real time due to its DSP technology.

Machine interface

Audio-to-picture work is one of the prime targets of the *MFX3*, so comprehensive machine control is called for. The unit is optionally available with built-in control over industry standard Sony 9-pin serial devices. Any VTR attached to the *MFX3* can be put on and off line by pushing a button, allowing the audio to follow whatever the video does, in whatever mode. This mimicry extends to emulating a VTR in freeze-frame, whereby a device is paused but displays one frame on screen continually. In audio freeze-frame, a sound is repeated 25 or 30 times a second, and will run together with the video transport give an impression of continuous audio play-back, at low speed but normal pitch.

The *MFX3* can also synch to longitudinal time-code (LTC) at all standard frame rates, vertical interval time-code (VITC), digital world clock, video colour-black, any digital input or internal crystal. The unit also has an Autoconform function, which allows acquisition of material to be speeded up considerably.

Beside ease of use and the range of functions, a major concern in the choice of a DAW is its storage capabilities. As standard, the *MFX3* uses new generation SCSI-2 hard disks, which gives the possibility of seven storage devices hanging off the system. The largest disk drive (4Gb formatted) provides in excess of 12 hours of mono track time. The disk transfer-rates to and from the SCSI interface are high, and allow continuous playback of 24 tracks of audio from a single hard disk.

A lot of DAWs today employ magneto-optical (M-O) drives and Fairlight have also incorporated this option. The *MFX3* can play 12 tracks of continuous audio from a single cartridge, and, if the average number of tracks playing does not exceed 12, it can sustain a full 24-track project on one removable disk. While this remains in the realms of 'possible configurations', it would seem that, until M-O technology progresses further, that this option is best suited for preparing material on smaller, off-line *MFX3* units, and then transferring to the master machine.

M-O can also be used as a backup, but this would be too expensive, especially given that the technology would be used only in a supporting role. Which is where good old tape comes back into favour. Oxide-based media is still seen as a useful backup, and it is possible to download from the *MFX3* to 8mm data tape cartridges, which can store up to 15 hours of audio and selectively restore them to hard disk.

Since visiting Fairlight's London office for this appraisal, new *MFX3* 4-band parametric equalisation software has been launched at the NAB Convention. This allows frequency, gain and the Q factor to be altered. The three banks of numeric keys are used to select these functions, with the effects displayed at the top of the graphics screen, while the Jog Wheel is used to control the parameters. The main feature of this new software is that it is clip-based, which means that the EQ moves with the audio. Only Fairlight and DAR offer this technology.

Fairlight have now established themselves in the postproduction field, but they have not forsaken the area that made its name in the first place. 'We're coming full circle, because we're talking to our old customers about multitrack,' says John Lancken. 'This is the first viable disk recorder and we see it as replacing tape. Musicians want to be spontaneous, pushing buttons and having something happen, so we're talking about writing software that can take multitrack recording further.' Fully loaded, the *MFX3* gives 24-track capability, although Lancken claims that its efficiency makes it more like a 32 or 48-track machine.

The Fairlight *MFX3* is an impressive piece of equipment, logical, relatively straightforward and fast. There are one or two niggles, like the multifunction keys, but Fairlight have thought out the system well. It is not for the small studio or radio station, however, given that a basic system starts at £19,000, rising to £90,000, although this market is catered for by the *MFX3 Mini*, which has a base price of £15,000 (UK pricing).

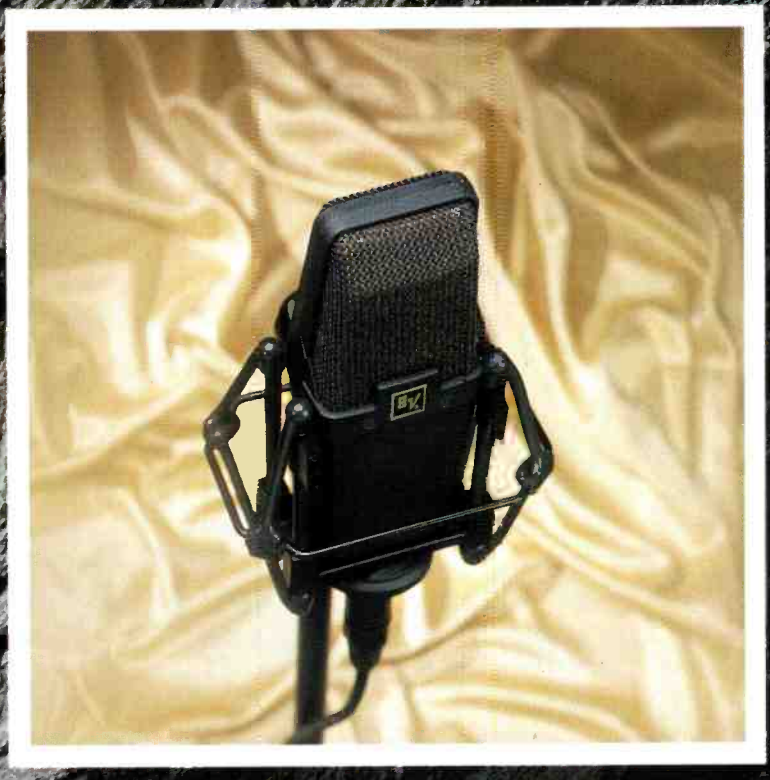
If Fairlight succeed in re-establishing a relationship with its original customers, then a fully-equipped, multitrack, disk-based recorder with full editing capability could revolutionise the way postproduction works. It just depends on who gets there first. ■

Fairlight ESP, Unit B, Skyline Place, Frenchs Forest, New South Wales 2086, Sydney, Australia. Tel: +61 2 975 2100. Fax:+61 2 975 1368.
UK: Fairlight ESP, Unit 12, Spectrum House, 32–34 Gordon House Road, London NW5 1LP. Tel: +44 71 267 3323. Fax:+44 171 267 0919.
US: Fairlight ESP, 3855 Hughes Avenue, 2nd Floor, Culver City, Los Angeles, CA90232. Tel: +1 310 287 1400. Fax: +1 310 287 0200.

CONDENSER
RE 2000
MICROPHONES
DISTRIBUTORS
AUSTRIA Claus Grothusen OHG
BELGIUM EML N.V.
BULGARIA Pro Technica
CYPRUS Radex
DENMARK Ascon Trading A/S
E..EUROPE Gotele AG
EGYPT Alpha Audio
EIRE Shuttlesound
FINLAND Hedcom
FRANCE Mark IV Audio SA
GERMANY Mark IV Audio
GREECE Audio & Video Systeme SA
HOLLAND Eerike Roos Import BV
ISRAEL R3Y International CO Ltd
ITALY Texim
LEBANON HiFi Services
MALTA Olimpus
MOROCCO Sofem Maroc
NORWAY Scandec Systemer A/S
POLAND Mega Music
PORTUGAL Audium
RUSSIA Rutcne S
S AFRICA Proscund (Pty) Ltd
SPAIN Auprosa
SWEDEN Audiatur A/B
SWITZERLAND Mark IV Audio AG
TURKEY SF Ses Ve Isik Sisemleri
U.A.E. N.M.K. Electronics
U.K. Shuttlesound
Electro-Voice

CONDENSER
RE2000
MICROPHONES

EXTRAORDINARY TALENT TELLS ITS OWN STORY



DON'T LET AN ORDINARY MICROPHONE INTERRUPT

Just when you've got a great take from an extraordinary talent you come up against noise, coloration and distortion. The ordinary condenser mic has to have its say. Cue the Electro-Voice RE2000. Plus a discrete (not to mention discreet) computer-grade power supply; plus a regulated operating environment that ignores the real world conditions outside its shock-proof casing; plus a best-of- all-worlds ultrathin gold-laminated diaphragm combining uniformity, wide dynamic range and exceptional transient response. Minus noise and interference.

Enough of the theory. This mic's been tested in practice by some extraordinary engineers, and they've got plenty to say. Like "the perfect mic for recording any acoustic string instrument" (John Beland of the Flying Burrito Brothers), and "the warmth of a tube mic — extremely quiet and sensitive, allowing me to pick up low-level material without adding noise" from Scott Weber of Buena Vista Sound, Walt Disney Studios. Tom Cusic of TM Century, Dallas "used less EQ to achieve what I look for. What goes in...comes out! It's also extremely versatile...from vocals to acoustic guitars to trumpets and violins", while Roy Thomas Baker (Producer of Queen et al) thinks "it's one of the most versatile I've ever used."

The Electro-Voice RE2000. No noise, no coloration, no distortion. No ordinary condenser microphone.

ELECTRO-VOICE. EXTRAORDINARY ENGINEERING.

Germany
MARK IV AUDIO
D-94315 Straubing
Tel: 09421-706-0
Fax: 09421-706-265

Switzerland
MARK IV AUDIO AG
2563 Ipsach
Tel: 032-51 68 33
Fax: 032-51 12 21

France
MARK IV AUDIO
77322 Marne la Vallée
Tel: 1-64800090
Fax: 1-60065103

Japan
MARK IV AUDIO
Tokyo 168 Japan
Tel: 03/3325-7900
Fax: 03/3325-7789

USA
ELECTRO-VOICE
Buchanan, Michigan 49107
Tel: 616-695-6831
Fax: 616-695-1304

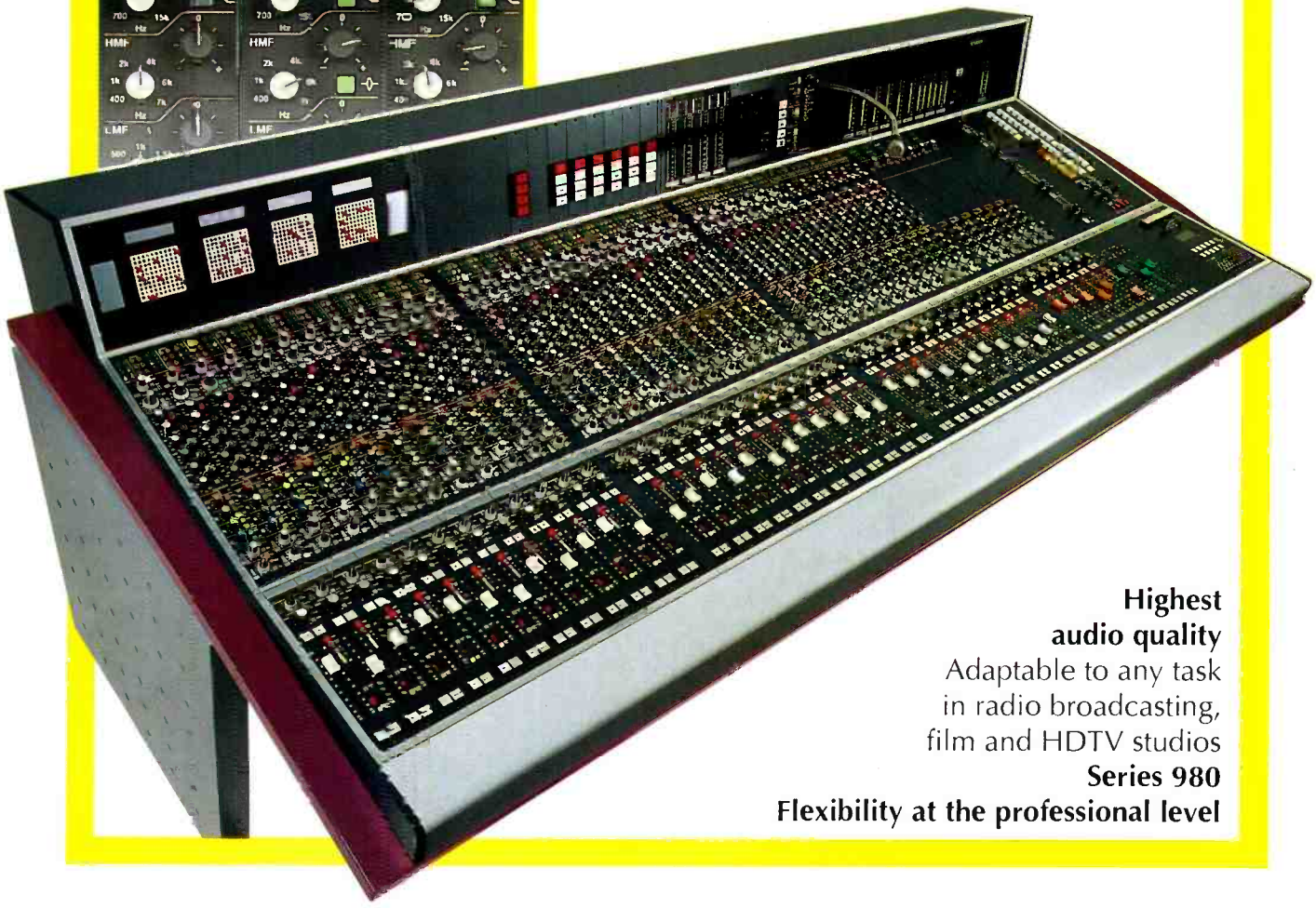
Electro-Voice

F L E X I B I L I T Y

Series 980 - the viable future of analog mixing console technology

The new Studer series 980 is now available - highly flexible, reliable, and efficient!

- Broadcast versions, up to 96 inputs / 8 groups / 4 masters
- HDTV / film version, with 6 groups / 6 masters
- «Top layer» snapshot automation with PCMCIA memory cards
- Positioning of mono sources on two, four (Dolby Surround™) and five (TV 3-2) channels
- Surround and TV 3-2 signals can be monitored and measured before and after coding
- All input units in broadcast or HDTV/ film version
- Faders for mono and stereo, with/without VCA, asmotor faders, in broadcast and HDTV/film versions



Highest audio quality
Adaptable to any task in radio broadcasting, film and HDTV studios
Series 980
Flexibility at the professional level

STUDER
PROFESSIONAL AUDIO EQUIPMENT

H A Harman International Company

STUDER Professional Audio AG, Althardstrasse 30, CH-8105 Regensdorf-Zurich Switzerland,
Telephone +41 1 870 75 11, Telefax +41 1 840 47 37

Direct Subsidiaries:
Austria: +43 1 866 54-0
France: +33 14 514 47 86
Germany: +49 30 72 39 34-0
U.K.: +44 (0) 707 66 50 00
Canada: +1 416 510 13 47
Japan: +81 3 34 65 22 11
Singapore: +65 481 56 88
USA: +1 615 391 33 99

A REDUNDANT REVOLT

As nonlinear audio and video systems become commonplace, the need for suitable storage systems becomes crucial. Micropolis' Trevor Duplock looks at data, disks and RAID solutions

The traditional demarcation lines between the computer industry and the audio-video industry have all but disappeared. With market convergence, a new breed of 'prosumers' has been created—those mixing the simple ingredients of a PC or *Macintosh*, hard disk and sound-video card, and making what is in essence, a digital editing machine. Unfortunately, the speed of this synthesis is producing a wave of confusion: there are audio practitioners who are sceptical about the true need for IT, while the IT companies want to investigate market potential but are quite unsure of where to start.

Some of the main reasons for this convergence concern the advances made in MPEG compression which are opening up the computer market to even the entry level audio-video consumer. This, perhaps, partly explains the huge quantities of peripherals (speakers, sound-video cards and so on) that are currently being shipped with most PCs in order to make them 'multimedia compatible'. However, what these developments constantly succeed in hiding is the increasing problems most end-users are experiencing with their storage medium, primarily hard disk. This is a fundamental consideration—after all, having a powered-up PC or *Mac* without a appropriately configured hard drive is like parading a Ferrari at a sports car rally with only the engine of a Mini. The reality is that not all hard-disk drives are capable of working with A-V data.

One of the reasons for this is a lack of understanding of the storage medium, or more importantly, the need to match your storage requirements with what is available on the market.

In the past, digital tape, standard cassette tape and DAT have been the most widely used storage media and will remain so among some users for years to come. However, many other A-V users are looking at the array of computer-based options now available. Faced with a number of different choices, these A-V users are facing two fundamental problems. Firstly, how does this IT technology actually work? Secondly, will the purchase cost of this new equipment fundamentally improve productivity?

Three choices face A-V users when considering computer-based storage: RAM (Random Access Memory), optical disc, and hard disk. To be most appropriate, the chosen method of storage should depend on user demands, the nature of the application and the kind of performance-reliability required. Users, thus, will need to familiarise themselves with factors such as processing requirements, cost per stored megabyte, access times and transfer rates. For users who do not have an IT background, these are terms that cannot be fully understood without a closer look at the three alternatives on offer.

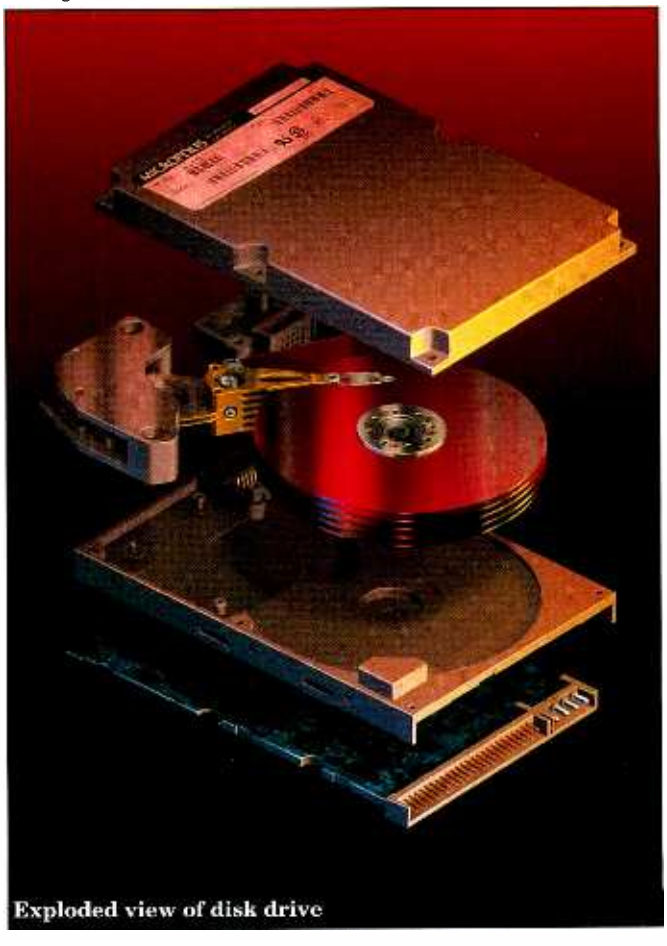
For a long time, hard-disk drives have been the preferred method of permanently storing information for short term use. Recently, hard disks have come under attack as other types of storage media have gained acceptance. RAM for instance is increasingly being used to store larger programs and disk files, however, it is likely to prove an expensive option for most A-V users. Other advances such as flash RAM, is a serious challenge to the hard disk at the lower levels of storage but will, again, not fully meet the requirements of the higher-end user.

Optical disc media have also been touted as a less expensive method of storage and one of the three types of optical storage, CD-ROM, has already enjoyed market acceptance, particularly in the field of multimedia. However, the fact that it is currently a read-only technology and has slow access times means that its use as a flexible storage option is limited.

The other optical disc options are WORM (Write Once Read Many) and Erasable Optical Disc. Both of these have longer access times than magnetic disks and, as a result, their use is primarily confined to archive and backup storage. However, their suitability for this task has meant that they have started to attack the market for magnetic tape which has, traditionally, been the most popular reference, archive and backup storage option.

Despite competition from other storage devices, the hard disk is quickly becoming the most popular computer-based method of storing information for A-V use. This particular method has gained acceptance through demonstrating the best mix of reliability, access times and transfer rates. In addition, the cost of hard drives is almost halving every year making them extremely competitive with methods of traditional A-V storage.

At this point, it may be useful to consider these particular strengths, looking into how a hard disk actually ▶



Exploded view of disk drive

works and why this makes them appropriate for Audio-Visual use.

What is a hard disk?

Today, the most popular hard-disk- drive format is a 3½-inch disk—a considerable reduction in size from when the medium was first introduced. This reduction has been made possible by an increase in packing densities which have allowed more information to be stored in less space.

It is claimed, though, that larger disks (larger than 3½-inch) are more reliable and indeed MTBF (Mean Time Between Failure) figures would seem to substantiate this. Large disk manufacturers are quoting MTBF of 500,000 to 1,500,000 hours, while small disk-drive suppliers are citing MTBF of between 100,000 and 150,000 hours. Mainframe disk manufacturers say that the reason for this higher reliability is that large disks have stronger and better engineered motors and spindles, as well as larger and better engineered heads and actuators. Smaller disks do have two significant advantages over larger-sized disks, however, and that is that they can withstand greater shock and vibration and have a lower manufacturing cost.

Despite the fact that larger disks seem to be more reliable, the trend is towards the use of increasingly smaller disks and it is likely that the 3½-inch format will be attacked by sub 3½-inch disks in the future.

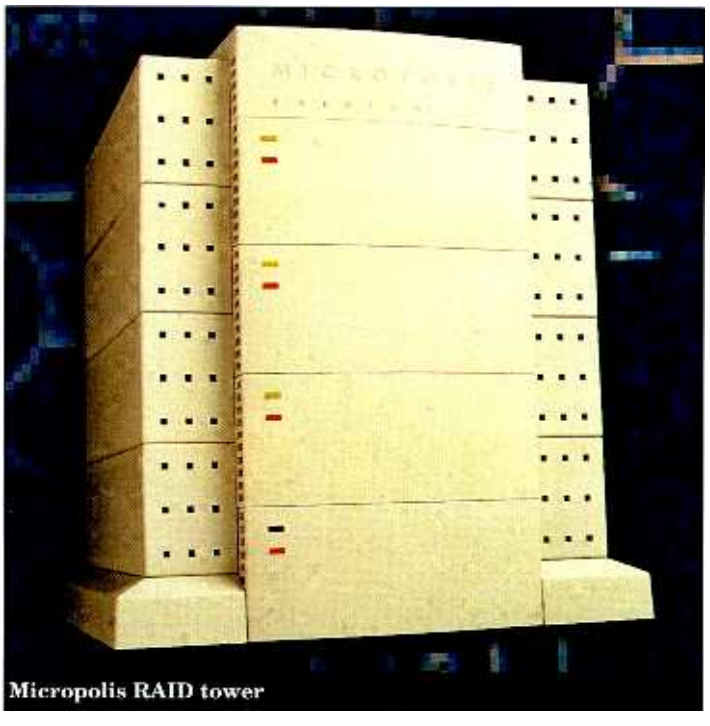
Surprisingly for such an integral part of the PC, the hard disk is relatively uncomplicated in mechanical terms. Basically, a motor is used to propel either one or more rigid, nickel-covered aluminum platters on a spindle at anything up to 7,200 revolutions per minute. (This rate is likely to rise as technology improves.)

A small arm, (the actuator) is used either side of the platter to suspend a read-write head 10 microns or less above the magnetic layer of the disk. A slight airfoil lift effect on the actuator is created by the spinning platter stopping the heads from making physical contact with the disk. As these heads fly above the spinning platter, magnetic changes on the disk allow read and writes to be performed. (Again, as technology improves, the efficiency of disk heads retrieving data from the platter is improving.)

In order for information to flow between the computer and the actual hard-disk drive, a disk interface and a disk controller are needed. The former receives the request for information from the computer while the latter gets the requested information from the disk drive and sends it back, via the interface, to the computer.

To complicate matters further there are two types of disk controller; IDE (Integrated Drive Electronics) and SCSI (Small Computer Systems Interface). At present, IDE is the most popular for small and medium hard disks. The major reasons for this is the fact that its high volume of sales have kept prices down and that it is based on relatively simple controller technology. SCSI, however, is the standard for larger drives or multi-user operating systems. Its main benefits are the fact that it can control, from one controller card, multiple devices such as hard drives, tape drives and CD-ROMs. Furthermore, it gets round the problem of compatibility by allowing drives and devices from various suppliers to be linked together. All these features make it ideal for mainstream A-V use.

Many users may be tempted to use the hard disk that comes installed in their PC or *Mac*, but the chances are that it will not be any larger that 500Mb capacity. Considering that one minute of uncompressed full-motion video data takes up 29Mb, these are be adequate for short video snippets but are be too small for the majority of users' requirements. The average audio user is therefore best advised to look for a hard disk of around 2Gb, which would roughly convert to 50 minutes of 8-track digital uncompressed data. (4Gb produces 50 minutes of 16-track.).



Micropolis RAID tower

The choice of hard disks, either internal in your computer or external in a small subsystem, is perhaps the most fundamental purchasing decision A-V users will make. Without a sufficiently capable hard-disk facility, all the accompanying expensive software could not be used to its full potential. The main reason for this is that although modern data processing disks can deliver data to traditional applications very quickly, they often have difficulty satisfying the enhanced I-O requirements of A-V applications. The real-time nature of audio-video applications requires disk drives to sustain a predetermined minimum data-transfer rate. Any drop in the data rate can spell disaster of the sort characterised by jumps, stutters and gaps in motion and sound reproduction. Thus A-V users, when considering the purchase of a hard drive, need to ask their vendor or dealer for those drives that are specifically configured for A-V use.

What is an A-V hard drive?

Although contemporary data-processing disk drives can deliver data to traditional applications quickly, they often cannot satisfy the requirements for digital A-V applications. Because of the nature of audio and video playback, the data must be delivered on time at the required rate. Any delay in the delivery of data from the disk will cause interruption in the playback resulting in blips in the audio and missing video frames. The move to computer-based audio and video systems therefore demands a new type of storage; storage that can instantly access any video frame, sound or word, but which can record and play back with the same measured precision as tape. This is a sophisticated type of storage for which standard data-processing disk drives are not designed.

As has been seen, for A-V applications, any drop in data rate will mean that sound or pictures will not run smoothly and this will obviously negate the value of using disk drives. As standard disk drives carry out what is termed 'housekeeping chores' (methods by which a standard drive validates the status of the data it is handling) which may cause momentary interruptions of data, they will clearly not be suitable for A-V applications.

Some of the ways in which standard drives can halt the flow of data include Error recovery procedure overhead, rotational retries, thermal calibration, and degaussing.

Error recovery on most contemporary disk drives is very robust and thorough. However, it is the major cause of data flow interruptions. For instance, the recovery from a correctable data error can often take more than 850ms to complete. Digital A-V applications cannot tolerate a delay this large. A-V optimised drives therefore have sophisticated and exceptionally reliable means of error correction that maintain data integrity, while completing housekeeping and recovery tasks much more quickly. In fact, the time required to perform this operation can drop to 10ms or less.

Traditional 'rotational retry' routines are designed to recover soft errors by simply repeating the operation. Although this method works, it has not been optimised for speed. Precious time is lost when a disk tries to reread the data that it could not retrieve on the first check. Disk drives optimised for A-V applications recover this situation by utilising alternative error-correction schemes to preserve the data and erroneous data without wasting disk revolutions. ►

Audio Data Compression

LISTEN TO THE VOICE OF REASON

"apt-X audio compression gives me quality without compromise."

Jesse Rae
SINGER SONGWRITER

Cult Scottish funk artist Jesse Rae is yet another convert to direct dial digital recording using the apt-X based 3D2 and DSM100 Digital Audio Transceivers. Jesse joins a growing list of over 300 studios – worldwide – who use the DSM100 for recording over both ISDN and Switched 56 networks.

When quality counts – apt-X audio coding is the prefered choice. Ask over 100 leading manufacturers of professional audio equipment who, after careful evaluation, have opted for the most robust – and most apt compression solution. apt-X based equipment is now incorporated in a wide variety of products from digital cinema playback systems to STLs – making it the natural choice for audio professionals.

The apt-X audio compression solution is equally applicable to storage and editing applications and is available in component, board level and software products.

Listen, then decide.
Call APT for details.

Audio Processing Technology

HEADQUARTERS NORTHERN IRELAND:
TEL: +44 (0)1232 371110
US OFFICE: TEL: + 1 213 463 2963
JAPAN OFFICE: TEL: +81 3 3520 1020

Thermal calibration—or T-Cal—is necessary to ensure that the disk's heads remain precisely over the data tracks by compensating for temperature changes during normal operation. With the majority of disk drives, a T-Cal requires more than 0.1s to complete. This can be a severe impediment to data flow from the disk and is one of the major causes of dropped video frames and interrupted audio.

A-V drives manage the T-Cal process intelligently so avoiding any break in the movement of data. Through comprehensive disk management techniques, thermal calibration will not occur if there is a pending request for user data. If the T-Cal process has begun and disk data is requested by the user application, T-Cal will suspend operation allowing the drive to furnish information to the user. Then, as the workload permits, the disk will complete the thermal calibration.

During the normal course of disk operation, the disk's data heads will accumulate a slight magnetic charge. This charge can adversely affect the drive's efficient operation. Before this happens the drive must demagnetise, or 'degauss' each head. Since head degaussing involves at least one head seek plus some rotational latency, this activity can cost more than 40ms and will interrupt the flow of data from disk. By minimising head seeking and rotational latency through a refined degaussing scheme, A-V drives allow the audio and video information to continue to flow to the user application without interruption.

RAID explained

Another major factor for considering hard-disk drive-based solutions is the reliability they can offer. At the forefront of this is RAID (Redundant Array of Inexpensive Disks) which offers a high degree of redundancy against individual disk failures.

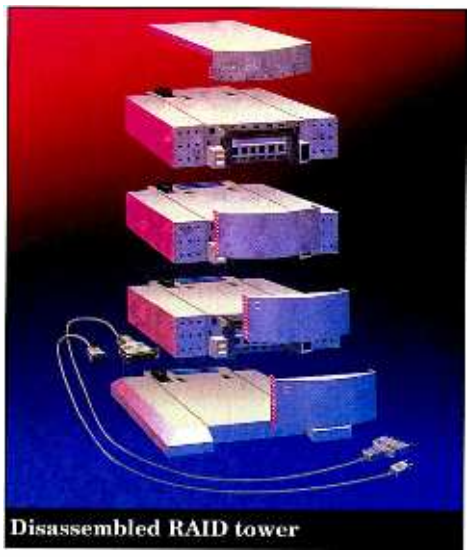
Put simply, RAID involves stringing together a number of small, inexpensive disks to create a storage solution which is ideal for mission critical applications that need true fault tolerance. Perhaps the best way to explore the concept of RAID is to look at what the acronym stands for.

Starting with the last letter, the 'Disks' are, typically, standard, smaller disk drives rather than the Single Large Expensive Disks (SLED) which have traditionally been used for storage purposes. As the disks used for RAID are smaller, then it follows that, relatively, they are also 'Inexpensive'.

Linked together, in an 'Array', these disks cannot only cope with very large amounts of data but can also provide fast access times. Imagine you have five disks in an array structure with data spread across them; the time it will take to access that data will be one-fifth what it would be if you were only using a solitary disk.

'Redundancy' is slightly more difficult to explain as it involves looking at Mean Time Between Failure of disks. Taking the solitary disk again, we can assume that it will have a MTBF of 100,000 hours. However, if you have five such disks linked in an array then it follows that the MTBF will be only 20,000 hours.

This level of MTBF is not acceptable so the RAID approach is to create a certain level of 'redundancy' into each array. This means that your data will not



Disassembled RAID tower

be lost if one of the disk drives in your RAID systems failed. It also means that any data will be automatically reconstructed after a disk crash without you even having to take your system down.

RAID can be broken down into six separate levels: Level 0 system has multiple disks in an array and, through the controller, is able to stripe (a technique used by proprietary minicomputers for many years) data onto several disks. Furthermore, if this controller is positioned intelligently over the next record to read or write, then disk-access times can be improved dramatically. However, striping has the major disadvantage that if one of the disks go down then data has to be reconstructed from backup tapes or similar devices. This means that, technically, Level 0 is not really a RAID level because it has no redundancy.

Level 1 provides disk mirroring where data is duplicated onto separate disks. This means that data can be read independently from each drive and if one disk fails then the other can take its place. Mirrored disks offer the advantages of local security as well as improvements in reading times as data can be read alternatively from the disks or by using the nearest available head. Typically, mirrored disks are offered with fault tolerant computers where the security of data is the issue rather than the cost per megabyte.

Level 2 uses a bit-interleave (also known as striping) process, to spread data across all of the drives in the array; the first drive in the array contains the first bit, the second drive contains the second bit, and so on. Separate drives are used to store error-correcting codes or parity information. This creates very slow read times as there is a constant need to assemble-disassemble bits from all the disks. As RAID 2 was designed for mainframes and supercomputers, it is not suitable for desktop LAN environments.

Level 3 addresses the problems inherent in Level 2; data is written across several drives but only one dedicated disk is used for error-correction bit checks. This single disk is then used to reconstruct data in the event of any error occurring. With Level 3, disk heads are synchronised which means that read and write transactions can take place at high speed. Consequently, this level is well suited to large file transfers or sequential file reading, updating and writing.

The main problem with Level 3 is its inability to perform simultaneous I-O transactions because large blocks of data are interleaved across all drives. The Level 4 approach differs by placing the entire transfer block on the first data drive, the second transfer block on the second drive and so on. This enables multiple reads and so improves disk performances. The disadvantage of Level 4 is that it uses a dedicated parity drive which contains the parity for all the data drives and is involved in every write transaction. Consequently, writes are particularly slowed down.

Levels 1 to 4 all use dedicated parity drives and are therefore limited to one write transaction at a time. The advantage of Level 5 is that because all the drives contain both data and parity blocks, there is no need for a dedicated parity drive.

As with Level 4, an entire transfer block is placed on a single drive and the parity for that block of data is stored on another drive. This means that if a drive fails, its data can be reconstructed from the remaining drives. By eliminating the need for a dedicated parity drive, the single-write bottleneck is removed so allowing Level 5 to perform multiple read and write transactions in parallel. This last point explains why this level of RAID is regarded as the most suitable for LAN users.

With a description like this it is little wonder that RAID has, traditionally, been viewed as ideal for larger systems rather than the desktop and no surprise that it has baffled A-V users. However, with more and more A-V users now holding increasing amounts of information on their *Mac*s and PCs, demand for RAID systems that can protect desktop-held information effectively is set to explode.

The future

Hard drives have now become an essential piece of kit in this industry. Despite the fact that hard-disks drives represent a greater cost than previous storage mediums most sound engineers and studios will be prepared to finance this extra expenditure in the interests of quality, reliability and efficiency. So how will the hard disk evolve over the years? Well, with increased demand from users wanting to run ever more Mb-hungry software applications, disk drive capacities are likely to keep rising. Encouragingly, the current doubling of capacities is accompanied by a halving of prices per Gb. Coupled with this, it is likely that there will be a move to smaller and smaller disks as miniaturisation continues. One thing for certain is that the hard disk will continue to evolve with developments originating from both the A-V and IT sectors. Although most of the hardware-based technological developments will come from the IT side, it is still the responsibility of the traditional A-V vendors and smaller specialist companies to convert these for the A-V market. Undoubtedly, hard disks are here to stay and, in a few years time, especially when a universal compression standard has been agreed, we will all be looking back and wondering how we survived without them. ■

He spent a fortune on a moving fader console. Then he discovered the Soundcraft DC 2000.

Steady yourself, the price of moving fader consoles just took a tumble. Available in a variety of configurations, with or without patchbay, the Soundcraft DC 2000 integrates powerful automation into a highly specified mixing console. And, thanks to our revolutionary C3 Console Control and Communication™ system, digital noise is effectively eliminated.

Its touch screen facilitates machine control for all industry standard formats, including the Tascam DA-88, Alesis ADAT and Sony 9-pin, and offers a host of other time (and money) saving features.

The DC 2000 slashes the cost of equipping a sound-for-picture facility and suddenly makes adding a second or third room a real possibility.

To find out more call +44 (0)1707-668143 or see your authorised DC 2000 dealer.

DC 2000

Silent Integrated Automation

HARMAN INTERNATIONAL INDUSTRIES LTD., CRANBORNE HOUSE, CRANBORNE INDUSTRIAL ESTATE, CRANBORNE RD., POTTERS BAR, HERTS, EN6 3JN, ENGLAND. TEL: +44 (0)1707 665000 FAX: +44 (0)1707 660482

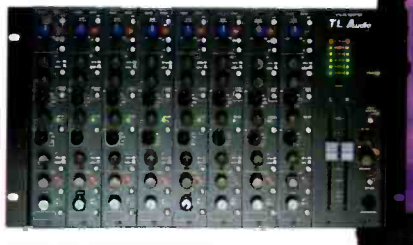
All trade marks acknowledged.

Soundcraft™

H A Harman International Company

Experience The Glow of..

VALVE TECHNOLOGY



TL Audio 8:2 Valve Mixer
Valve 4 band eq & mix amps, balanced busses & outputs. Class A discrete option. Link facility for 16, 24, 32 etc. channels. Free standing or rack mount.

Dual Valve Mic Pre-amp/DI
Mic & instrument inputs, peak LED, +48v phantom power, switchable sensitivity, variable gain control, rack ears included.

Dual Pentode Valve Pre-amp
Transformer coupled mic input, +48v phantom power, input/output gain controls, front panel instrument input, Phase reverse switch, Filters.

TL Audio Valve EQ
2 channels x 4 band valve EQ, balanced mic & lines, +48v phantom power, front panel AUX input, bypass switch.

TL Audio Valve Compressor
Pre-amp valve compressor, balanced mic & line inputs, +48v phantom power, 2 AUX inputs, variable 'soft knee' compression.

Give your recordings the rich, warm glow of **Valve Technology**, a series of valve based mixers and signal processors from TL Audio. Choose the EQ, Compressor, Pentode Pre-Amp, Mic Pre-Amp/Di or modular 8:2 Valve Mixer and you'll get a smoothness of sound, very low noise floor and a quality of construction that only TL Audio can deliver.

Magazine reviewers the world over agree:

"I fell in love with them from the start" - Mix. "The HF is superb...Incredibly quiet" - Audio Media. "An openness and depth of sound that surprised me...remarkably clean performance" - Studio Sound. "The presence was outstanding" - Audio Media.

Experience the glow of valve technology from TL Audio.

SASCOM MARKETING GROUP
Canada & USA:
Sascom Marketing Group
Tel: +905 - 420 3946
Fax: +905 - 420 0718

For United Kingdom sales
Tony Larking Professional Sales Ltd.
Letchworth, SG6 1AN (UK)
Telephone +44 (0)1462 490600
or Fax +44 (0)1462 490700

TL Audio

Worldwide Distribution **Tony Larking Professional Sales Ltd.** Letchworth, SG6 1AN (UK). **Tel: +44 (0)1462 490600 Fax: +44 (0)1462 490700**

AKAI DR8

Believing the *DR8* to be a 'doubled up' *DR4d* is 'missing the point'

Anyone encountering Akai's *DR8* hard-disk recorder-editor for the first time could be forgiven for thinking that this is a doubled up *DR4d* with extra panel space devoted to controls. They would, however, be missing the point.

While the *DR8* shares and preserves much of the operational ease and control layout of what is still one of the cheapest stand-alone, 4-track, hardware-based, hard-disk systems, internally the machine is more of a downgraded and re-presented *DD1500* than a souped-up *DR4* (See review, July 1995, *Studio Sound*.). Consequently, it is a mistake to judge the *DR8* against the *DR4* because it sports so many extra features and thoughtful inclusions in addition to the obvious difference of 8-track operation to make it a completely different machine.

Running through the *DR8*'s features, there is a 16-channel, programmable, digital mixer to handle eight tracks from disk and eight external inputs, 18-bit, 64 times oversampled, A–D convertors and 20-bit, 8-times oversampled, D–A convertors. Recording is 16-bit linear PCM to up to six SCSI drives with backup to DAT. Points of note include 100 autolocate points, nine direct-access locate points, absolute and relative time modes, tempo mapping, adjustable preroll, varispeed playback, automated punch-in and punch-out, and high-quality scrub from a jog-shuttle dial for pinpointing cues from the device's various editing modes. Sampling frequency is selectable between 48kHz, 44.1kHz, 32kHz and 44.056kHz.

Connections are via balanced jacks for the eight analogue outputs (switchable in pairs for high or low gain), eight analogue inputs (switchable in pairs for high, medium and low gain) plus a main stereo output and what equates to a stereo aux send, both of which are switchable for high or low gain. There are also AES-EBU and SPDIF digital I-Os and a BNC for wordclock or video sync. Seven *DR8*s can be locked together for 56-track operation via rear panel, multipin, remote sockets and a forthcoming remote controller, which plugs in to the front panel.

Optional boards include a SMPTE reader-generator for time-code sync, a MIDI interface for synchronisation and MIDI control and digital EQ for the mixer. The model under scrutiny here had the SMPTE and MIDI boards fitted but no EQ or remote.

As already mentioned, the *DR8* shares the excellent tape-machine-style ergonomics of the *DR4*. Tracks are armed individually on dedicated keys, and fast forward and rewind functions operate in Play mode for audible cueing. Dedicated keys are also provided for the To, Over and From functions. To Starts playback a preprogrammed number of seconds before the current position and stops when it reaches it; Over starts playback a preprogrammed number of seconds before the current position and stops the same amount of time after it and From starts playback at the current position and stops a preprogrammed number of seconds after it. These three functions may seem a little curious but prove indispensable for setting up things like autolocate points accurately and the altogether more important business of defining In and Out points. With this in mind, an IN TO OUT button previews the segment of audio between these two points making it easy to listen exclusively to the part you have defined. A smaller REPEAT key cycles the selected section.

Almost surprisingly, the IN and OUT setting buttons are small unimportant-looking switches given their essential role in operating the *DR8*. Similarly with the ENTER button: this key is pressed so many times in operation that it deserves to be larger and prominent enough to be thumped with confidence.

Locate points are accessed from the numeric keypad (some of the buttons serve as different functions keys in the Sub Menu mode) with nine single-press direct locate points and 100 others selected after three key presses. There is also a useful LAST button which can ▶

Less a progression from the *DR4d*, more a slimmed down *DD1500*. Zenon Schoepe finds Akai's latest disk recorder powerful and appealing

DR8 rear panel connections

call up the last two positions at which the STOP button was pressed. Direct access to points entered as a numerical time value is also possible.

Peak hold, fluorescent light, display bar graphs cover the eight tracks and the stereo send and stereo levels. CHANNEL ON buttons select tracks for monitoring and combine with the Arming buttons to select tracks for the various editing functions. The legending below the bar graphs would benefit from being a lot brighter as the metering serves as a visual display of mix parameters (such as level, pan and aux send) for each channel.

The one-unit-high panel at the base of the *DR8* contains some of its most interesting features. Apart from providing gain pots for analogue inputs and a headphone socket and level control, it is here that the mix functions are accessed, In and Out points are entered, Edit mode is activated, Sync modes are set and Tempo and Beats are decided. You also access a wonderful Multiple Take section in this area.

In use

Getting around the *DR8* is simple and its structured in a way that does not force you to use the mixing section or the additional inputs. Like the *DR4d*, Record mode cannot be activated from the Track Arming buttons, but once you have committed up to eight tracks simultaneously to disk you can highlight sections using the IN and OUT point flags and assign them using the CHANNEL ON and Track Arming buttons as source and destination keys respectively to perform the various editing options.

There are cut, copy and insert, move, move and insert, insert, erase, delete and slip functions, all of which are slick and undo-able. Like the *DR4d*, the *DR8* deals in butt edits. Matters are aided by high-quality scrub audio and the ability to cue and review on the FAST FORWARD and REWIND keys. To give you an idea of the speed of the machine, you can exit Record on a track and go immediately into Scrub—which impressed me.

The only thing you have to be wary of in Record is the THRU button which routes input signals through to the main output as it will interrupt the signals that are being recorded to disk.

It would be useful and quick to be able to access the locates from Play mode rather than from Stop, although I found the LAST button incredibly useful once I had trained myself to remember roughly the last two times the STOP key had been pressed.

You cannot get to the submenu while recording, but this is only a hindrance when you are running close to the limits of your hard disk and could do with some indication for the time remaining.

Even so, I was surprised at just how happy the *DR8* is to operate on a near full memory's worth of data; there is no noticeable sluggishness when the quantity of audio starts to build up. In this area alone the *DR8* seems to feel a little more forgiving than the *DR4d*.

Undoubtedly one of the best features is the Take function which allows you to store individual audio takes onto five buttons, each of which can be discarded or kept and that is in addition to the latest new recording and the Undo beneath it. You can then audition at your leisure and this takes out a lot of the restriction of having only eight tracks. If you are clever and have enough free tracks available, you can write the best takes to disk, comp them up and repeat this process for further recordings. This inclusion contributes most to unlocking the power and usefulness of this machine—we are into the land of creativity here, away from tape machine analogies and into using random access to good effect. It is superb and you can also store an existing track or a combination of tracks to a Take.

Sync and backup

Synch-wise, the *DR8* locks reliably and varispeeds convincingly when controlled externally or internally. It takes MMC, SMPTE, MTC and MIDI clock. Those looking for an affordable and compact eight tracks of hard disk to run alongside tape with will find it transparent and fuss-free.

Eventually you will want to backup, and on the v1.02 software of the review model, backup is total and not selective, although I understand that this will change with the latest software revision. Backup is in real time to DAT, which means that if you are in hurry then you either have to discard what you really can do without or soldier on and use your disk space as efficiently as possible. The downside of DAT-based backup is that backupable disk size could be limited by the length of DAT tape available.

There is a time display to advise you on the length of tape required to backup the disk contents but this, we are told, is approximate. Consequently running close to DAT length limits is risky if you're prepared to sit through a full disk download in real time only to find that you are a minute short on tape at the very end.

I would go so far as to say that if you have ended up with an edited stereo master, it is probably quicker to run this out digitally onto DAT in real time along with any other relevant material and be prepared to sort it all out again when you load it back in—the machine certainly edits quickly enough to make this a possibility. This sort of ingenuity will be necessary if you are dealing with big disk's worth of audio.

There is no verification procedure for the backup and to be honest, I am grateful as it would mean that the process would take even longer but backup seemed reliable and dependable.

An annoying point is that erasing a disk for the start of an all-new session defaults many values and settings which then have to be changed again. Given that these are things that have been set deliberately by the user, it would be handy if they could be preserved.

The Mixer seems on the face of it to be a bit of a gimmick but in reality its quite useful. While predictably no substitute for a real desk it is convenient and relatively easy to adjust levels and pans digitally using the jog wheel inside the box —although I doubt whether I would have bothered with the EQ even if the machine had it. You can fiddle with the eight tracks of disk and eight external inputs and you automate via 99 snapshots which can be tied to time. Channels can be soloed and six tracks can be bounced down digitally and internally via the mixer and bussing sections to two other tracks.

Conclusion

It is difficult not to like the *DR8* because it excels in the areas you would want it to—operational ease and decent, all encompassing, editing facilities. It is fast because it is well designed, well thought out, and because it has some natty touches, like the Take function and the mixer section, that release more of its power and give you more creative control than you might expect. Backup is a bit of a problem but it always is—M-Os would be a solution but they would raise the starter price on a unit which has price competitiveness stacked heavily in its favour. If you want to integrate with tape-based systems on a stand-alone box, the *DR8* takes some beating. Do not confuse the horsepower of the *DR8* with the *DR4d*.

Against a backdrop of large numbers of affordable computer-hosted or computer-based systems the *DR8* proves to me that manufacturers can build hardware-oriented hard-disk systems if they have the conviction and the inclination. Akai has proved that it has and it can. I really like it. ■

UK: Akai (UK) Ltd, Haslemere Heathrow Estate, Silver Jubilee Way, Parkway, Hounslow, Middlesex TW4 6NQ. Tel +44 181 897 6388. Fax +44 181 759 8268.
US: Akai-AMC, 1316 East Lancaster, Fort Worth, TX 76102. Tel: +1 817 336 5114. Fax: +1 817 870 1271.

The new Calrec S Series has all the big sound quality of Calrec's big desks, but in a smaller frame. And, because performing to an audience is second nature to Calrec, it includes all of the characteristics that have made the Calrec name famous in broadcasting today.

Even if space is limited, your choices aren't.

If you have limited studio space, but still appreciate the quality of Calrec, that means your choices aren't limited too.

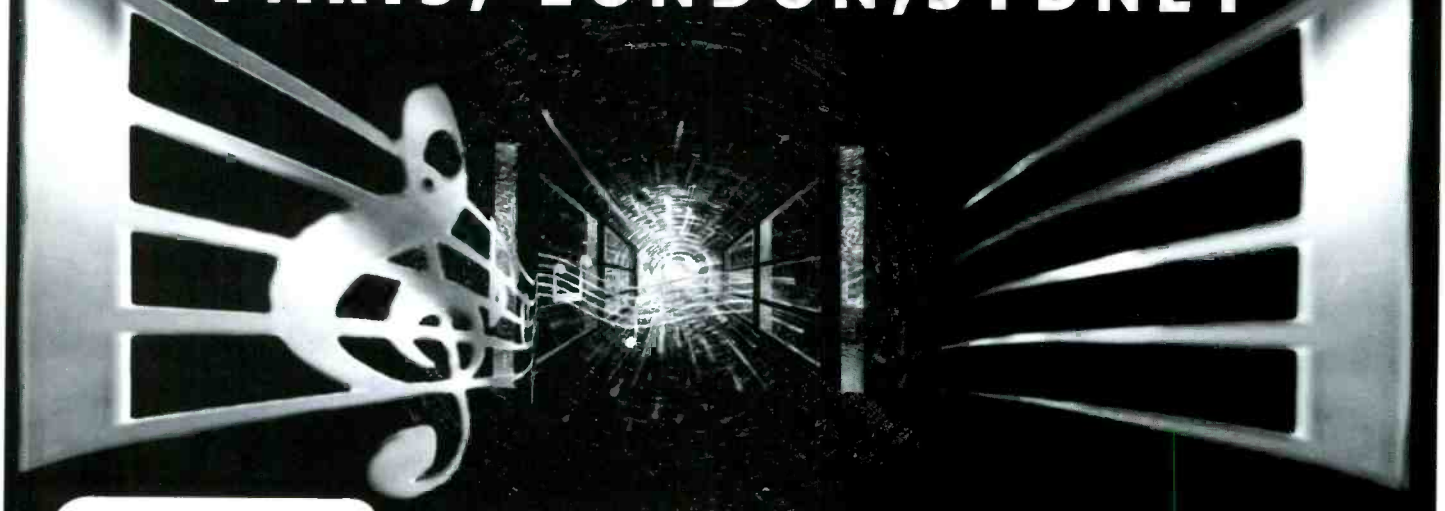
With up to 72 stereo channels, eight groups, and 32 track outputs, the Calrec S Series is fully featured with no compromises - ensuring you get a first class performance every time.

CALREC

Another first class performance from Calrec

Calrec Audio Ltd, Nutclough Mill, Hebden Bridge, West Yorkshire HX7 8EZ Tel: 01422 842159 Fax: 01422 845244

Music Production Workshop in PARIS, LONDON, SYDNEY



SAE
School of Audio Engineering

Call or write for FREE color brochure.

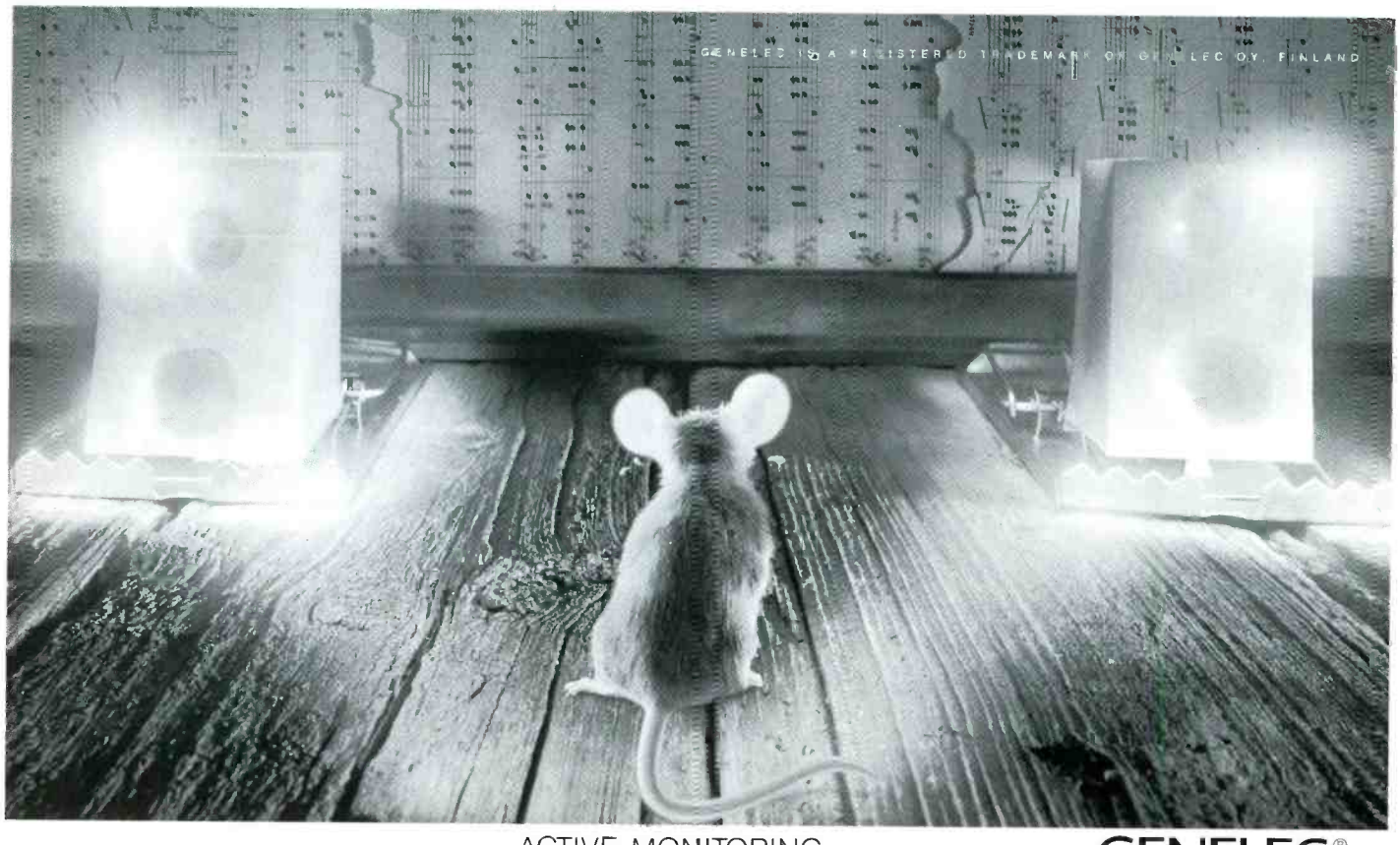
Held in PARIS LONDON or SYDNEY during July/ August '95 with leading engineers and producers. Individual practical "Hands-On" studio time is guaranteed, to all participants !

Our studios are 24/32 track with Neve VR "Flying Faders" consoles and a full selection of outboard equipment. SAE operates 40 recording studios in 18 cities and 10 countries around the world, just for training. SAE is the largest audio training facility !

SAE PARIS - Bât 286. 45, Av.Victor Hugo
93534 Aubervilliers Tel.+ 33 1 4811 9696

SAE LONDON United Hse, North Rd
London N7 9DP, UK Tel. + 44 71 6092653

SAE SYDNEY 68 Wentworth Av., Surry Hills
2010 Sydney, Australia Tel + 61 2 211 3711



ACTIVE MONITORING

JECT AUDIO

PROJECT AUDIO LIMITED
UNIT 1, 321 ESSEX ROAD
LONDON N1 3PS.
TEL: 0171-359 0400
FAX: 0171-359 3393

GENELEC®
OLVITIE 5
SF-74100 IISALMI, FINLAND
TEL +358-77-13311
FAX +358-77-12267

SOFT OPTIONS

As computer code plays an increasing part in pro-audio, Zenon Schoepe quizzes three major manufacturers on their attitudes towards software development

There is a popularly held belief, in these computer-driven times, that software holds the key to our destiny. While any problems with a system can be knowledgeably attributed to the software, by the same token they can also be cured by it. The promise of any amount of extended power and features can be harnessed and realised by it.

Because few operators actually understand or can fix the workings of software, it has nurtured a situation in which users have been removed from the traditional hands-on operator-equipment relationship. Consequently, software now controls machine transports, mixing console functions, PA systems and anything else that sports a screen —from the generation of music at its origin to its assembly and editing at completion. Dependence on software has reached the stage where reputations and livelihoods are staked continuously on other people's code—despite the fact that everyone has encountered the disastrous consequences of software failure.

The word-processing package being used to compose this article is treated with respect because it has in the past lost files and corrupted disks and—as anyone who has ever spent hours reconstituting or attempting to redeem partially lost data will vouch—the feeling of frustration and isolation is made worse through an ignorance of software and the blind trust that is placed on some stranger's ability to program carefully.

The fact that this trust persists in all of us is an indictment of human perseverance and the incredible leaps that have been made in software capability and reliability. It is all the more amazing given that most people's first encounters with software, while exciting, are likely to have been unpleasant. The early stuff, the hardware-software combo, was unpredictable, it did move very slowly and slick was not a phrase that sprang to mind even then when we didn't know any better. One of the most alarming things about software is that its wide-scale, or rather popular, use in audio did not take hold until relatively recently. But when it did, it pulled the computer, which has been the technological revelation, along with it into everyday use.

Mike Parker, DAR

Program code is immortalised in a product and while we can remember some pretty ugly incarnations many will be surprised to learn that high-profile products in these highly reliable times can still contain code kernels and lumps that extend back in origin over many years.

Now that we are firmly up the steep part of the software learning curve, issues arise which relate to the life expectancy of a piece of software—what influences manufacturers to take a drastic departure or subtle swerve in direction and what decides when a package gets a revision. Digital Audio Workstation manufacturers DAR have been busy rearranging how they store sound on disk in a move towards achieving their open media plans and have also achieved the transferal of their software on to cheaper platforms. MD Mike Parker believes the secret to software evolution lies with opting for a top-end operating system to begin with.

'What made it possible was that we started off with a particular operating system which was good but normally used for controlling nuclear power stations—it's RMX and it's written by Intel and is real-time multitasking,' he explains. 'It's a very high-end product that was originally designed only to go with their own dedicated hardware processors so the original *SoundStation*s had a very expensive Intel processor card. Intel decided there would be a bigger market for their software operating system if they ported it and allowed it to run on standard PC hardware. We were able to port our software which is what we did when *Sabre* came out. In fact the reason for *Sabre* was that we could run our software product, which we'd invested 25 man-years in, on a PC platform and we could make a cheaper product. We had to change odd things in the software and rather than risk jeopardising our core *SoundStation* products we launched it on a lower-end platform until the software stabilised.

'Since then that PC technology has gone back into *SoundStation*s which is what all the *SoundStation Plus*es are all about—we've taken out the strange Intel processor card and put in our own lump containing the PC card and a high performance graphics processor among other things and it's ▶

Mike Parker, DAR

Thomas Minter, Audio Precision

an upgrade we offer.' He continues: 'We've been fortunate in being able to evolve our hardware and our software together and yet give our customers a nice smooth continuous upgrade path.'

The software is built up of a large number of separate lumps which are rewritten when they are no longer up to the job or can no longer be added to in a process Parker describes as 'continuous and on-going' with each piece lasting around three or four years.

'We wrote some of *SoundStation* software in 1987 and there is probably the odd bit that is still there like a lot of the user interface stuff—although we've improved the graphics the layout of the screens was basically right to begin with,' he says.

Parker observes that many software tweaks that come to market often have more to do with gimmickry than core performance enhancements but believes that despite cheaper and faster hardware the desire to start from scratch has to be resisted.

'In ten years time the machines will probably have different hardware and most of the software will have changed but it won't have come about because of a rewrite at any particular time,' he claims. 'The software holds the expertise and the experience of the users and is an evolving thing.'

Parker claims it is now a lot easier for new companies to develop computer-based products from ground zero by writing software on currently available tools and he believes this is a trend that established manufacturers are also following. 'Even so it takes a hell of a long time to debug a piece of software which is why you don't throw the whole thing away and start again,' he says. 'If we were to rewrite our software from scratch it would probably takes us 2½ years to debug it.'

Thomas Mintner, Audio Precision

American test-and-measurement experts Audio Precision have recently introduced *Windows* software in *APWIN* for its *System One* and *System Two* test sets. The move to *Windows* was irresistible according to Thomas Mintner, Director of Sales and Marketing, particularly as users wanted the graphics interface and the better harnessing of 486 potential that the still current and still supported original DOS-based system could not offer.

'*Windows* offers a fantastic platform to operate from because you not only have multitasking but what they call multithreading,' explains Mintner. 'In the case of our integrated test set if you purchase *APWIN* for *System One* as opposed to *System Two*, which has just been introduced, you have simultaneous access to more of the hardware than you did with the previous software. There were things in there that you couldn't view or use all at once which you can now.

'Releasing functionality in existing equipment is an important point because you can engineer software only for new equipment or make it retrocompatible.' He continues: 'It opens up a platform that meets people's expectations in terms of things like graphics but at the core of it there's also a speed issue.'

Mintner draws a distinction between the approaches to revisions of software only and hard-soft manufacturers. 'For many of the software only companies the number of versions are sometimes improvements and sometimes partial improvements and partial bug fixes but they represent the only possible solution for them to ensure a continued revenue flow,' he believes. 'In some respects that has got out of hand and given a bad name to software upgrades. On the other hand, for hardware companies and companies more closely allied to our industry, the software is usually part of the tool to operate hardware or to keep track of it and there is a more total value. If SSL or Audio Precision bring out a software update usually it's for a pretty good reason and I don't believe that is always the case in consumer broad-based software.'

Mintner also addresses one of the critical issues facing any software orientated manufacturer—the question of how to make software development and continued support pay for itself. 'It depends on the structure of the product as a whole. We have an investment in the software which helps us to sell the hardware which is the primary revenue stream. The software costs are hidden. For manufacturers of relatively generic pieces of hardware that do editing and some processing with so many platforms out there then the strength lies more in the software and I think that those companies would be more aggressive in marketing the software upgrade as a costlier option if it indeed adds a lot of functionality.'

Charlie Steinberg, Steinberg Research

The name Steinberg has probably meant software to more users than any other through the company's dominance of MIDI sequencing with generations of product that first started seriously with *Pro 16* and *Pro 24* and has extended into *Cubase* with many *Audio* incarnations. According to Charlie Steinberg, owner and Co-MD, the only thing that makes a piece of software obsolete is 'better' software. However, it begs the question of how long an idea can be improved.

'*Cubase* has already been going for eight years but in a way its always different programs when it comes to different versions—it's not just an enhancement of features,' says Steinberg. 'The home or pro-studio environment changes because of the software which replaces hardware and it changes the way of working in general'

The limitations of computer hardware play a part, and Steinberg agrees that software does eventually outgrow its host—the last incarnations of *Pro 24* ▶

PORTADAT

INTERNATIONAL DISTRIBUTORS

AUSTRALIA: AUDIO SOUND CENTRE
Tel: 02 901 4455 Fax: 02 901 4229
Contact: Geoff Grist

AUSTRIA: AKG ACOUSTICS
Tel: 01 866 54 256 Fax: 01 866 54 549
Contact: Reinhold Fliedl

BELGIUM: AMPTEC
Tel: 011 281 458 Fax: 011 281 459
Contact: Bart Willems

CANADA: STUDER CANADA
Tel: 416 510 1347 Fax: 416 510 1294
Contact: Dave Dysart

CZECH REPUBLIC: AUDIOPOLIS
Tel: 42 2 322 552 Fax: 42 2 323 069
Contact: Jan Adam

DENMARK: INTERSTAGE
Tel: 31 62 00 26 Fax: 31 62 06 40
Contact: Finn Juul

FINLAND: STUDIOTEC
Tel: 90 592055 Fax: 90 592090
Contact: Peter Strahlman

FRANCE: S.A.V.
Tel: 1 42 40 55 22 Fax: 1 42 40 47 80
Contact: Philippe Desgué

GERMANY: MEDIACOM
Tel: 05451 500185 Fax: 05451 500183
Contact: Uwe Seyfert

GREECE: KEM ELECTRONICS
Tel: 01 647 8514 Fax: 01 647 6384
Contact: Thimios Kolikotsis

HOLLAND: K&D PROFESSIONELE
Tel: 2526 87889 Fax: 2526 87362
Contact: Daan Verschoor

HONG KONG: DIGITAL MEDIA TECHNOLOGY
Tel: 2 721 0343 Fax: 2 366 6883
Contact: Wilson Choi

ITALY: AUDIO EQUIPMENT
Tel: 039 212 221 Fax: 039 214 0011
Contact: Donatella Quadrio

NEW ZEALAND: AUDIO VIDEO WHOLESALERS
Tel: 07 847 3414 Fax: 07 847 3412
Contact: Murray D. Hunt

NORWAY: SIV. ING BENUM A/S
Tel: 22 1 45460 Fax: 22 1 48259
Contact: Egil Eide

POLAND: STUDIO DAVE
Tel: 2 226 4912 Fax: 2 635 5262
Contact: Bogdan Wojciechowski

PORTUGAL: ESTEREOSOM LDA
Tel: 01 356 0563 Fax: 01 57 2981
Contact: Jorge Goncalves

RUSSIA: ABV COMPANY
Tel: 95 192 8101 Fax: 95 233 6019
Contact: Boris Nekrasov

SINGAPORE: TEAM 108 PTE LTD
Tel: 065 748 9333 Fax: 065 747 7273
Contact: Helena Lim

SPAIN: KASH PRODUCTIONS
Tel: 91 367 5222 / 91 377 0068 Fax: 91 367 5209
Contact: Jim or Carmen

SWEDEN: INTERSONIC SYSTEMS LEAB
Tel: 08 744 5850 Fax: 08 184354
Contact: Mikael Sjostrand

SWITZERLAND: AUDIO BAUER PRO AG
Tel: 01 4323230 Fax: 01 4326558
Contact: Roland Frei

USA: INDEPENDENT AUDIO
Tel: 207 773 2424 Fax: 207 773 2422
Contact: Fraser Jones

HHB

HHB Communications Limited
73-75 Scrubs Lane · London NW10 6QU · UK
Tel: 0181 962 5000 Fax: 0181 962 5050

UPGRADE TO PORTADAT

PORTADAT PDR1000
4 Head portable DAT recorder

Does your DAT portable have what it takes for professional portable sound recording? You need 4 heads for confidence monitoring and a rugged, 4 motor transport for reliability. Equally important is a full range of professional analogue and digital I/Os, plus selectable sampling rates (including 44.1KHz) to guarantee compatibility with post production editors. A two hour minimum battery life is vital in the field – preferably from superior Nickel Metal Hydride rechargeable batteries – along with a choice of other powering options, including a 12 volt DC input. You'll need access to a full range of professional accessories including cases, two and four way battery fast chargers and in-vehicle battery chargers. And, most important of all, sound quality must be superb. Only the most advanced converters and mic amps are acceptable.

One DAT portable has it all and more – the PORTADAT. Developed by HHB, the world's leading independent supplier of DAT technology, the PORTADAT has become the new industry standard in portable recording. But don't take our word for it. Take a look at what the press has to say.

"The PORTADAT is undoubtedly one of the finest portable DAT machines available". "At last you can buy a portable DAT recorder that has all the facilities required by a professional..." *Audio Media*

"...it is hard to think of anything one might want which HHB have not provided. It bristles with all the right features..." *Studio Sound*

"...HHB has done an excellent job...This is a professional tool that offers the features, audio quality and rugged construction that serious users require" *Mix*

"It seems that every possible detail was considered in the PDR1000's design" *EQ*

There are two models in the PORTADAT range – the PDR1000 and the time code equipped PDR1000TC. So if you're serious about DAT recording, upgrade to a PORTADAT now.

PORTADAT PDR1000TC
Portable time code DAT recorder

For full details of PORTADAT professional portable DAT recorders, please mail this coupon to HHB Communications

Name: _____

Address: _____

Tel: _____

DAT
Digital Audio Tape

HHB

HHB Communications Ltd · 73-75 Scrubs Lane, London NW10 6QU, UK · Tel: 0181 962 5000 · Fax: 0181 962 5050
Independent Audio · 295 Forest Avenue, Suite 121, Portland, Maine 04101-2000, USA · Tel: 207 773 2424 · Fax: 207 773 2422

SS

•HAND HELD AUDIO

The Radio Microphone Specialists

SENNHEISER

SONY

IN-EAR MONITOR SYSTEMS by GARWOOD

AKG

SHURE

SAMSON

Frequency Planning and Licensing Service

Rental • Sales • Service

Unit 2, 12-48 Northumberland Park, London N17 0TX
Tel: 0181 880 3243 Fax: 0181 365 1131

*NEVE.8026. 24/8/16 RIGHTHAND PATCHBAY FITTED. 24 x 1073's. 32 x 1943/1's, 4 x REV RETURNS, 2 x 2254 COMP/LIMITERS. PHONE FOR PRICE.

*NEVE.8036. 16/8/16 LEFTHAND PATCHBAY. FITTED 16 x 1064's, 25 x 1900's, 4 x 1901 ECHO RTNS. 4 x 2254 COMP/LIMITERS. 2 x EMT REMOTES. PHONE FOR PRICE.

*NEVE.8036. 20/8/12 LEFTHAND PATCHBAY. FITTED 20 x 1064's, 28 x 1900's, 2 x 2065, 3 x 2254A. COMP/LIMITERS, 2 x EMT REMOTES. PHONE FOR PRICE.

*NEVE.5315. 24/4. REMOTE PATCHBAY. FITTED 24 x 33114's, 24 x 33726A's, DIRECT TAPE OUTS. PHONE FOR PRICE.

NEVE SMALL BROADCAST CONSOLES 6/2 (STEREO(AVAILABLE REFURBISHED. CHOICE OF 3. PHONE FOR PRICE/DETAILS.

*NEVE MODULES FOR SALE.
10 x NEVE 1064's
12 x NEVE 33115's
16 x NEVE 33114's
4 x NEVE 33141's (STEREO)
COMP/LIMITERS
4 x 2254's
4 x 2254E's
1 x FAIRCHILD 670
MICROPHONES
1 x NEUMANN U47 PSU/CABLE
2 x TELEFUNKEN U47's PSU/CABLES
10 x NEUMANN SM2's PSU/CABLES
4 x NEUMANN U67's PSU/CABLES
2 x NEUMANN KM86's
1 x NEUMANN KMS85i
1 x NEUMANN U87
2 x SENNHEISER 441's

SSL MODULES AVAILABLE
10 x SSL611E SERIES MODULES
**BREAKING SSL4040E SERIES FRAME. PHONE FOR PARTS LISTING

Presently wishing to purchase Neve/API/SSL consoles worldwide.
*Please note all items are owned by A.E.S. Pro Audio.

AES PRO AUDIO

TELEPHONE: 0932 872672
FAX: 0932 874364
TEL: INTERNATIONAL 44 932 872672
FAX: INTERNATIONAL 44 932 874364

A UNITED KINGDOM BASED COMPANY

NEUTRIK presents: The A/B Series

The new industrial standards

* Universal mounting
  PCB mounting: vertical, horizontal, lateral and IDC
* Highest available packing density
* Solves the "pin 1 – to ground – to shell" problem
* Hard gold plated polished patented tuning-fork contacts, corrosion-free and self cleaning, 5'000 insertions guaranteed
* Available with plastic (A) or metal (B), UL94-V-0 grade plastic
* Outstanding price/performance ratio

We are setting standards

NEUTRIK
CONNECTING THE WORLD

NEUTRIK AG Liechtenstein Tel 075/2372424 Fax 075/2325393
NEUTRIK USA INC. USA Tel 908/9019488 Fax 908/9019608
NEUTRIK UK Ltd. UK Tel 0983/811441 Fax 0983/811439
NEUTRIK Zürich AG Switzerland Tel 01/7340400 Fax 01/7343891
NEUTRIK / SCJ Japan Tel 03/54112551 Fax 03/54112827

bear great witness to this fact. 'There is always a limitation, the computer can never be fast enough and it can never have enough memory, that's for sure,' he asserts. 'Through the program the computer replaces additional hardware step by step and if it doesn't do that then it controls the hardware more and more. The ideal is a totally integrated studio where everything is in there but you will have to have something like 128 audio channels and all the samplers and synthesisers integrated into the computer. That's not really out of this world because the hardware currently is being enhanced so strongly that there is a horizon where this may happen in the not too distant future.'

He remarks that it is the programmer's delight to take any computer with increased abilities and immediately hack into it and push it to its limits. However, he acknowledges that not every computer hardware development can be chased down with software.

'I think if you look at the add-ons to a computer that make it faster then we can probably only support the ones that are most commonly used,' says Steinberg who agrees that there is risk involved. 'It's sort of reduced because the products that we write software for you can more or less rely on them happening in the marketplace but it is always a risk.'

Steinberg draws attention to the Atari *Falcon* computer, the responsibility for which has now been passed to software house C-Lab, as a good example. 'Atari has closed its doors and this is very hard for us but we will try and do what ever is possible now with the C-Lab *Falcon*. There are a lot of companies that are working with the *Falcon* because it is a good machine,' he observes.

Having started with MIDI sequencing and progressed to hard-disk recording and digital mixing, Steinberg maintains that it is the manufacturer's responsibility to achieve customer satisfaction by not overloading a program with too many features and ensuring that it can still be learnt quickly by a beginner. He also acknowledges that a software-based company's life-blood is its ability to evolve a product with a never-ending stream of enhancements and agrees that in addition to users who have to have the latest version there are a band of users who cut-off on software once it achieves precisely what they want and go no further.

'When I'm programming I always look at it from the point of view of the user,' says Steinberg. 'At the moment, at home I have a *Falcon* and I'm very satisfied and pleased with it but I'm already working on the PowerPC and an *Audio* version that gives you twice as many tracks and a lot of other features—and that's what I want. But if you're doing MIDI sequencing and your pleased with what you have and think you don't need anything else then you shouldn't buy anything else.'

It is an honest observation that he immediately qualifies. 'I wouldn't say that if I wasn't sure that there are people that always have to have the latest stuff.'

Adding functionality is software's goal as a glance down a list of on-paper features of the currently available DAWs reveals, yet personal preference and common sense tells us that they cannot all be the same even though they may seem it.

As computers play an ever more important part in our lives so software will exert its irrepressible influence on how we work and how we think. Faced with upgrade and update routes that are potentially infinite perhaps we should draw from the experiences from the early days of software when getting it to work reliably and getting it to do what was wanted was all that was expected.

If there is a lesson to be leant it is that more realistic and practical expectations should be made of software. It exists to enable a genuinely useful function to be performed in a manner that is faster and more convenient than what it replaces. Techno-lust is a frightening thing yet software is its natural habitat. It does not control our destiny so much as we control its. ■

Charlie Steinberg, Steinberg Research

DIRECT

Recording direct to tape or hard disk, bypassing the console, is becoming the definitive way to obtain the best possible results, whether in a project studio or a world class recording facility.

red 6

Focusrite microphone preamplifiers and equalisers are probably the most often used devices for recording direct. Now Focusrite introduces **RED 6**, a combined mic-pre and EQ designed specially for the purpose.

One channel of the industry reference electronics, with the additional benefits of a VU meter and output fader to optimise level. The EQ section may also be accessed through the line input.

Uncompromised transformer balancing of the mic-amp ensures the best matching with your chosen microphone whilst the transformer balanced output stage will optimally drive multiple line inputs, balanced or unbalanced.

At £1,495*, **RED 6** brings Focusrite quality to an even wider audience. Ask your dealer for a demonstration or contact us for a brochure. (* EXCL. VAT)

Focusrite
RED RANGE

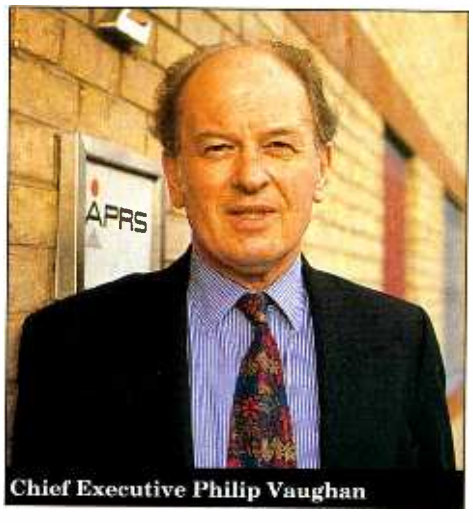
USA: Group One Ltd. 80 Sea Lane, Farmingdale, NY 11735 Tel: (516) 249 1399 Fax: (516) 735 1020
West Coast: (310) 306 8823 Canada: Sonotechnique Tel: (416) 947 9112
Focusrite Audio Engineering Ltd. Cores End Road, Bourne End, Bucks SL8 5AS, England
Tel: ++44 (0) 1628 819456 Fax: ++44 (0) 1628 819443

REFLECTING THE FUTURE

Adrian Kerridge, Philip Vaughan and David Ward are all part of a new look APRS Show—Audio Technology 95. It takes place next month and represents the fruition of a fresh approach

The fact that the APRS exhibition has the longest and most illustrious history of any pro-audio event on the planet is not something you will get APRS chief executive Philip Vaughan to dwell on for too long. To him the fact that the Association was formed in 1947, became a limited company in 1951, and held its first exhibition in 1968 as an adjunct to its Annual General Meeting where a few manufacturers laid out their latest gear on green baize-covered tables, is of historical interest but not the major factor. To Vaughan what has happened since and what is happening this year in particular is far and away more pertinent. The APRS show is relaunching as Audio Technology 95 as a positive move to better reflect the changing nature and content of the industry it represents and serves.

'We are continually regenerating,' says Vaughan. 'We have a board of directors which is always open to new people. The show regenerates itself every year and it has relaunched itself with a new title. The make-up of membership is always evolving. We have been around for a long time but we are not now what we were when we started and there is a lot of internal dynamism to keep this renewal process going.'



Chief Executive Philip Vaughan

For Vaughan, this year will be a milestone exhibition captured succinctly in its new name. 'It's exactly a reflection of the change that's been growing over perhaps five years,' he explains. 'It was time for a relaunch and with it an opportunity to put together a slogan to demonstrate what our exhibition truly represents right now. Yes, the APRS show of once upon a time was the show for people who bought gear for big recording studios the days when the initials APRS included an 'S' for Studios. That name changed some years ago, 'S' now stands for Services, and the show has also become much wider and what it is really about is audio technology.'

To coincide with this, for the first time in very many years the exhibition will be held entirely on the single floor of the National Hall at Olympia, London. 'Those exhibitors who have been to AES shows on the continent will be able to contrast the nightmare of a conference centre that's adaptable for an exhibition venue as opposed to the one big lofty hall, all on one level, such as the AES Amsterdam,' says Vaughan. 'Against that sort of background people will appreciate Audio Technology 95.'

Last year's highly successful *Briefings* sessions are here to stay with a markedly high profile, as Vaughan explains. 'Because we are a trade association and not a learned society we only concern ourselves with what is practicable, on the market now, what is happening now, and how to make the most of it. The style of these *Briefings* is deliberately different from any Conventions, such as AES or IBC because they tend to be less formal and certainly more down to earth in terms of practical application. The existence of the *Briefings* and the content of the programme reflects the changing nature of the recording business.'

These three major changes combine to place a different complexion on the exhibition which Vaughan believes has been brought about in response to what the exhibitors and attendees want. 'The days when the show existed as a medium in which manufacturers of kit that was bought by professional studios was the core, have gone forever,' he claims. 'Because of that we welcomed people from a number of associated fields and it's a matter of fact that over the last five years there have been a substantial number of exhibitors from the sectors of broadcasting, sound for radio and TV, live sound, theatre sound and, in the last two or three years, project studios. We have been happy to push that aspect and exhibitors have been very glad to make their full range of products available.'

Promotion of Audio Technology 95 will be carried in the broadcast, project studio and live sound press and visitors are expected from as far afield as Japan, Australia, South Africa, America and throughout Europe—not in numbers that overshadow the UK attendance but in numbers that nevertheless qualify the show's international status. 'It's a show that is as significant internationally as the UK music industry,' states Vaughan.

Consequently, he dismisses the claims made by critics of the show who accuse it of entertaining a high proportion of 'tyre kickers' and finds it an unusual attitude to be found in an industry that has its origins far removed from be-suited serious-looking folk.

'By "tyre kickers" they presumably mean those who don't actually have a cheque book in their pockets or don't look as if they're ever likely to be able to have one,' laughs Vaughan. 'In the music business you certainly cannot tell if the guy with holes in the back of his jeans isn't actually somebody quite competent to order some exciting equipment or to influence other people. A group with an advance to spend are certainly not going to walk around in suits.

'If an exhibitor has done the job of receiving those people properly on his stand, explaining the benefits and advantages of his equipment, taking them at face value as informed professional attendees at a technical trade show, he can't go wrong,' he continues. 'And if these 'tyre kickers' aren't really buyers in disguise they may be youngsters who will be buyers in the future and if they've been received properly they are bound to think better of that company.'

With the rebirth of the APRS show as Audio Technology 95, the Association's Chief Executive sees an assured future for the event as it continues to major on

PHOTOS: CHRIS TAYLOR

Audio Technology 95 looks to embrace all aspects of professional audio

high-quality audio. 'I don't see a better way of responding to the requirements of the future than with something like an exhibition,' he observes. 'As a visitor you've got the excitement of the occasion, the ability to access many objects of interest, a live human interface to respond to your questions —I can't see an interactive CD superseding the human element of what you can do at a trade show.'

According to Vaughan, those who fail to make it to Olympia for the three days in June will be missing out on the only opportunity they will have this year to witness the largest assembly of technology in the UK and to sample the 'pro-audio village atmosphere'.

'They will fail to pick up on an awful lot of very valuable information on where the industry is now and how it is shaping up for the future,' warns Vaughan. 'They will see a great selection of products that are already known and they will also see, if they are perceptive enough, a number of products which might not be known at the moment but which are going to be the hot topics of years to come. They will have the opportunity of participating in the *Briefings* and while they may know 90% of everything that is known in their field they may find that the remaining 10% is something they can get a contact with.'

PHOTOS: CHRIS TAYLOR

A positive response

New APRS Chairman Adrian Kerridge reveals he'll be approaching his three-year tenure with the same 'hands on' interaction that has marked out his successful professional career

Ask newly-appointed APRS Chairman Adrian Kerridge if there are critics in the UK pro-audio trade association's membership and he'll tell you that there are—but he will qualify it by adding that without them there would be no yardstick by which to measure improvement.

Kerridge believes that the APRS does respond positively to requests and he is adamant that it is something it must continue to do. In a letter to each member in March he asked them to take the time to identify three issues that they consider important to their business and to the well being of the industry, and he encouraged any other comments and suggestions. He is taking the game to the members and he wants a reaction.

'One of the points that comes out time and time again is the prospect of the downwards spiral of rate cutting,' explains Kerridge. 'In a competitive world rate cutting will go on and I see the APRS' task is to encourage our studios to communicate with their clients. When you have rate cutting clients can't always differentiate, and I say this with respect for the client, between different studios whereas we know that there are various classes of studio.

'All the things like return on investment, staffing levels, maintenance levels, the whole area, is communication and education,' he continues. 'The UK Studio Accord has put together some good ideas in terms of setting standards for what you would expect from an Accord member studio which then filters through to the other studios. It's about encouraging others to improve standards and to be professional all the way through.'

Kerridge, who was appointed Chairman at the beginning of January, describes the task as 'daunting' but says he is supported by the tremendous team of a highly professional and motivated board. He sees his role as 'three years of interaction with the ▶

AUDIO TECHNOLOGY 95
The APRS Show

membership'. The structure of board meetings has been changed so office 'routines' can be got out of the way fairly quickly leaving more time to focus on industry topics and problems.

He is clearly not a bureaucrat. 'The phone is here, I'm always here, and if any member wants to talk to me they call me up, it's as simple as that,' he says. 'If I can't give the answer then we'll get somebody else who can and we'll get back to them—try me guys!'

As director of CTS and Lansdowne Studios in London his association with the APRS goes back to the late-1960s but most recently he has been Chairman of the Administration, Finance and Legal Committee. Fiercely proud of the British pro-audio industry and a major player in its recording business, to many he typifies the sort of studio businessman that the UK is so good at producing.

'I'm still a practising engineer, I live with clients at the sharp end,' he states. 'I live with equipment and I get to know the warts-and-all of everything but equally I have to run a professional organisation that makes money for its shareholders.

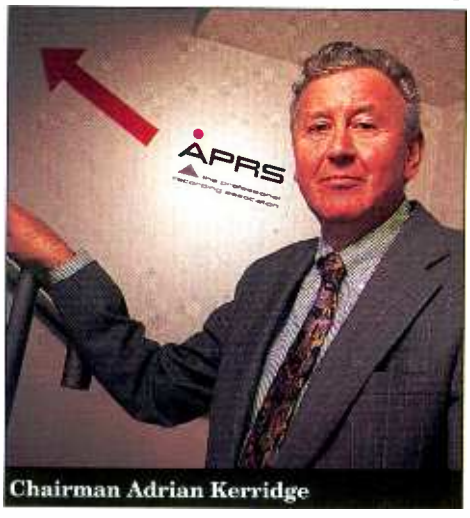
'When a client walks out through any APRS studio's door they've got to be happy in every respect. Did they have a good time, did they get what they required, did all the equipment work?'

He claims that repeat business is the mark of client satisfaction. 'We get repeat business and yes, I am a businessman in that sense but I've come through the whole school.' He adds that professionalism is the right of any APRS studio.

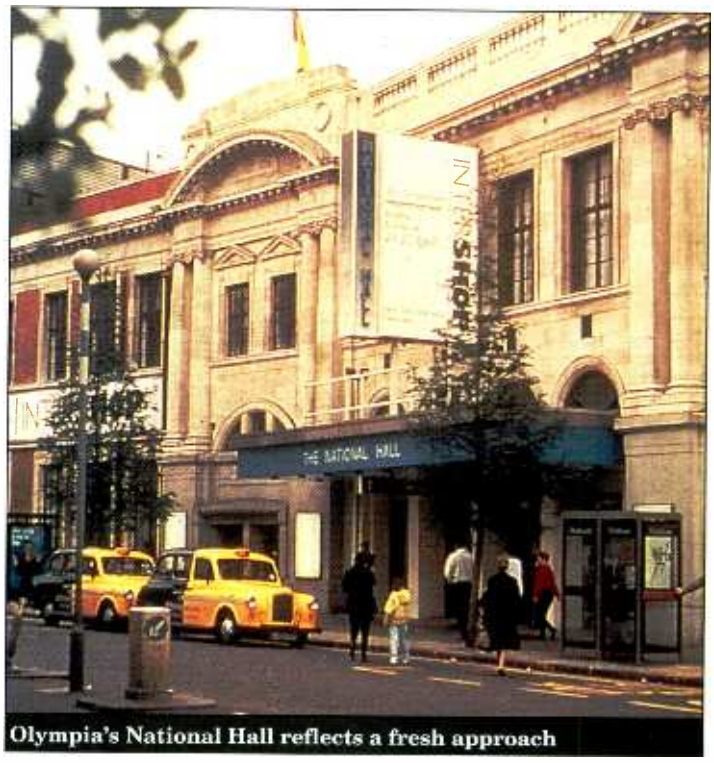
'It's a people business—they take care of their clients and it's what makes it all happen,' explains Kerridge. 'Each of these studios have their own level of professionalism but it's a difficult word to define. If you talk about unprofessionalism then that's the lack of technical expertise, technical knowledge and technical backup, it's purchasing the wrong type of equipment for short-term gain, it's about not making enough money to reinvest in equipment.

'I believe it is the APRS' duty to its members to look after them and to give them the best advice available in all aspects of business and technical issues,' he adds quoting the example of a call he received from a mastering house that had been experiencing PQ encoding shifts on various media.

'I spoke to some other guys who had been having the same problems and we immediately set up a working party to address mastering standards under the chairmanship of Bill Foster,' recounts Kerridge. 'It's an enormous task but I believe if we get the heavyweights together to try and formalise something so that everybody, including the manufacturers, know where they're going, at the end of it the APRS will be able to set out guidelines in mastering standards. Like we did with the Tape Labelling system which works extremely well; the labelling of DAT masters is not working too well in practice, but we'll address that too.'



Chairman Adrian Kerridge


Olympia's National Hall reflects a fresh approach

Among the most recent—some would say most surprising—changes is the inclusion of project studios within the APRS membership categories. 'I don't have an attitude problem with any of that,' states Kerridge. 'In America there's been this paranoia about main studios going out of business because of project studios but I don't believe that's the cause. There are project studios that artists have to do their own work in to a certain level and standard. Why shouldn't they? Eventually they'll have to come out and overlay other musicians or mix and hopefully they'll come to APRS member studios for that.

'The problems arise with some non-APRS studios that advertise themselves and operate, as what I would describe, as cowboys. There is no planning permission, no fire regulations, no indemnity insurance, or public liability insurance. These studios could be a danger to the artists that work in them.' He continues: 'They should be encouraged to operate in a correct manner but some of them are very successful and our members say this is not a level playing field and they're quite right. There's not a lot we can do about it beyond continuing to recommend our customers to be very careful who they do business with—buyer beware!'

Kerridge believes that the APRS is fortunate to have highly active groups within it such as the Studio Accord, Repro, the PAD group and the Suppliers group, all of which work in their own areas, but he does not see the Association's role to be that of a audio policeman.

'Policeman is too strong a word—adviser is better,' he comments. 'Some manufacturers over the years have released equipment that has been technology-driven prior to the technology being up to speed and running, and guys have bought it and it's been terrible. I think the APRS should look at that area and work with manufacturers.'

He believes that equipment should be properly beta-tested before it is released on the open market and that the APRS could keep a watching brief over this as it does in other areas already.

'We have credit circles where there's a watching brief over who pays who and who doesn't—there's the studio credit circle with PAD and there's the manufacturing credit circle,' he states. 'We know who they are and they know that we know. It's a self-regulating device and I believe we could apply something like that to new technology. Let's work together with the manufacturers.

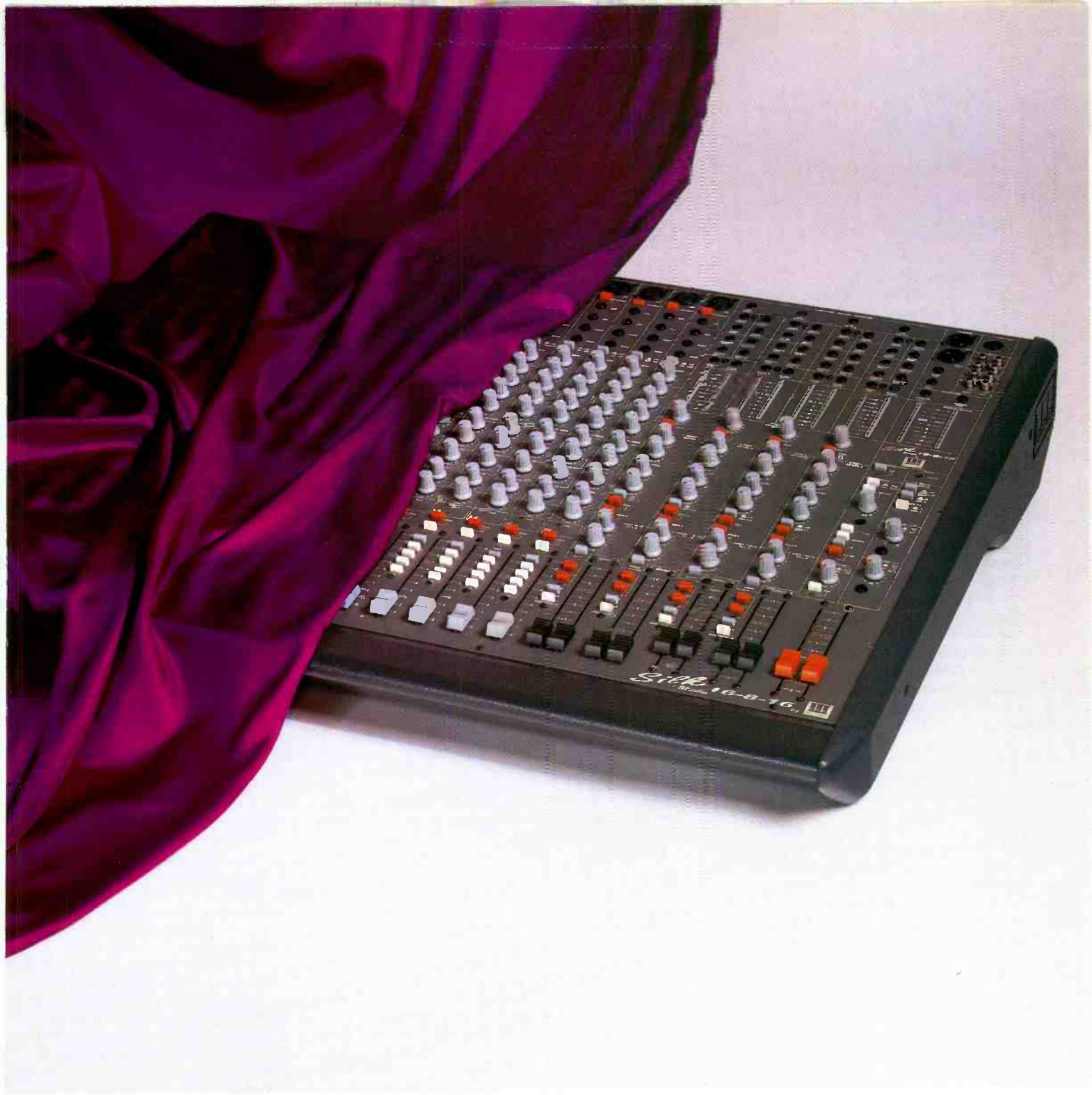
'There's also been a feeling among some members for some time that we've been driven by manufacturers telling us what we want. That's changing because we now want to tell them what we want,' adds Kerridge harking back to the early pro-audio days, when this was in fact the norm.

Above all else he feels passionately that the UK industry should not lose sight of its heritage and its primary purpose of capturing audio for posterity and he sees the APRS, which he says is run professionally and democratically, playing its part.

'I'm proud of that and these are exciting times,' he enthuses. 'Members have grouches, moans, groans, complaints but there's the phone, pick it up and we will address it. We can't be all things to all men but what we can do is recognise the change in the exhibition, the technological changes, and we must never overlook the artistic changes that are derived from the technology.

'For my money, we have the finest musicians in the world in this country and we still lead the way with the Americans although they still look to the British for all that history that started here decades ago. We must never lose that,' he states. 'The talent of engineers we have is enormous. We in the APRS must recognise that and drive forward and be active with all these people.' ▶

PHOTOS: CHRIS TAYLOR



WARNING

Once you've tried Silk there's no going back

Unveiling the new 3G Silk Live and Studio Desks, designed to give you total mixing control. They feature true stereo imaging, smoother long throw fading and overall superior flexibility, quality and value for money.

SILK SERIES MIXERS **LIVE: 16-2-1 24-2-1** **STUDIO: 16-8-16-2 24-8-16-2**

3G **SILK MIXERS**
WITH 3 YEAR GUARANTEE

Please send me full details of the 3G Silk Mixers

Name _____

Address _____

_____

Postcode _____

SS/5/95

HW INTERNATIONAL

Sole Distributors: HW International, 167-171 Willoughby Lane London N17 OSB. Tel: 0181-808 2222

The Briefings

SEMINAR ROOM 1

● **WEDNESDAY, 21st JUNE**

11.00–12.00 Equipping a professional project studio. *Sound On Sound* magazine's David Mellor explores the choices available and explains how to get the best out of your hard earned investment.

13.00–14.00 Media issues relating to modular digital multitrack. Presented by John Ostertag of Ampex.

15.00–16.00 *The Mix* magazine production workshop.

16.30–17.30 BASF presents an update on marketing trends in talking book production.

● **THURSDAY, 22nd JUNE**

13.00–14.00 *The Mix* magazine production workshop.

15.00–16.00 Getting away from presets. *Sound On Sound*'s Martin Russ reveals quick and easy ways to customise preset sounds and personalise recordings.

17.00–18.00 EMI talk about their new factory for CD manufacture.

● **FRIDAY, 23rd JUNE**

11.00–12.00 The PA Forum—problems of PAs in small venues. Plasa, *Lighting and Sound* magazine and Dave Ward of Gateway lead a panel of experts in throwing some light on problems and questions.

13.00–14.00 Integrating hard-disk recorders with the project studio. *Sound On Sound*'s David Mellor explores the creative potential of nonlinear systems and shows how to harness the power of hard-disk recorders.

15.00–16.00 *The Mix* production workshop.

17.00–18.00 Andrew Bruce of Autograph reveals the secrets of the Meyer System for acoustic environments.

SEMINAR ROOM 2

● **WEDNESDAY, 21st JUNE**

10.30–11.30 Pioneering automation systems in the theatre. Theatre Sound Designer John Leonard demonstrates his work and looks into the future.

12.30–13.30 Audio-Video disk storage and disk-array systems for fault-tolerant direct-to-disk recording and broadcasting. Presented by Trevor Duplock of Micropolis and sponsored by *Audio Media* magazine.

15.00–16.30 The Broadcast Forum: Live Music on Television. Sponsored by the Institute for Broadcast Sound and *Line Up* magazine, chaired by Adrian Bishop-Leggat.

● **THURSDAY, 22nd JUNE**

10.30–13.00 Multimedia. Tim Frost of *Data Production International* pulls the lid off the expanding world of multimedia and discusses its relevance to the recording industry. Andy Bereza spills the beans in a practical demonstration on how a multimedia package is put together.

14.00–15.00 ISRC: How to get paid in the future. An introduction to ISRC and ISRC data collection presented by Peter Filleul of Repro.

16.00–18.00 ISDN. Dolby's Andy Day and consultant Bill Foster offer an update on ISDN applications and link up live for breakfast with America.

● **FRIDAY, 23 JUNE**

10.30–11.30 John Watkinson discusses synchronisation and machine control. Sponsored by *Studio Sound* magazine.

12.30–13.30 John Wykes of radio-microphone systems manufacturers Micron analyses the pros and cons of working with radio mics.

15.30–16.30 Detlef Wiese of CCS talks about the increasing use of audio compression, in particular ISO MPEG Layer 2 (Musicam), in broadcasting, recording studios and telecommunications. ■

Briefings build on success of year one

Briefings organiser Dave Ward outlines the cross-market appeal of three days of seminars and their importance for concentrating the mind on the value of training

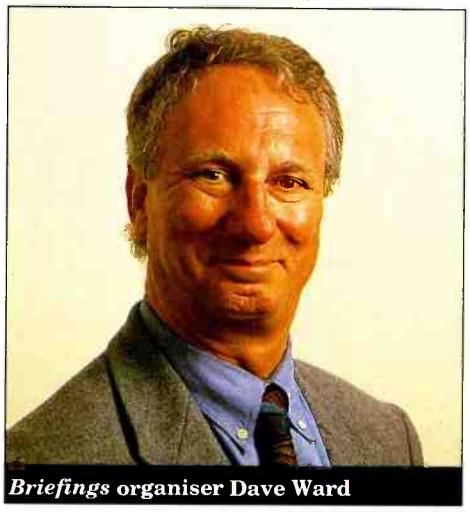
Last year was significant for the APRS Show as it saw the debut of the *Briefings* sessions—informal seminars covering a wide range of topics and reflecting the broader scope and appeal of the exhibition. It marked something of a departure for the world's longest established pro-audio event and, while its organisers will now admit a degree of trepidation in that first year, it was indeed a resounding success with staggering levels of attendance and interest.

The *Briefings* at this year's Audio Technology 95 will again be handing on knowledge to users of all standards but in bigger rooms and through a busier programme and with the same theme of cross-sectional subject matter and expert industry presenters. Areas covered include: production workshops; project studios; talking book production; media issues in modular digital multitrack; synthesiser programming; CD manufacture; theatre sound and automation; multimedia; royalties payment; ISDN; synchronisation and machine control; radio mics and data compression.

Organiser Dave Ward, from the UK's Gateway Studios, says the purpose behind the *Briefings* was to add value to the exhibition and serve the need for information-giving forums by all sides and to all areas of the industry.

The scale of this year's sessions may be grander and more ambitious but the initial intentions and concepts have been preserved. 'It's not intended to be a learned paper programme,' explains Ward. 'AES do that extremely well—it should be information giving, sharp and zappy, but not a manufacturers' sales pitch either.

'This year it's much bigger. We have bigger rooms and we can now make some noise,' he adds. This last point is a pertinent one as last year's *Briefings* were held on the exhibition floor with interference caused by the exhibition itself, particularly as more people wanted to attend than there was space for. The move to the National Hall at Olympia for Audio Technology 95 has opened access to the large balcony area above the main floor with two rooms of this dedicated to the *Briefings*.



***Briefings* organiser Dave Ward**

PHOTO: CHRIS TAYLOR

Room 1 is the larger of the two and will host presentations aimed predominantly, although not exclusively, at the project studio with Room 2 taking care of the remaining fields. Ward admits he wasn't surprised by the high attendance at project studio *Briefings* last year as it has become the area of intense activity for many manufacturers.

'There was a lot of interest last year in the live sound side, particularly on a session I did on gain structures, so we've put a panel of people together with Plasa who were very keen to support what we're doing to answer questions from live-sound people and especially those who work with small systems in small venues.'

Every *Briefing* is a highlight in its own right according to Ward and notable speakers include John Watkinson, Andrew Bruce, Andy Bereza, Tim Frost, and David Mellor. 'I've tried to make them all unmissable in their own particular areas,' claims Ward. 'If we take Wednesday, John Leonard is doing his bit for theatre sound designers, then there's the hard disk area with Trevor Duplock and then a broadcast forum so we're looking at all sectors of the industry.'

Predictably, hard-disk recording is well represented. 'They're going into nearly all pro studios and project studios and hard disk is now everywhere. All the multimedia work coming along is where it's at and it's why we've got Andy Bereza and Tim Frost in again to update everybody on what has happened since last year,' he says. 'The studio people have got to learn a little bit about other people's professions.'

Production workshops by *The Mix* magazine will follow last year's formula of bringing in producers with tapes to demonstrate their approach to mixing. Ward believes that the Audio Technology 95 *Briefings* are a rare opportunity in the UK for people to get involved on this sort of level and he sees it as manifestation of the APRS playing its part in education and training in the industry. Ward says that announcements will soon be made which will see the Association having even greater involvement.

'These areas are the most crucial for the industry particularly in view of the power of the new National Curriculum for music where music technology, information technology and recording technology will play a big part,' he observes. 'This can't be ignored, we have to look at it.'

According to Ward, it's not just about raising and maintaining standards. 'We have to separate training issues and education issues,' he says. 'Training issues are to do with raising competence and awareness in the industry, education is to do with issues around what is happening in schools with the National Curriculum for music and how our industry can help with that. We are the only people to do it, we're the people with the knowledge and we should be doing it and being seen to be doing it.

'We're talking about musically educating tomorrow's customers for the manufacturers and the studios,' he adds. ■

Audio Technology 95—The APRS Show, 21st-23rd June 1995, The National Hall, Olympia, London, UK. Tel: +44 1734 756218.

SSHDR1 FROM SOUNDSCAPE

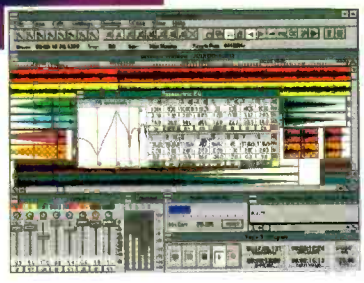
THE MULTI-TRACK HARD DISK RECORDER

The Producer 'we need more tracks'.

The Engineer 'no problem! how many do you need ...16 ...24 ...32 ...48...➢?'

THE SSHDR1
Sync it! Expand it! Use it!

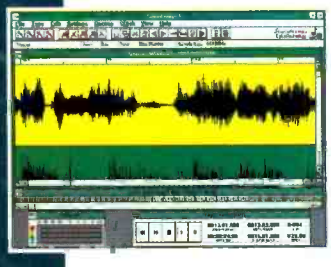
Unlock the power of digital audio on the PC in your studio without compromising *audio quality* or *synchronization* issues and have real flexibility to **EXPAND** and upgrade your system. Unlike other systems, each SSHDR1 8 track rack unit has its own internal 24 bit DSP handling all soundfiles allowing the freedom of integration with other Windows™ applications like MIDI sequencers or random access digital video and the ability to expand your system up to 128 physical tracks.



Hardware and powerful editing software from the same manufacturer gives perfect compatibility and eliminates the *'sorry man, it's the other guy's problem!'*.

Now SHIPPING in the US, and with a price tag that WON'T break the bank ... do yourself a favor and DEMAND A DEMO at your local store today and find out why this British company have sold more digital audio workstations in Europe over the past 12 months than any other manufacturer.

- Expandable from 8 to 128 tracks
- 64 virtual tracks per unit
- Powerful non-destructive editing tools: cut, move and copy/real-time fades/copy from hard drive to active arrangement/normalize process/repeat/loop record/ varispeed (+/-10%)/waveform display/stereo link tracks/ compute tempo/stereo*. WAV file support
- Mounts for 2 IDE hard drives within each rack unit currently up to 3.4GB (10½ hours recording time)
- Full chase-lock sync
- Software features 8 real time parametric EQ's per rack unit assignable to any of the 8 tracks
- 'Crystal' 16bit A/D, 18bit D/A 64 x oversampled converters
- Analog in: 2 x RCA/cinch, unbalanced – 10dBv/+4dBv
- Analog out: 4 x RCA/cinch, unbalanced + 4dBv
- Digital in: 1 x RCA/cinch, S/PDIF format
- Digital out: 2 x RCA/cinch, S/PDIF format
- Input S/N Ratio: > 93dB un-weighted
- Output S/N Ratio: > 113dB un-weighted
- MIDI: in, thru, out
- Rock solid synchronisation even with 386 machines
- Back up to DAT recorder or any logical PC drive
- Real time digital mixing with full automation via MIDI even using multiple units
- Optional: XLR balanced analog inputs and outputs, AES/EBU Digital inputs and outputs (XLR)
- Seamless integration with any Windows™ sequencer or editor
- Software upgrades add new features (in the works: Time stretch, pitch shift, reverb, compression)



SOUNDSCAPE DIGITAL TECHNOLOGY

US Office:-
705-A Lakefield Road
Westlake Village
CA 91361
Tel: 805 495 7375
Fax: 805 379 2648

UK Office:-
Crichton House
Mount Stuart Square
Cardiff Bay
Cardiff CF1 6DR
Tel: +44 (0) 1222 450120
Fax: +44 (0) 1222 450130

Dealer enquiries invited

Name

Address

Post Code

Telephone

Please send me a color brochure on the SSHDR1

Please return to:
Soundscape Digital Technology Ltd
Crichton House
Mount Stuart Square
Cardiff Bay
Cardiff UK CF1 6DR

NEW !!! The "quick lock" Speakon®

Nothing is perfect but we are getting close:

* A new locking device does away with the original cumbersome locking ring and the associated "double locking action".
* It's fully compatible with present versions and virtually "foolproof".
* All other features remain unchanged: Robust, field serviceable, multifinger high current touch proof contacts, excellent strain relief, UL and CSA recognized.

We are setting standards

NEUTRIK
CONNECTING THE WORLD

NEUTRIK AG	NEUTRIK Zürich AG	NEUTRIK UK Ltd.	NEUTRIK USA Inc.	NEUTRIK Dept. of SCJ
Liechtenstein	Switzerland	Isle of Wight	USA	Japan
Tel 075/2372424	Tel 01/7340400	Tel 0983/811441	Tel 908/9019488	Tel 03/54112551
Fax 075/2325393	Fax 01/7343891	Fax 0983/811439	Fax 908/9019608	Fax 03/54112827

PMD Professional DAT . . . .

FREE DAT OFFER

Cut out this coupon and return to PMD Magnetics for a free sample to evaluate

NAME _____

COMPANY _____

ADDRESS _____

_____

_____

_____

TEL. NO. _____

FAX. NO. _____

or fax full details and request sample

PMD MAGNETICS

. . . . Lowest Prices, Made in Japan

PMD MAGNETICS, Magnetics House, Avenue Farm, Stratford-upon-Avon CV37 0QJ

Tel: 01789 268579 Fax: 01789 414450

DYAXIS POST TRIO

Attracting serious attention at the recent NAB 95 Convention was Studer Editech's Integrated Postproduction Studio Console. James Douglas looks in depth at the *Post Trio* system

Over the past several years, Studer Editech have been continuously refining and enhancing the popular *Dyaxis* series of Digital Audio Workstations, culminating in what I would consider to be a very powerful, fully-integrated system for film and video postproduction. The new *Dyaxis Post Trio* is comprised of a collection of modular sub-units that are integrated into a stand-alone system that provides full waveform editing, mixing and signal processing. In addition, the firm's new *VideoMix* Digital Video Recorder provides full-speed, full-motion, synchronous picture playback from hard disk, a development that dramatically reduces spooling and rewind time; now any segment of video can be accessed in literally the time it take to press a button.

Post Trio is centred around the new *Dyaxis IIi* InterMix processor, which represents a complete redesign of Studer Editech's proprietary nonlinear editing engine. At the heart of *Dyaxis IIi*'s expandable design is a high-speed, 128-channel TDM (Time-Domain Multiplexed) back-plane architecture. Each *IIi* processor provides eight channels of disk recording and 16 channels of real-time playback; virtual mixing enables playback of an unlimited number of tracks, which in reality is restricted only by the amount of available disk space. Any input can be freely routed to any disk channel or mixer via the InterMix TDM-based network; MultiMix v2.30 software provides visual display and control of all mixing, EQ and signal-processing functions.

Using up to three *Dyaxis IIi* chassis connected to a single *Macintosh II-PowerPC* graphics controller, *Post Trio* systems can provide either 8, 16 or 24 disk channels, with simultaneous record and playback; between 16 and 72 I-O ports for signal processing and I-O; and between 14 and 32 summing buses that can be dynamically assigned for recording, mixing, auxiliary sends and monitoring. The new *IIi* system is fully compatible with existing *Dyaxis II* file formats and Plug and Play M-O media.

One very neat feature of the new system is the fact that you can simultaneously play and record on each of the *Dyaxis IIi*'s disk channels. So, during punch-in and punch-out sequences, as I discovered, it is possible to monitor the end result directly, without having to roll back and review the punch. A great time saver during music, ADR, Foley and other functions. It is also possible to layer multiple recordings onto a single track during, for example, ADR or voice-over sessions, as the actor tries a series of different reads—and then edit and-or modify each layer independently. And with access ▶

***Dyaxis IIi* configured as the *Post Trio* system**

to an unlimited number of Virtual Disk Tracks and no edit density restrictions, it is possible to quickly zero in and modify any ingredient during any phase of a project—even during a final mixdown of edited sound elements.

VideoMix

In terms of editing and mixing sound to picture, Studer Editech's remarkable *VideoMix* provides a cost-effective alternative to slower video-cassette or even laserdisc transports. Available as an option, *VideoMix* features digital playback of *QuickTime*-format video, fully-synchronised with *Dyaxis III* audio, plus synchronous audio-video scrubbing. The system provides field-accurate display in pause mode, genlock to external sync capability, PAL and NTSC support (50-60 field), plus full-frame playback (768 x 576 pixels for PAL and 640 x 480 for NTSC) on a dedicated monitor.

Based around the well-established Radius *VideoVision Studio* system, which includes a NuBus card and a video breakout-interface unit, *VideoMix* provides 2Gb of high-speed, A-V specification Micropolis hard-disk storage as standard. This capacity offers up to 60 minutes of draft-quality playback, 15 minutes of reference/S-VHS quality, or five minutes of on-line/D2-quality video playback. (Larger, 4Gb capacities and multiple drives are also available as a system option.)

From my evaluations with both draft-quality and reference-quality *QuickTime* video playback, the system is more that adequate for just about any postproduction assignment; video lock and scrub editing is extremely precise, repeatable and, above all, accurate. Studer Editech quote a tolerance of better than 0.25 video frames; during my evaluations it was possible to nudge picture and audio in single-frame increments, which proved more than sufficient for precisely locating edits to on-scene action, of for tagging EQ changes, for example, to specific locations. (It should also be pointed out that the firm's engineers have hot-rodded the basic *QuickTime* system extensions provide by Apple, and squeezed far better playback quality than is available from the standard configuration; I'm not sure exactly how they did it, but certainly applaud the results.)

Because of the data-processing throughput required by VideoMix, Studer Editech specify the use of an Apple *Macintosh PowerPC 8100* or better as a master controller-graphics interface, plus a minimum of 16Mb of system memory. Bundled with VideoMix is Adobe's premiere video production and editing software. Also provided is a Subtitling Function, which allows captions and other information to be superimposed on the video signal (and which is therefore only available from VideoMix-equipped systems). Typical applications might include conventional subtitling for ADR or Foley sessions, as well as voice-over and related operations.

And if your needs do not run to disk-based video storage and replay, *Post Trio* also features conventional nine-pin serial control for conventional audio and video transports (supporting P2, TimeLine *Lynx*, Studer ES.Bus, Tascam *DA-88*, *SV-3900* and ASC Virtual Recorder protocols); LTC and VITC time code at all popular frame and field rates is also featured.

A separate dynamics section provided with the MultiMix software offers a compressor, gate and expander section that can be assigned to any input, playback channel or output bus; a 'pool' of summing buses can be dynamically accessed as required for recording, aux-cue sends, mixing, monitoring, and solo operations.

System components

The new *Post Trio* system adds a set of dedicated hardware controllers and user interfaces to the *Dyaxis III*, which enables an operator to take full advantage of the processor's enhanced editing, mixing and DSP functions. Located above the operator's central position at the ASCII keyboard is a 16-channel metering panel, complete with peak-hold and related functions. The MultiMeter panel follows the system's source switching—either input, output or disk playback; for 8-channel systems, Channels 9–16 follow aux output levels. Since it functions independently of MultiMix software, the metering panel allows visual displays of output levels, for example, regardless of how the main *Dyaxis* display screens has been configured.

To the immediate left of the keyboard and metering is the *Post Trio*'s Mixer Panel, which comprises a bank of assignable channel faders equipped with moving-fader elements; a bright VFL (vacuum-florescent) display located at the top of the fader bank is used for switching I-O sources, and for controlling the system's built-in EQ and DSP functions. *Post Trio*'s integrated mixing capabilities provides the user with two assignable automated mixer strips per disk channel. During recording, one strip might be used to control input levels to the system, while the other provides monitoring of disk playback levels. During a mix session, all the extra strips are available to mix inputs from external signals, such as effect units, laugh tracks, etc. All mixer strips feature input trim, a servo-controlled fader, 4-band parametric EQ, full dynamic functions, six pre-post aux sends, pre-post inserts, pre-post fader listen, and destructive solo-in-place. In addition, all sources can be panned across up to eight main output buses using an on-screen MultiPan joy stick.

The Mixer Panel handles assignable control and mixer automation for up to 24 channels of *Dyaxis III* playback; any physical fader can be mapped to any input, output or disk playback channel physically located in up to three processor units. Nine moving faders are provided: eight assignable channel plus an overall stereo master. The upper VLF display features four assignable knobs and 14 soft switches that provide control of pan, EQ, trim, channel assignment as well as setup parameters. Channel EQ, and automation status, plus SOLO-MUTE buttons, are provided on each channel and the master strip. All faders, pans, mutes, and bus assignments are dynamically automated via moving faders, buttons, and knobs. EQ and trim controls may be memorised and recalled via snapshot automation. System setup and control is a breeze.

To the right of the desk is located the Edit Panel, which handles transport, editing, and machine control. Buttons are arranged in groups associated with specific functions, including transport control, cursor control, edit trim, fade-crossfade control, edit functions, time-code functions, and machine control. Associated with the transport section is a scrub-shuttle wheel that can be used for rapidly moving through a sound, and also for performing precise trim functions. A track ball is also included on the Edit Panel for both controlling point-and-click functions for the MultiMix software.

Dyaxis will read a variety of sound-file formats, including MultiMix, MacMix, Native OMF, AIFF, *Sound Designer II* (SDII) and Lightworks. A number of Edit Decision List formats can also be directly imported into *Post Trio*, including OMF Recipes, CMX, Grass Valley Group, SMPTE and Lartec, enabling autoconform and other functions to be activated against time-code designations from an external EDL.

To the extreme right of the control desk is the StudioPak section that provides control-room monitoring, studio playback monitoring and cue-foldback controls, as well as headphone monitoring, studio talkback and slate. A custom MIDI interface between the outboard StudioPak Processor and master *Dyaxis III* rack(s) provides both I-O routeing and level control. The processor features seven, stereo, analogue inputs, with connections to multiple headphone and loudspeaker outputs. While all of these functions could be achieved via, for example, a separate switch box, integrating them within the *Post Trio* control surface means that they can all be controlled and implemented from the user's position, without reaching for a separate knob or switch.

A pair of 20-inch monitors are recommended for the *Post Trio* system: one to display the conventional View and Edit Panels associated with the *Dyaxis* MultiMix editor, and the other for graphic representation of the system's Mix Panels.

A 'starter' *Post Trio* features eight channels of simultaneous hard-disk record-playback, 16 assignable mixer strips, plus 12 analogue inputs and outputs and 12 digital inputs and outputs. Physical connections to and from the system are provided on the rear panel of each *Dyaxis III* module; XLRs handle time code, analogue I-Os and digital I-Os (the latter can be selected between SPDIF, AES-EBU, Yamaha Y2 and other popular formats); RCA phono ports carry consumer-format SPDIF digital I-O; BNCs carry video sync, word clock and similar signals; various D-Sub ports link multiple processors and provide serial control of external video and audio transports.

In use

Space prevents coverage of more than some of the basic functions offered by the new *Post Trio* system; suffice it to say that a combination of the new, dramatically enhanced *Dyaxis III* processor, with its powerful editing, mixing and processing capabilities, plus an assignable control surface with moving faders, helps streamline the myriad functions required during film and video postproduction.

While performing complex cut-and-paste editing, The Edit Panel handles transport, editing, crossfade and machine-control functions. The ▶

Future-Safe Audio Testing

Carved in Stone?

That's the way most audio test equipment is designed... The instrument maker chooses analog or digital, lays out a front panel, builds in a fixed level of internal processing power and adds a display from today's choices.

They'll never adapt to the future like System One and System Two from Audio Precision.

First a comprehensive selection of digital *and* analog measurement capabilities and options allows you to tailor your initial purchase to an exact fit for your needs of *today*.

Tomorrow, you benefit from continuous product and technology improvements, as System One and System Two grow with your needs. Both System One and System Two allow you to later add options not originally fitted.

DSP versions gain new functions and features by simply downloading different and newer versions of our DSP software.

You get better and faster system performance as well as higher resolution displays by upgrading PC technology without buying new audio measurement hardware. Upgrade to the popular Windows™ graphical user interface.

We introduced our first System One audio test sets in 1985. Today over 4000 of our PC and GPIB-based System One and System Two analyzers are in service worldwide, testing everything from aircraft to automobiles, satellites to cell phones, hi-fi to hearing aids.

Our customers who purchased System One in *1985* are still enjoying the benefits of our open-ended design philosophy. Those who purchase System Two in *1995* will enjoy the same benefits well into the next millennium. You can join them by contacting one of our worldwide Audio Precision representatives today for information and an onsite demonstration.

Audio precision

P.O. Box 2209
Beaverton, OR 97075-3070
(503) 627-0832 , 1-800-231-7350
FAX: (503) 641-8906

The recognized standard in Audio Testing

INTERNATIONAL DISTRIBUTORS: **Australia:** IRT Electronics Pty. Ltd., Tel: 2 439 3744 **Austria:** ELSINCO GmbH, Tel: (1) 815 04 00 **Belgium:** Trans European Music NV, Tel: 2 466 5010 **Brazil:** INTERWAVE LTDA., Tel: (21) 325-9221 **Bulgaria:** ELSINCO, h.e. Strelbishte, Tel: (2) 58 61 31 **Canada:** GERRAUDIO Distribution, Tel: (416) 696-2779 **China, Hong Kong:** A C E (Int'l) Co. Ltd., Tel: 2424-0387 **Croatia:** AVC Audio Video Consulting, Tel: (41) 624 622 **Czech Republic:** ELSINCO Praha spol. s.r.o., Tel: (2) 49 66 89 **Denmark:** npn Elektronik aps, Tel: 86 57 15 11 **Finland:** Genelec OY, Tel: 77 13311 **France:** ETS Mesureur, Tel: (1) 45 83 66 41 **Germany:** RTW GmbH, Tel: 221 70913-0 **Greece:** KEM Electronics Ltd., Tel: 01-6478514/5 **Hungary:** ELSINCO KFT, Tel: (1) 269 18 50 **India:** HINDITRON Services PVT, Tel: 22 836-4560 **Israel:** Dan-El Technologies, LTd., Tel: 3-6478770 **Italy:** Link Engineering s.r.l., Tel: 0521/648723 **Japan:** TOYO Corporation, Tel: 3 (5688) 6800 **Korea:** B&P International Co., Ltd., Tel: 2 546-1457; B&P (Kumi Office), Tel: 0546 53-7347/8 **Malaysia:** Test Measurement & Engineering Sdn. Bhd., Tel: 3 734 1017 **Netherlands:** Heynen b.v., Tel: 08851-96300 **New Zealand:** Audio & Video Wholesalers, Tel: 7 847-3414 **Norway:** Lydconsult, Tel: (47) 66-988333 **Poland:** ELSINCO Polska sp. z o. o., Tel: (22) 39 69 79 **Portugal:** Acutron Electroacustica LDA, Tel: 1 9414087 / 9420862 **Singapore:** TME Systems Pte Ltd., Tel: 747-7234 **Slovakia:** ELSINCO Bratislava spol. s.r.o., Tel: (7) 784 165 **South Africa:** SOUNDFUSION Broadcast, Tel: 11 477-1315 **Spain:** Telco Electronics, S.A., Tel: 1 531-7101 **Sweden:** TTS Tal & Ton Studioteknik AB, Tel: 31-803 620 **Switzerland:** Dr. W.A. Gunther AG, Tel: 1 910 41 41 **Taiwan R.O.C.:** Cha Wei Electric Trading Co., Tel: 2-5612211 **Thailand:** Massworld Company Ltd., Tel: 662-294-4930 **United Kingdom:** Thurlby Thandar Instruments, Ltd., Tel: (1480) 412451

Windows is a trademark of Microsoft Corporation.

scrub-shuttle wheel provides real-time control of transport functions, as well as edit trim. Scrub edit is precise and very easy to use; once audio and video are locked together they stay in accurate sync as you move backwards and forwards through the edit location, which can then be marked with a single keystroke. To avoid unnecessary clutter, buttons are arranged in groups that correspond to specific system functions, including cursor control, edit trim, fade-crossfade control and edit profiles. The central QWERTY keyboard is used to label mixes and handle other system functions.

The Mixer Panel, which handles control and mixer automation for up to 24 assignable channels of source or hard-disk playback, is elegance personified. The mixer section is clearly laid out and easy to use, and functions just like a normal console, complete with the familiar safe-ready, input-tape and related functions. Located directly above each channel fader are a series of buttons that control input-replay, solo, EQ in-out, mute and automation functions for that channel. On aspect of *Post Trio*'s design approach should not be overlooked. Since the various mixing and editing functions are fully integrated, EDL information does not have to be exported to a separate mixing console. In addition, edit changes are automatically captured by the *Dyaxis* software, along with any level, EQ and DSP modifications.

The moving-fader automation is based on an OEM version of Audiomation Systems' *Uptown* Series fader elements and master processor. Internally, the various level, mute and solo control functions are linked to the MultiMix software which, in turn, provides dynamic storage and recall of channel settings against time code. Fully integrating the mixing and editing functions within a single control surface allows the operator to develop some serious speed, if only because all controls fall easily to hand; control of the assignable eight channel-and-master faders soon becomes intuitive, as you bank-switch among the various I-Os and disk channels being used at a particular stage of the session.

After a few minutes, you forget that the controller is connected to a hard-disk workstation, and use the mixer in a conventional manner, complete with assignable EQ, level trim and output pan controls, plus the moving-fader automation functions. Edits can be made freely across the available virtual tracks; housekeeping functions continuously monitor the amount of disk access that will be needed to replay the current number of tracks. If these fall beyond the physical capabilities of the system—and which depends upon the type of media being used (either Winchester or Magneto-Optical) and the optional use of AC-2 data compression—then the MultiMix software will perform an automatic mixdown of the high-density, disk-intensive sections. It usually takes just a couple of seconds for the *Dyaxis IIi* to take care of business. It's a function that seldom, if ever, gets in your way during even the most complex sweetening and editing sessions.

Above the bank of faders, an array of four assignable knobs and shaft encoders plus software-defined switches allow pan levels, EQ, trim, channel assignment setups to be altered and memorised. A VFL panel displays corresponding channel, EQ values and automation status. The *Dyaxis* parametric EQ section is very powerful and sounds good. The EQ page displayed on the VFL panel shows the type of EQ profile applied to the input or disk track—band-pass, low-pass or high-pass—plus the centre frequency, gain adjustment and bandwidth-Q setting for each of the four bands. Settings can be labelled and stored to disk, for subsequent recall and re-assignment to other sound cues. The Mix page shows the names of the eight currently accessed fader channels, with pan, input source selection (analogue, digital or mix output), plus output assignments.

Although the display window is small, it is clear in its layout and easy to follow. But remember that all system information is also displayed on one of the colour VDUs, which can be set up to show, for example, a real-time graphic representation of a parametric equalisation profile, or dynamics envelope.

The Edit panel, as might be expected, dramatically streamlines the editing process. A dedicated scrub-shuttle wheel allows edit markers to be located very easily—one revolution equates to one second of audio. While trimming and-or refining the selected edit point without audio playback, resolution of the wheel is magnified by a factor of 10. It is no exaggeration to say that the scrub-shuttle wheel enables rock-and-roll/scrub editing as easily as conventional analogue techniques—with enhanced resolution and outstanding precision.

As will be appreciated by current users of hard-disk editing and mixing systems, on-screen graphics and the location of Now Lines and Replay Cursors are of crucial importance. While normal playback occurs between the left and right cursors, MultiMix always places the Now Line at the left cursor, unless you're playing, paused, or scrubbing the free cursor. Each of these various interlinked functions—dependent upon whether an In or Out-point is being refined, for example, or you are simply listening through a section—has been mapped to dedicated keys. Default transport control mode is for the system to replay what has been marked for editing by the left and right cursors in both of the MultiMix Source and Destination areas. Once these design topologies have been absorbed, however, running MultiMix is extremely simple and very straightforward, All of which greatly speeds up a typical editing session and, once mastered, makes operating the system a real snap.

Dedicated buttons are provided for a number of functions, including SYNC CUT, SPLIT, RIPPLE, PASTE, PUNCH PASTE, INSERT, ZOOM IN AND OUT. Cursor Block controls move the cursors, as well as performing audition and trim functions to the left, right or both cursors. Particularly handy are the AUDITION-TRIM UP TO LEFT and related buttons, which cause MultiMix to play up to or from the left-right cursors and then stop. Double pressing the button will loop-audition the operation, enabling fine trim of the cursor position with the scrub wheel, or using the left and right keyboard arrows to trim by a predefined amount. A related section provides edit-based (splice) and event-based audition, plus trim functions. Having selected a splice or event, the outgoing or incoming audio of the selected splice can be replayed; alternatively, the Event In or Out section can be replayed or looped.

Six preset fades and crossfade profiles can be user-assigned to a series of dedicated buttons, and pasted onto selected cues in the graphic EDL window. Fade time assigned to these buttons can be labelled with H.M.S values, as well as a contour value (attenuation in dB at the fade's centre). SET-GET LEFT-RIGHT controls, as well as capture and goto buttons, function exactly like those on the MultiMix screen. SET LEFT changes the cursor's time-code value to the value stored in the time-code buffer without moving it; the same operation can be performed on the right cursor.

All in all, the Studer Editech *Post Trio* offers one of the most intuitive, easy-to-follow editing, mixing and processing systems I have used. The integrated user interface offers an excellent compromise between too few and too many controls. A large console section takes up a lot of space, and often gets in the way during an editing session. Full dynamic automation of every level, mute, pan, EQ and dynamics function means that a complex mix can be built up in sections, with some functions being assigned to panel controls as you proceed with the mix session. And should you become stuck at any time, the *Dyaxis IIi* instruction manual is comprehensive, and well illustrated.

The *Dyaxis Post Trio* Integrated Postproduction Studio Console is well thought out and engineered, and offers an excellent balance between a virtual and physical work surface. It will dramatically simplify and streamline a great number audio production tasks.

Conclusion

The *Post Trio* is available in three configurations: 8:16:24, 16:32:40 and 24:48:56, with the numerical suffix referring to Disk Channels: Mixer strips: Analogue and Digital I-O ports. (For example, a *Post Trio* 8:16:24 features eight channels of simultaneous record to and playback from disk; 16 assignable mixer strips; 12 analogue inputs and outputs plus 12 digital inputs and outputs.) The *Post Trio* 8:16:24 costs $84k, complete with two, 1Gb removable drives (six track-hours of linear recording); *Post Trio* 16:32:40 is $132k, complete with four, 1Gb removable drives; and *Post Trio* 24:48:56 is $177k, complete with six, 1Gb removable drives. VideoMix is an additional $12.5k. Other system options include Dolby AC-2 , 4:1 digital data compression; an I-O expansion unit (0:0:8); 3½-inch M-O Plug-and-Play drives with AC-2; 5¼-inch Extended M-O Plug-and-Play drives; Data-DAT 4mm or Exabyte 8mm backup drives. All costs are quoted in US dollars and do not include the *Macintosh* graphics controller. ■

Studer Editech Corporation, 1370 Willow Road, Menlo Park, CA 94025, USA.
Tel:+1 415 326 7030. Fax: +1 415 326 7039.
UK: Tel: +44 1707 665000. Fax: +44 1707 665723.
Switzerland: Tel: +41 1 870 75 11.
Fax: +41 1 840 47 37
Japan: Tel: +81 3 3465 2211.

Spectrum™ Organ contains 128 presets including classic rock, jazz, gospel and pipe organ sounds. Each preset includes individual vibrato, distortion, reverb, key click and release click settings. These settings can be globally altered from the front panel, or using MIDI controller messages. In addition, each preset contains four drawbar waves which can be accessed in real time using the PC™-1600 MIDI Controller.

- *1 Mb 16-bit Classic Organ Sample Wavetable*
- *128 Presets*
- *32 Oscillators*
- *32 Voice Polyphonic*
- *4 Part Multi-timbral*
- *Voice Pedal Input*
- *Leslie Speed Pedal Input*
- *Stereo Audio Outputs*

Spectrum™ Synth contains 256 (64 RAM/192 ROM) classic synthesizer presets including analog, digital and hybrid sounds. With 24 dynamic resonant filters, hard sync and pulse width modulation, the Spectrum Synth emulates classic analog synthesizers better than any other digital instrument. Presets can be edited and saved to RAM locations using the PC-1600 MIDI Controller.

- *2 Mb 16-bit Classic Synthesizer Sample Wavetable*
- *256 Presets (64 RAM, 192 ROM)*
- *24 Oscillators*
- *12 Voice Polyphonic*
- *12 Dynamic Resonant Filters and 24 LFO's*
- *Poly and Legato Receive Modes*
- *Hard Sync and Pulse Width Modulation*
- *Stereo Audio Outputs*

Spectrum™ Bass contains 200 presets including classic analog and digital synthesized basses, as well as electric, acoustic, fretless and slapped sounds. The Spectrum Bass includes sustained and legato versions of most presets sounds. Up to 4 presets can be layered on separate MIDI channels to create incredibly fat combination sounds. Individual presets can be edited using the PC-1600 MIDI controller.

- *1 Mb 16-bit Classic Bass Sample Wavetable*
- *200 Presets*
- *6 Oscillators*
- *6 Voice Polyphonic*
- *8 Dynamic Resonant Filters and LFO's*
- *4 Part Multi-timbral*
- *Poly and Legato Receive Modes*
- *Stereo Audio Outputs*

Spectrum™ Analog Filter is a true programmable analog filter system which can be used to process any sound. It offers a 3-channel input mixer followed by a classic voltage controlled resonant 4-pole filter and voltage controlled amplifier. The filter circuit includes an ADSR envelope, velocity, and key track amounts, and is MIDI controllable. The amplifier circuit also offers an ADSR envelope and master volume. 100 program locations allow settings to be stored in memory.

- *Classic Analog 4-Pole Filter Circuit*
- *100 Programmable Locations*
- *3 Audio Inputs*
- *MIDI Note Triggering*
- *Audio Trigger and Envelope Follower*
- *Filter Frequency, Velocity and Key Tracking*
- *MIDI Controllable*
- *Mono Audio Output*

PC™ 1600 MIDI Controller This general purpose MIDI controller offers 13 sliders and 16 buttons that can be programmed to send system common or system exclusive MIDI messages. In addition, 2 CV pedals and the data wheel can be used as alternate controllers. The PC-1600 has many uses including programming and controlling any of the Spectrum series sound modules. The PC-1600 comes with 50 presets offering a variety of synth editors, sequence controllers, lighting system controllers, etc. All presets are fully programmable, so as other needs develop, they can be programmed by the user very easily.

- *16 Programmable 60mm Sliders*
- *16 Programmable Buttons*
- *2 Programmable CV Pedal Inputs*
- *Multi-function Data Wheel*
- *50 Programmable Memory Locations*
- *100 "Scene" Memory Locations*
- *Setup String Send on Patch Recall*
- *MIDI Dump/Load Capability*

GET WHAT YOU NEED. . .
AND WANT. . . AT AN AFFORDABLE PRICE!

In a world of keyboards and sound modules which claim to offer "every instrument sound known to man," Peavey realizes that you probably don't want, or need, all of that! **The Peavey Spectrum Series** sound modules are each designed to do one thing--offer specific instrument sounds you do want. The Spectrum **Organ, Synth, and Bass** units offer unique features and capabilities needed to produce the most realistic reproduction of its particular instrument family.

Complementing the Peavey Spectrum Series sound modules are the **Spectrum Analog Filter** and the **PC-1600 MIDI controller**--offered to make the Spectrum Series modules even more powerful. The Spectrum Analog Filter will add that fat, classic and true analog sound to whatever you plug into it. And the Peavey PC-1600 MIDI controller allows programming and controlling of any Spectrum module.

Amazing sounds, amazing simplicity, amazing flexibility, and truly amazing prices! The only thing about the Spectrum Series that is not amazing is it's from Peavey...the company dedicated to giving musicians everything they need...and want!

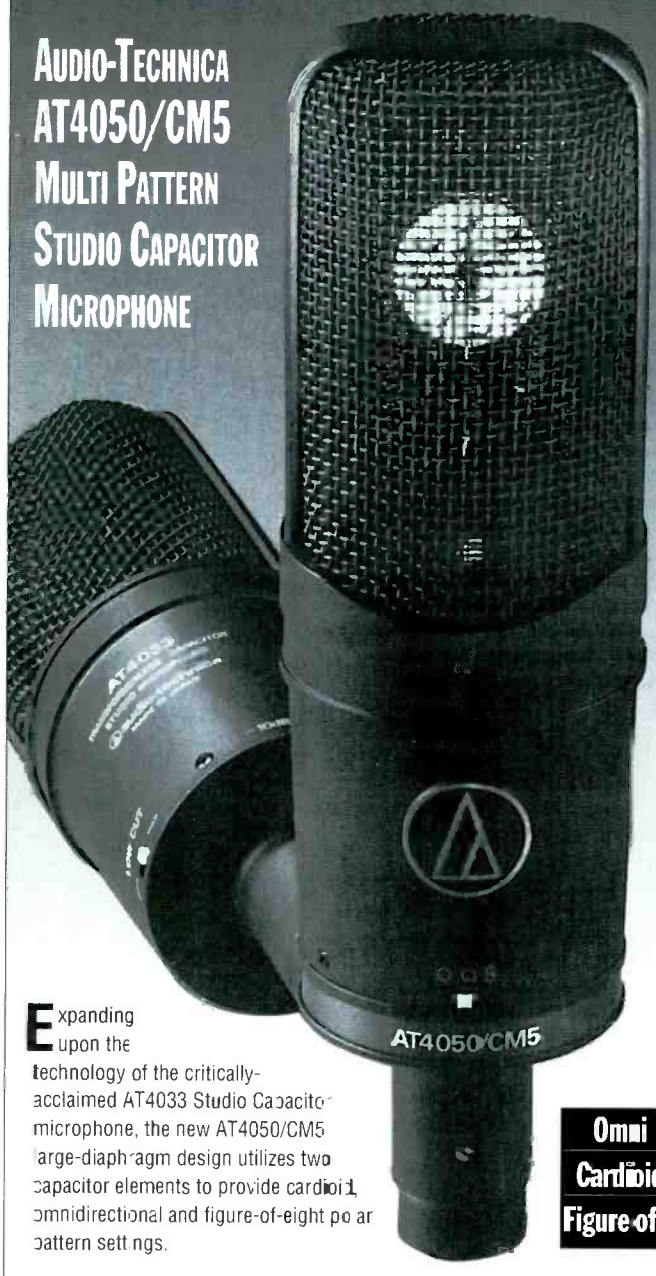
For complete Peavey keyboard information, pick up the latest edition of *KEY ISSUES* at your local Peavey dealer.

Peavey Electronics (U.K.) Ltd. • Hatton House • Hunters Road • Weldon Ind. Est. • Corby Northants NN17 5JE United Kingdom • Tel: 0536 205520 • Fax: 0536 269029

PEAVEY

THREE ENGINEERS, ONLY ONE ACCOUNTANT

AUDIO-TECHNICA AT4050/CM5 MULTI PATTERN STUDIO CAPACITOR MICROPHONE



Expanding upon the technology of the critically-acclaimed AT4033 Studio Capacitor microphone, the new AT4050/CM5 large-diaphragm design utilizes two capacitor elements to provide cardioid, omnidirectional and figure-of-eight polar pattern settings.

Omni
Cardioid
Figure of 8

To achieve a warm, true-to-life sound in all polar pattern settings, Audio-Technica vapor-deposits pure gold onto specially contoured large diaphragms which are aged through five different steps to ensure optimum characteristics over years of use. The dual elements are then mounted with special internal baffling to increase the signal-to-noise ratio of the microphone system. The transformerless circuitry results in exceptional transient response and clean output even under extremely high SPL conditions.

Three patterns... only one budget.
Call us for more details

audio-technica
INNOVATION PRECISION INTEGRITY

Technica House, Royal London Industrial Estate, Old Lane, Leeds LS11 8AG
Tel: 0113 277 1441 Fax: 0113 270 4836

ATM 1008

---

weiss engineering ltd. digital audio. Florastrasse 10, 8610 Uster, Switzerland, Tel. +411 940 20 06
Fax +411 940 22 14

setting the tone

«The Weiss 102 is an essential ingredient to Gateway Mastering Studios success. I don't know what I would do without it. From the Grammy award winning Sting album to the grunge of Nirvana and Pearl Jam, the 102 is my most used piece of gear.»

Bob Ludwig
Gateway Mastering Studios, Inc.

Weiss 102 Series – the ultimate digital audio processing system.

weiss

☐ Please send detailed information to:

Company: Name:

Adress: Country:

weiss engineering ltd. digital audio Florastrasse 10 8610 Uster Switzerland

---

RICHMOND FILM SERVICES

Tel: +44 (0)181 940 6077 Fax: +44 (0)181 948 8326

THE HIRE COMPANY
OTHER HIRE COMPANIES HIRE FROM !

NAGRA-D AS REVIEWED IN AUDIOMEDIA APRIL '94

Only £60 per day

£240 per week

THE BEST NEED NOT BE EXPENSIVE !

Martin Polon

Audio archiving: today's problem or tomorrow's loss?

Nearly everyone in the world today would recognise O J Simpson as a result of his public trial. Less well recognised, though, is the problem of preserving aural evidence from the trial—a problem shared by the world's recording and studio communities.

It is revealing to note that multitrack tape still stores the majority of masters from recording sessions—both in the analogue and digital domains. But other formats are coming through and tape's habit of shedding oxide begs that a more reliable medium be found. For the purposes of this discussion, let us consider archival storage of recorded audio to be beyond ten years, with 25 years as ideal.

All of the following formats are acceptable for short and medium-term storage. Their relative suitability, or otherwise, for archival storage is the issue in question.

Vinyl LPs are remarkably stable but potentially fragile and good for only one pass without introducing groove distortions. They are, however, potentially laser playable, eliminating many possible downsides.

Analogue-digital multitrack tape is subject to manageable audio problems of crosstalk, demagnetisation, noise accrual while in storage and so on. Its major shortcoming is mechanical degradation of the tape itself due to the separation of the plastic acetate or polyester backing from the magnetic coating. Not all tape sheds, but not knowing whether or not you have an archival 'time bomb' is not comforting.

DAT tape has seen growing use in the recording studio community for 2-track digital recording. The downside archivally is the relatively inconsistent playback from machine-to-machine. Many feel that to successfully archive DAT tapes, one would have to archive the DAT machine that made them.

U-matic tape is a 20-year old technology still much used for CD mastering. Its medium-term reliability is shown by TV news use, but long-term availability of new machines seems in doubt as newer technologies replace it.

Use of 8mm videotape as a digital multitrack format raises the same questions as for the above two TV VCR-derived technologies. Again the long-term question mark is a problem for those seeking to archive audio recordings.

MiniDisc offers relatively limited space (130Mb) and involves use of digital-audio data eliminating low bit-rate coding and companding.

Removable hard disks, RAID and data backup systems store audio in a digital format allowing the use of computer-industry standard removable storage mechanisms. The downsides are a lack of predictable history for computer data beyond 120 months or so, and the short term each technology exists in before it is superseded by a newer technology.

Magneto-Optical discs are possibly the new standard for archival recording, either as a computer data store or as a dedicated digital-audio recorder—as in Sony's *PCM9000*. As to whether the chemistry of the recorded disc will be stable enough for archiving after the high powered M-O changes are made, the jury is still out and will continue to be so for a number of years.

CD-R is a real dark horse that is performing the archival task for computer users. Services are now coming to homes and businesses and producing a complete CD-ROM of the dump of all files on a computer to permanently archive them. The fee is in the $50–$100 price range. The same thing is happening in recording studios as enterprising individuals take advantage of the permanence and portability. CD-R is more than adequate for the near-term in professional audio but we do not have enough information as to long-term reliability.

One question that frequently comes up is whether to archive in the analogue or the digital domain. From the anecdotal evidence available from studio operators, plus the statistical data on storage of computer data—which after all is what digital audio is when stored on computer media —the answer is digital. That is, the storage of analogue audio—primarily on tape—has been relatively successful. Controversial tape-backing problems aside, the advantage of analogue is the presence of artefacts that have been extracted in reissuing an album 10, 15 and even 25 years later. Said one mastering expert, 'Analogue is almost like freezing a loved one who is terminally ill, to restore them to health 20 years later when science has learned to cure their illness. The analogue tape holds acoustic treasures we may not be able to process out now, but that we can return for later.'

The methodology of storage may be as important or more important than the medium of archiving itself. It is not clear, for example, from US Government experience, that tape backing problems happen without fail to tape that was stored in ideal humidity and temperature conditions—such as in salt chambers or domes below the surface of the earth. It is equally unclear that some of the commercial tape storage 'vaults' have paid good enough attention to temperature and humidity control in the past. Smog is another factor that has not been properly studied, especially with the obvious history of smog attacking speaker surrounds, audio cables and other rubber and plastic items—over time. It may be that 'smog proof' storage containers are another way to prevent backing loss with tape over time, assuming proper storage temperatures and humidity. And let's face it, a significant amount of audio history has 'passed away' in a storeroom in a studio complex with a water heater as a cell mate.

> One tape maker's brochure assured customers that even in a nuclear war, both audio tape and cockroaches would survive

The nearly insurmountable problem we face is that none of the new and old technologies that we have to archive 2-track or multitrack audio with have any long-term storage performance to consider except for the vinyl LP, multitrack analogue tape and CD. Although the unplayed LP does offer perfect capture, playback limitations are a factor. Tape has been relatively reliable aside from the worrisome shedding problem. It is interesting to remember that to one tape maker's brochure assured customers that even in nuclear war, both audio tape and cockroaches would survive. One was left with a sense of invulnerability about tape that proved to be very false indeed. Oh yes—after the nuclear war to end all nuclear wars, colonies of cockroaches would be gathered to listen to tapes of Elvis, since both were virtually indestructible.

Though CD is a relative newcomer with only a 10-year history, it is considered today to be the most reliable storage format we have. Though CDs have been pressed since the early-1980s, the first years saw the pressing industry learn about material quality, pressing and cooling times, coatings, acid and other chemically aggressive inks. In the last ten years, CD production techniques have yielded a very high quality product as long as pressing quality is not sacrificed to record label earnings.

The USAF, in searching for an archival tool to serve as a storage medium for vast audio-visual holdings, conducted elaborate tests on CD and adopted it. The Air Force decided that if CDs were pressed and coated properly and labelled minimally, that a 25-year life was obtainable for every disc.

For audio, the most reliable method of archiving does not come from the dozen or so new technology solutions but is to buy a limited CD run needed just to get one or two perfectly archivable copies. This technique, costing between $500 and $750, would guarantee a pressed compact disc which should have a 25-year life span at the minimum.

There are no easy answers here. Any of the newer media are technologically attractive and some offer the desirable option of long-term storage of multiple tracks. But what is missing is history and in the storage of audio, history has left the music industry baking tapes in an oven. Archiving artist's performances today requires a leap of faith to store multitrack and the acceptance of older technologies for reliable options.

Many lament the speed of technological change today and pine for the days when one could 'cut a tape' and then set it and forget it. But that was a fool's paradise since the tapes that everyone trusted were disintegrating in ways that no one could imagine at the time. Archiving then actually meant ignorance is bliss. Or perhaps archiving out of sight, out of mind. And this holds true for many producers and studios today. ■

10 YEARS

Digigram

We have never forgotten that sound is above all a vibration

our role simply revive and transmit it

1995 : **Digigram** celebrates its 10th birthday
1995 : **Digigram** launches a new line of products

Digigram

Simply digital

Parc de Pré Milliet - 38330 MONTBONNOT - FRANCE
Tel. : (33) 76.52.47.47. - Fax. : (33) 76.52.18.44.

Kevin Hilton

Multichannel broadcast: proprietary battle zone or land of opportunity?

There is an old audio cliché that says, in television, sound has always been the junior partner. As with all clichés, there is an element of truth in this—which itself is a cliché. Before this becomes a metaphysical tract, it should be pointed out that the balance has started to be redressed in the past five years.

One of the reasons behind this general upgrading of TV audio chains was the coming of stereo TV sound, thanks to that elaborate acronym NICAM (Near-Instantaneous Companded Audio Multiplex). TV stations went crazy over this new toy: continuity announcers could hardly contain themselves, breathing things like, 'And *LA Law* is brought to you in NICAM digital stereo.'

Nowadays they don't bother. The majority of programming is stereo today, but both the broadcasters and the viewers have moved on. TV stations are now looking at widescreen transmissions, with digital pictures for both satellite and terrestrial services seen as the future—a future which is not that far away. Meanwhile, the viewer has the option of turning the front room into a home cinema.

This may still be seen as an enthusiast's market, but research figures show that sales of large or widescreen sets equipped with Dolby Surround are on the increase, the only area of so-called entertainment electronics showing any kind of life. Despite this, audio now appears to be in danger of slipping behind again. When stereo TV was first mooted, the industry said that it heralded the cinema in the home, which has been shown to be untrue because both real cinemas and domestic setups revolve around multiple channels.

In the UK, the driving force has been Granada Television, producer of *Cracker* and the *Prime Suspect* series, both of which make the most of Surround and flag it clearly on the opening credits. 'Surround is a creative choice, but it's also part of the entertainment,' says Drama Production Executive Craig McNeill. 'The second time around, a lot of these programmes are going to sound very tasty.' However, he is frustrated by the reticence of others: 'There's no point doing shows in Surround unless you tell the viewer about it, and a lot of the broadcasters, newspapers and listings magazines don't bother.'

Other ITV companies have followed Granada's lead. A technical spokesperson for Carlton, the London weekday service, said the main concern was to ensure that the mono, stereo and Surround tracks were compatible. 'There have to be three levels of audio checking because the mix is different for each one. We're still learning how to deal with this.'

It is the failure of other broadcasters to do this that is angering the viewers who have invested in multichannel systems. It must be very frustrating to see the end credits showing a programme to have been in Surround and not have the decoder switched on, something that is very common with both the BBC's and Channel 4's treatment of movies and bought-in shows, notably *Star Trek: The Next Generation*, *The X-Files* and *NYPD Blue*.

The two services have differing reasons. 'Our position up to now has been that we wouldn't endorse it because it is not freely available,' says C4's Assistant Chief Engineer, Peter Marshall. He quickly adds, 'It's not a technical criticism, it's because it's controlled by one manufacturer. Really, we're entirely neutral on the issue. If a programme is supplied by an independent with Surround on two channels, we will transmit it unaffected.' Marshall adds that the station regards home cinema as 'tweakie', although he acknowledges that if Dolby Surround became a *de facto* standard, C4 would 'take a positive line'.

The BBC's reservations have a more technical foundation, although Surround encoded material that passes technical standards is broadcast unaffected, albeit unannounced. 'We're not offering a multichannel service,' explains a spokesperson, 'but if the consumers can get it, that's up to them. However, if something goes wrong with the Surround, to whom do they complain?' Mark Holland, Manager of Studio Operations at TV Centre in London, says that discrete multichannel systems are preferred, because the coded formats can introduce artefacts into the signal.

Like many satellite broadcasters, BSkyB see new technical advances as an extra selling point, and are using Dolby's double-D logo as a powerful symbol. Surround sound is being used on a wide variety of material, and Sky's programming reflects the broad applications: movies, Premier League football and international boxing on Sky Sports, and Sky One's entertainment series, including *Highlander* and satirical animated show, *The Simpsons*. 'We definitely see it as the future,' comments a spokesperson. 'If we're supplied in that format, we will use it and inform the viewer that they can get enhanced sound.'

At the moment, Dolby have this market pretty much to themselves and are not convinced about some of the objections to Surround, particularly those of its proprietorial nature. 'The trademark is free of charge,' says Dale Learie, the company's Licensing Operations Manager, 'and you don't have to take out a licence on the system. Look at PAL and NICAM—they're proprietorial systems, yet certain broadcasters are quite happy to use them. In reality, all services broadcast in Dolby Surround, because it's on every feature film.' As for coding problems brought about by the matrix, Learie comments, 'The encoding uses a patented ±90° phase shift, and as our unit is used, the encoding signal gives accurate stereo.'

In the past year Dolby have released AC-3, a discrete 6-channel format (front left and right, rear left and right, centre dialogue, and sub-bass) which has been adopted by the US HDTV Grand Alliance. (Learie is quick to point out that it is not intended as a replacement for either Dolby Surround or Pro-Logic, the company's current matrixed formats.) AC-3 is big in America, already implemented for LaserDisc (but only NTSC can sustain the format due to its FM tracks) and cable, as well as HD.

In Europe, the bulk of work on multichannel sound revolves around MPEG, and as this is the standard for satellite broadcasting, the American DBS project looks set to adopt MPEG format audio. The Eureka 1187 group developing Advanced Digital Terrestrial TV and the DVB (Digital Video Broadcasting) project are 'looking at ways sound can be enhanced, compatible to standard mono and stereo', according to an inside source. The aim is to produce a standardised discrete 5-channel audio system.

A subcommittee of Eureka 1187, made up of representatives from the BBC, Bang & Olufsen, Nokia, Philips and IRT, is currently working on this and is due to report to the full working party by the end of next year, with final ratification of any standard down to the International Standards Organisation (ISO).

Much of this work is based on Musicam surround, which is heavily favoured by the DVB project, and could form the basis of any decision made by Eureka 1187. A number of different companies, including Philips, hold patents for this technique, which would endear it to those broadcasters who have problems with Dolby's current supremacy. The format is currently available on some products, including Video CD, and has been chosen for digital broadcasting by French station Canal+.

The development of a true standard would affect the consumer, many of whom either rent or own a vast amount of Dolby Surround encoded material. The advent of Musicam would require yet another box to be added to the growing clutter in peoples' homes, sitting alongside the existing Dolby decoder. A technical source close to the European work told me that, although the two would have to co-habit in the early days, future units could feature merely a plug-in chip for whatever format was needed.

As if things were not complicated enough, there is a 4-channel system on the way from a Japanese consortium, while Sony has its SDDS (Sony Dynamic Digital Sound) system, an 8-channel format optically printed onto 35mm film. Although this is exclusively used in cinemas at present, a spokesperson for the Cinema Products division ominously commented, 'This is Sony—anything can happen.' Perhaps the least likely option is the suggestion that quadrophonic could be hooked up to HDTV pictures.

While quad should be filed under NAO (Not An Option), multichannel sound for television is no longer merely a preserve of the enthusiast. Standards are being ratified but the crucial point is telling the viewer about it. If not, audio sweetening and the creative use of sound will be for nothing, and expensive home entertainment systems will become no more than modernist ornaments. And expensive ones at that. ■

Pro Audio&Light Asia '95

The 7th Annual International Trade Exhibition for Professional Recording, Sound Reinforcement, CD Manufacturing, Duplication, Public Address, Live Sound, Disco Lighting, Theatrical Lighting, Laser, Special Effects and Associated Equipment for the Leisure, Presentation, Entertainment, Music and Related Industries for the Entire Asian Region.

July 12 - 14, 1995 World Trade Centre, Singapore

INTRODUCING

AUDIO BROADCAST TECHNOLOGY

We are creating a segment within this year's PRO AUDIO & LIGHT ASIA show to meet the demands of the growing broadcasting market in the region, specifically in the area of AUDIO. Highlighted as AUDIO BROADCAST TECHNOLOGY, it will give manufacturers an opportunity to show their latest offerings to this market need. In addition, a conference on "New Audio Technology in Broadcasting" with prominent industry speakers is planned.

Pro Audio&Light Asia '95

World Trade Centre, Singapore
July 12-14, 1995

*Our likely space requirement is _____ square metres.

Name: _____ Position: _____

Company: _____

Address: _____

Tel: _____ Fax: _____

- ❑ Please send me more details of the '95 show for **Audio Broadcast Technology**
- ❑ Send your representative to see me.

*We understand this indicates our interest but in no way commits us.

Please make a photocopy of this coupon, complete and return it to Miss Tan Seok Hoon of IIR EXHIBITIONS PTE LTD at 101, Cecil Street #09-03, Tong Eng Building, Singapore 0106
Tel: (65) 227-0688 **OR FAX TO** (65) 227-0913

OPEN SYSTEMS INTERCHANGE: REALITY OR PIE IN THE SKY?

Francis Rumsey explores file exchange and establishes the problems associated with moving audio and edit lists between Digital Audio Workstation systems

As professional-audio recording moves further into realms which are probably more the business of computer systems analysts, it pays to be aware of some of the gremlins waiting to catch out the unwitting explorer in the fields of audio networking and file exchange. One thing is for certain: we will always want to be able to exchange audio between systems and between facilities, because that is the way that work moves around organisations and around the world. But this relatively simple requirement is far from simple to deliver in the workstation world. Organisations investing in new technology lift up stones under which crawl masses of abbreviations: ATM, FDDI, OMFI, DDP, ISDN, WAVE, AIFF, Exabyte, PMCD, all of which they know are important in one way or another. The question is: in what sense are they important and how much is it necessary to know about them in order to make a system work in which audio and edit lists can be moved about freely?

It is clear that individual manufacturers are capable of delivering integrated solutions based on networking and file exchange which work well. This is because they can control every element of the interchange process, and there are many levels at which compatibility must exist if operation is to be smooth and straightforward. The problems arise with the truly open system in which information is exchanged between equipment from diverse sources. Anyone who has tried setting up a mixed computer network in an office environment, with *Macs*, PCs and Unix boxes, will know how many different elements have to be coordinated before a satisfactory solution is established.

Although it is clear that there are a number of people associated with the audio industry that understand all of the issues involved—and understand them at a sufficiently comprehensive level to be able to develop solutions—it is also clear that the general level of ignorance is high. People talk about Exabyte as if it were a digital-audio-recording format like DAT, and about SCSI as if it were a digital-audio interface like AES-EBU. The problem is that people try to map existing knowledge onto unfamiliar territory, without realising that they are dealing with a wholly different set of concepts. Yes, Exabyte can carry digital-audio information, but in all sorts of different ways, depending on the way it is formatted and so on. Yes, SCSI can be made to transfer audio data, but you cannot simply connect it to another SCSI interfaced system and expect the two to talk to each other.

Horses for courses

In the past, the digital-audio industry made for itself a number of dedicated formats for carrying audio, either in electrical or physical form. The former examples of DAT for carrying stereo audio on tape, and AES interfaces for carrying stereo audio over wires are good as illustrations. Now that audio is stored in the form of data files, the question of formats still exists but it now has many different layers. The physical medium and the data format are no longer necessarily tied (although a particular configuration might be recommended for convenience). Indeed this has been discussed in these pages before, but there is no harm in reiterating some of it because the education process required is quite phenomenal if what might be called the 'traditional' audio industry is to make the leap into the age of the dreaded information superhighway.

It is easy to get swept along by the attractiveness of networking solutions in the field of digital-audio workstations, but whether you actually need a network or not depends very much on the operational applications envisaged. There are also many different kinds of network which suit different purposes, and the distinctions are subtle. The approach adopted to audio data ▶

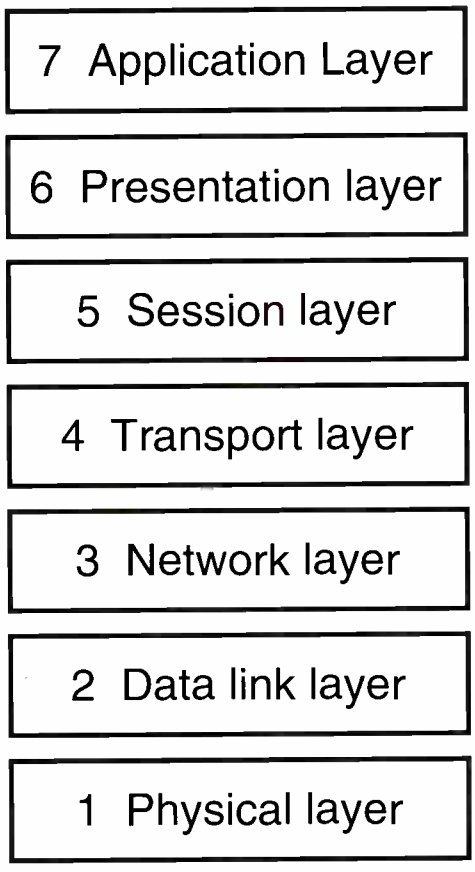


Fig.1: ISO 7-layer model for Open Systems Interconnection

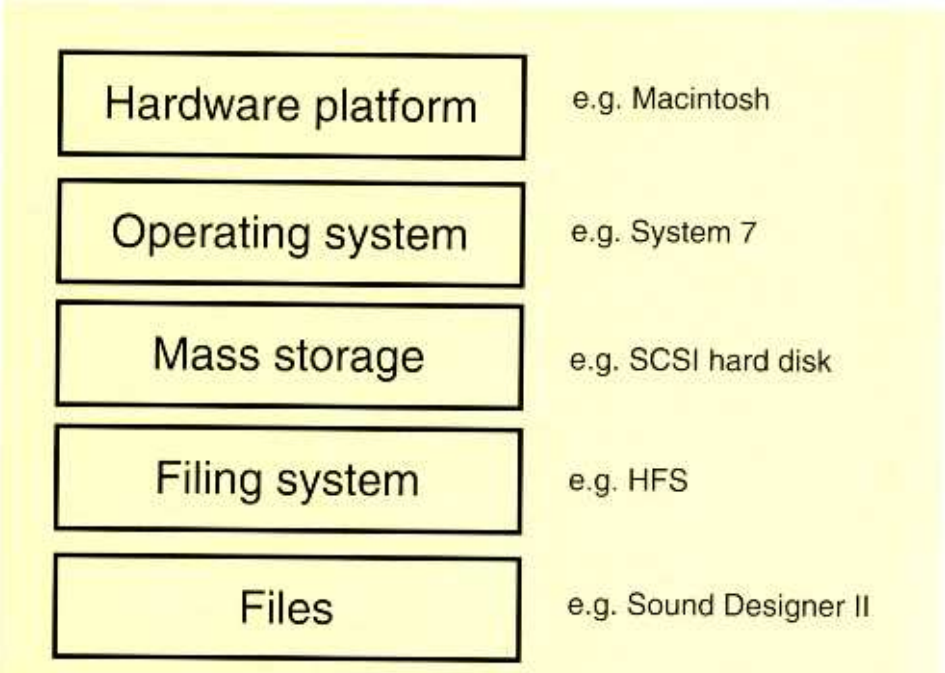


Fig.2: The hierarchy of compatible file systems with examples of implementation

interchange requires very careful systems analysis, of the kind one might perform when introducing IT (Information Technology) into a corporation for office automation. What precisely are people likely to want to do in day-to-day operations, and what capacity for future development is required?

It is a strongly held view by some that networking—rather than physical media interchange—will offer the key to the future in audio operations. It is quite possible, for example, that one might receive and send out commercial projects this way in the future. One might send CD masters for pressing over a network to the plant, or, to look at a more radical alternative, one might never expect to see the result of one's labours in a physical form and simply be preparing audio information for issue on demand over an on-line service. The solution to suit one person's requirements is going to be very different to that which might suit another.

The industry has long awaited a universal format for audio information interchange, and the Open Media Framework Interchange (OMFI) widely trumpeted by its promoter, Avid Technology, is the subject both of guarded welcome and considerable scepticism by other manufacturers. It is freely available to anyone who wants it, though, so no one can complain about licensing fees. Its main potential application is at the recording and postproduction end of the chain, allowing files of audio data and associated edit lists to be exchanged between systems. To potential workstation users it may seem to be a dream too good to be true, and is far from being properly understood. People know that it it is supposed to offer a solution to interchange of audio between systems, and this has been demonstrated, but the extent to which OMFI defines all the elements of that interchange is not clear to many. Adding to the confusion, manufacturers such as DAR are announcing 'open media-type' approaches to networking and file exchange which are almost certainly not the same as OMFI.

At the CD premastering end of the chain, a number of formats exist for transfer of finished masters to pressing plants, again much misunderstood by potential users. People often associate DDP (Disc Description Protocol), devised by Doug Carson Associates, with the physical format of Exabyte tape, but in fact DDP is entirely medium independent and could be carried over a network or on an optical disc if required.

These examples simply serve to illustrate that layers of confusion have been added to the once simple business of getting audio from place to place, and it cannot be to the advantage of the business in general that this should continue.

Layers of compatibility

There is a well-known model in the networking business known as the ISO 7-layer model for open systems interconnection (OSI). It warrants careful study, since it shows how many levels there are at which compatibility between systems needs to exist before seamless interchange of data can be achieved (**Fig.1**). It shows that communication begins with the application and filters down through various stages to the layer most people understand—the physical layer, or the piece of wire over which the information is carried. Layers 3, 4 and 5 can be grouped under the broad heading of 'protocol', determining the way in which data packets are formatted and transferred. Those familiar with computer systems and the Internet may already know of examples such as TCP-IP, Novell Netware, AppleTalk and DECNet.

Recent networking solutions in the audio field, such as those proposed by AMS Neve, Siemens, Sonic Solutions and others, use high speed optical fibre technology such as FDDI and ATM. Other companies, such as SSL and DAR are sticking with the slower Ethernet for the time being, although not attempting to use it for the purpose of transferring large numbers of channels of audio in real time. Ethernet, FDDI and ATM are examples of physical network standards which may also specify further layers within the OSI model. FDDI, for example, specifies only the first three layers of the OSI model (the physical, data link and network layers). Sonic Solutions have taken the step of developing its own network protocol for transporting audio and other multimedia data over FDDI in a form which ensures optimum use of bandwidth, and allows systems to guarantee that real time file transfers, once started, will be able to complete without breaks (the so-called 'reservationist' approach). They have therefore gone further through the OSI model than the first three layers specified in the FDDI protocol, allowing them greater control over the way in which data is transferred. The alternative to this highly controlled approach is a form of network 'free for all', which assumes there is more network bandwidth than will ever be needed at any one time, allowing applications to grab whatever bandwidth they can for file transfer operations. This is simpler, but less reliable in cases of heavy network load.

The other major area of confusion with interchange relates both to networked exchange and physical media exchange. It is the area concerned with disk filing systems and their interface with the platform on which the application handling the audio resides. Everyone probably knows that MS-DOS computers won't read *Macintosh* disks, and that *Macs* can only be made to read MS-DOS disks with the addition of some useful software such as PC Exchange. This is an example of the problem. Operating systems format disks in different ways, and this relates not particularly to the data files on the disks but to the way that the sectors are formatted, files stored, and the directory structured. This is the reason why you can't just take a SCSI disk which previously had been connected to a DAR *SoundStation* and connect it to a *Macintosh* running Digidesign *Pro Tools*. Electrically there would be no problem, but the *Mac*'s operating system would not be able to interpret the disk format. Even if it could, *Pro Tools* would not be able to read the files it found there. It is possible to equip computer platforms with drivers that will read and write disks in filing systems other than their own, but the need to do so has to be recognised, and the solution may not be immediately straightforward. File names in one system may be restricted in a different way to those in others, for example. Again there is a hierarchy of compatibility levels (**Fig.2**).

It is important to realise that open concepts such as OMFI, introduced above, have no influence or control over the aforementioned aspects of inter-system compatibility. They only aim to specify ▶

We didn't reach No.1 by being out of stock, slow or expensive

Virtually, any item you could need; recording, live sound, broadcast, post production and audio for video is in our catalogue and can be in your hands today or tomorrow!

Whether it be a simple jack plug, cables, a reel of 456, a 16 track recorder or acoustic treatment, Studiospares has it and everything else you could need, in stock at the trade counter at the UK's lowest prices. Next day delivery, nationwide.

3M
AGFA
AKG
AMPEX
ARBITER
BASF
BEHRINGER
BEYER
BOSE
BSS
CONNECTRONICS
CP CASES
DBX
DENON
DRAWMER
DURACELL
EDAC
EDITALL
E.M.C.
FOSTEX
HARTING
H+H AMPLIFIERS
ISOTRACK
JBL
KLOTZ
KOSS
LA AUDIO
MACKIE
MARANTZ
NEUTRIK
P & F AUDIO
PHILIP REES
REVOX
ROCKWOOL
SENNHEISER
SONY
SHURE
SOUNDCRAFT
SWITCHCRAFT
SYQUEST
TANNOY

TDK
TASCAM
TEAC
TECHNICS
TRANTEC
TURBOSOUND
YAMAHA

Acoustic Analysers
Acoustic Treatment
A.DAT Tapes
Aerosols
Amalgamating Tape
Amplifiers
Attache Case

Bantam Plugs
Batteries +Chargers
Books

Cable
Caged Nuts
Cassettes
CCTV
CD Players
CD-R
Compressors
Connectors

DAT
Demagnetisers
DI Boxes

Effects Units
Empty Spools
Equipment Stands

Fibre Optical Leads
Fish Poles
Floppy Discs
Fuses

Gates
Glands
Goosenecks
Graphic Equalisers
Guitar Stands

Headphone Amps
Headphones/Headsets
Heatshrink
Humfrees

Infra Red Headphones
Isopropyl Alcohol

Littlelites
Leads
Looms
Loudspeakers

Mains Transformers
Meters (Volt-Amps etc)
Microphones
Microphone Stands
MIDI Accessories
MiniDiscs
MiniDisc Recorders
Mixers
Music Stands

Noise Gates

Patch Cords
Patch Panels
Phantom Power Supply
Phono Preamps
Plastic Spools
Plugs
Pop Screens
Porta Studios
Power Amps

Power Supplies
Pre Amps

Quickrack

Racks Lights
Racks Strip
Racks Trays
Radiomics
R-DAT Tapes
Reverbs
RIAA Preamps
RFI Filters
Roadcases
Rockwool

Scart Leads
Sleeving
Snakes
Solder and Irons
Speakers
Spike Filters
Stack Rack
Stage Boxes
Stools
Strato Rack
Syquest

Tape
Tape Recorders
Tools
Transformers
Turntables

Ventilation Panels

Wall Boxes
Windshields
Workstations

Zimmer Rack

Studiospares

No waiting, no fuss, just service with speed!

Studiospares Ltd
61-63 Rochester Place,
London NW1 9JU
tel 0171 482 1692
fax 0171 485 4168

Access SWITCH VISA

Ansaphone +44 (0) 171 482 1692 24 hours

Please send me a free copy of the new Studiospares 108 page catalogue

Name .....
Company (If relevant) .....
Address .....
.....
.....
Post Code .....

Studio Sound

International Dealers

Australia
SYNCROTECH SYSTEMS DESIGN
Unit C, 9 Gibbes Street
Chatswood, N.S.W. 2067
61-2-417-5088 phone
61-2-417-8360 fax

Austria
AUDIO SALES
Neusiedlerstrasse 19
A-2340 Mödling
43-2236-2613 phone
43-2236-43223 fax

Benelux
TRANSTEC BV
Brugwachter 19
3034 KD Rotterdam
31-10-414-7055 phone
31-10-411-3580 fax

Brazil
VISOM DIGITAL
Rua Prof. Ferreira da Rosa 108 Cob-01
Barra da Tijuca 22600
Rio de Janeiro
55-21-493-7312 phone
55-21-493-9590 fax

Canada
ADCOM ELECTRONICS
310 Judson Street, Unit 1
Toronto, Ontario M8Z 5T6
(416) 251-3166 phone
(416) 251-3977 fax

460 E. St Paul Street #200
Montreal, Quebec H2Y 3V1
(514) 842-0604 phone
(514) 842-6484 fax

MATRIX PROFESSIONAL VIDEO
123 West 7th Ave.
Vancouver, B.C. V5Y 1L8
(604) 875-6301 phone
(604) 875-0543 fax

Caribbean
COMPUTER VIDEO & GRAPHICS
6157 N.W. 167th Street, Suite F-14
Miami, FL 33015
U.S.A.
(305) 822-2480 phone
(305) 822-1680 fax

Central America
SYSTEMS MIDWEST
310 N. 16th Street
Fairfield, IA 52556
U.S.A.
(515) 472-6988 phone
(515) 693-9600 fax

China
MEDIALAND
Flat B-C, G/F, Comfort Bldg.
86-88, Nathan Rd.
Tsim Sha Tsui, Kowloon
Hong Kong
852-2-721-0343 phone
852-2-366-6883 fax

Czech Republic
AUDIO SALES S.R.O.
Plzenska 66
CZ-151 24 Praha 5
42-2-544 174 phone/fax

Denmark
DANSK AUDIO DISTRIBUTION
Fuglegardsvej 5
2820 Gentofte
45-31-682811 phone
45-31-652449 fax

Egypt
EKO SOUND
30 Omer Ebn El Kattab
Dokki, Cairo 12311
202-349-7181 phone
202-360-7549 fax

Finland
STUDIOTEC KY
Kuusiniemi 2
02710 Espoo
358-0-592055 phone
358-0-592-090 fax

France
D.D.D.
97, Boulevard de Magenta
75010 Paris
33-1-4246-8501 phone
33-1-4246-2048 fax

Germany
R. BARTH KG
Grillparzerstrasse 6A
D-2000 Hamburg 76
49-40-229-8883 phone
49-40-223-209 fax

STAGE TEC GmbH
Bahnhofstrasse 13
79843 Löffingen
49-951-71295 phone
49-951-972-2532 fax

Greece
KEM ELECTRONICS
32, Katechaki St.
30-1-64 78 514 phone
30-1-64 76 384 fax

Hong Kong
DIGITAL MEDIA TECHNOLOGY
Flat B-C, G/F, Comfort Bldg.
86-88, Nathan Rd.
Tsim Sha Tsui, Kowloon
852-2-721-0343 phone
852-2-366-6883 fax

India
ORANGE PALE
203 TTK Road
Alwarpet, Madras 600 018
91-44-434-6543 phone/fax

Indonesia
ADS
Jl. Tanjung Duren Barat III No. 104F
Jakarta 11470
62-21-568-3213 phone
62-21-568-5860 fax

Israel
D.Z. SOUND PRODUCTIONS
18 Shenkin Street
Givataim 53 301
972-3-317-185 phone
972-3-573-1744 fax

Italy
REPP ITALIA srl
Piazza Sicilia, 6
20146 Milano
39-2-4802-2775 phone
39-2-4802-2770 fax

Japan
DAIKIN INDUSTRIES LTD
Shinjuku-Sumitomo Bldg.
6-1, 2-Chome, Nishi-Shinjuku
Shinjuku-ku, Tokyo 163-02
81-3-3344-8151 phone
81-3-3344-8113 fax

MERCURY MUSIC ENTERTAINMENT
Wako Bldg., 8-5 Roppongi 4-Chome
Minato-ku, Tokyo 106
81-3-3479-3712 phone
81-3-3403-3095 fax

START LAB, INC.
3-8-5 Misaki-cho
Chiyoda CB Building
Chiyoda-ku, Tokyo 101
81-3-3288-4321 phone
81-3-3288-4325 fax

Korea
UNION SOUND
88-4 Non Hyun Dong, Kang Nam-ku
Yang Hyun B/D 201
82-2-540-4740 phone
82-2-540-4741 fax

New Zealand
SONIC SYSTEMS LTD
3 Centre Street
Auckland 1001
64-9-300-3038 phone
64-9-302-3038 fax

Norway
SIV. ING. BENUM
Haakon den Godes vei 14
Vinderen, 0373 Oslo
47-22-145460 phone
47-22-148259 fax

Poland
TONMEISTER RECORDINGS
6120 Massachusetts Avenue
Bethesda, MD 20816
U.S.A.
(301) 229-1664 phone
(301) 229-8002 fax

ul. Krasinskiego 8 m. 45
01 601 Warszawa
Poland
48-22-397949 phone
48-2-774-8154 fax

Portugal
LMT
Rua Nova de Piedade, 54, 2nd andar
1200 Lisboa
351-1-395-3956 phone
351-1-395-3956 fax

Russia
I.S.P.A.
Srednetsishinski per. 12
Moscow 123557
7-503-956-1826 phone
7-503-956-2309 fax

Singapore
TEAM 108
55 Genting Lane
Singapore 1334
65-748-9333 phone
65-747-7273 fax

Slovak Republic
AUDIOSALES s.r.o.
Nad Dunajom 6
SK-841 04 Bratislava
42-7-722-249 phone
42-7-726-809 fax

South Africa
EMINENTLY MORE SUITABLE (EMS)
24 Napier Road
1st Floor, South Wing
Richmond, Johannesburg
27-11-482-4470 phone
27-11-726-2552 fax

Spain
SONY ESPAÑA
Maria Tubau, 4
28050 Madrid
34-1-536-5700 phone
34-1-358-9794 fax

Sweden
PRIFIX
Fagelviksvagen 7
S-145 53 Norsborg
46-8-531-911-83 phone/fax

Switzerland
Dr. W. A. GÜNTHER AG
Seestrasse 77
CH 8703 Erlenbach-Zurich
41-1-910-4141 phone
41-1-910-3544 fax

Taiwan
ACESONIC
No. 6, Alley 5, Lane 130, Sec. 3
Ming-Shing E. Road
Taipei
886-2-719-2388 phone
886-2-716-0043 fax

Thailand
AMEK/TAC THAILAND LTD
165/4 Main 4
Samakorn, Sukhaphibaan 3
66-2-373-2722 phone/fax

Turkey
MARS MUSIC
Kokurent Sitesi, B Blok K1D5
Levant, 80600 Istanbul
90-212-274-1212 phone
90-212-266-5303 fax

United Kingdom
TYRELL CORPORATION
49/50 Great Marlborough Street
London W1V 1DG
44-171-287-1515 phone
44-171-287-1464 fax

the contents of stored files, not the filing system under which they are stored or the physical medium or networking protocol by which they are transferred between systems. To some this may seem like opting out of the most difficult part of the problem, but of course to tackle this problem would be to tie the approach to specific platforms and protocols—a solution which might be popular in the short term, but which in the end would limit scope for taking advantage of changes in technology as they came along. It is true, nonetheless, that one could make recommendations concerning certain filing structures, network protocols and physical media for interchange which would be appropriate at the present time, with the proviso that these might be updated as time progressed.

The responsibility for making such recommendations really lies with end-user organisations themselves, or with consortia of organisations wishing to interchange data, rather than with manufacturers. It is hard to say whether this should be the subject of standardisation, such as AES standardisation, since the technology is changing faster than standards can be made. That said, the AES has just formed a new working group, SC-2-8, under the chairmanship of Michael Franke from Digidesign, to study the issue of file interchange, with the specific first task of dealing with OMFI so as to clarify certain audio-specific issues within OMFI and possibly publish a standard relating to file interchange.

Independence

It is clear that although it might be convenient for audio exchange to be tied to certain specific physical media, filing structures or network protocols, this is not really in the best long-term interests of the audio industry. Therefore it is vital that we wake up to the fact that the disks and tapes we use, and the network wiring that we put in place, are only ways of getting formatted data from place to place, and that we may expect to change these physical interchange media quite regularly as the years go by, in order to take advantage of speed and capacity increases, as well as improvements in open systems design that may come along. To do anything else would not be taking full advantage of the computer industry, upon whose back this industry now rides. If we are going to have the curses of that industry, we had better have the blessings as well.

To reiterate the examples raised at the beginning of this article, we must stop talking about Exabyte as if it were a term that described everything about the recording format, just as we must stop talking about network media such as Ethernet or FDDI as if they were standard audio interfaces. Instead we must get to grips with the issues which really define inter-system compatibility, which are filing structures, network protocols and file formats themselves.

To give an example of this, DAR have recently announced a networking option for their products, and at the same time they are rewriting their filing structure and audio file format. Why? Because their own native file format is not compatible with other systems, and if they want to be able to share audio files with other users on the same network they will need a more widely-used approach. Consequently, it is proposed that DAR's audio files will be stored in the Microsoft WAVE format which will be easily read by many other multimedia platforms.

It has certainly been the case in the first ten years or so of the workstation revolution that many manufacturers' file formats and filing systems were the key to their operational success. They were the key to achieving high throughput of data to and from disks with limited transfer bandwidths, and consequently the key to handling a sufficiently large number of audio channels in real time. Sonic Solutions were an example of such an approach, where the disk containing the audio information was formatted in a unique way (the Media Optimised Filing System or MOFS), different to that of the *Mac* on which the system ran. The *Mac* desktop showed small aliases of the real sound files which were stored on a disk interfaced directly to the Sonic audio card. Since disk drives are now much faster than they were, the need for sophisticated private audio filing structures may become less of an issue, and compatibility with other systems may become the overriding factor. Digidesign applications, for example, store audio in the plain vanilla *Macintosh* filing structure, so they are visible on any *Mac* desktop.

(Sonic Solutions MediaNet software allows remote volumes formatted in the MOFS fashion to be accessed using the standard Apple Filing Protocol system, so that the volumes can appear like normal *Mac* volumes and be accessed by standard applications. They also expect to extend this approach to encompass Unix and DOS systems as well.)

What does OMFI specify?

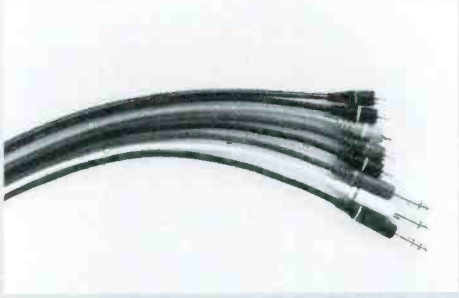
The OMFI 1.0 specification is quite lengthy and deals with descriptions of the various types of information that can be contained and the methods of containment. As far as the audio user is concerned, the 1.0 version specifies that the common audio formats to be used are the uncompressed versions of either the AIFC (or AIFF) format which is written in the big-endian byte ordering typically used by Motorola-based equipment, or the WAVE format which uses the little-endian byte ordering as handled by Intel-based equipment. It also allows for the possibility that manufacturers might want to specify 'private' interchange formats in the future. Since OMF is in fact principally concerned with video exchange, most of the document refers to video operations. Cuts and effects are all described in video terms and there is very little that refers to audio crossfades at edit points. So far as it is possible to ascertain, v1.0 of OMFI specifies no more for audio than a common format for the audio data files and a means of specifying edit points and basic crossfade durations (but not the shape). This is indeed a start, and Avid are proposing that the next version of OMFI due out later this year ▶

THE LONG-LIFE, ECO FRIENDLY CABLE

MOGAMI

Any cable failure often results in problems where the original cause is extremely difficult to detect. The reliability and quality of Mogami cable ensures those problems do not arise. Long-life, safety, efficiency and economy make Mogami the No. 1 choice for cable.

BANTAM PATCH CORDS

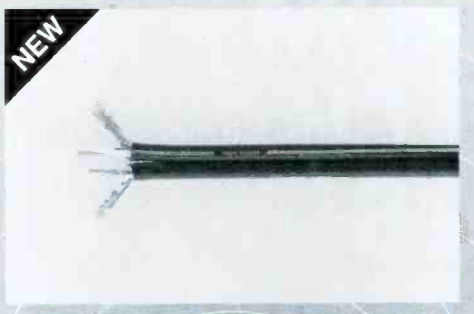


HIGH DEFINITION 75Ω AUDIO/VIDEO CABLES

LONGFRAME PATCH CORDS

MIDI SYNCHRO CABLES

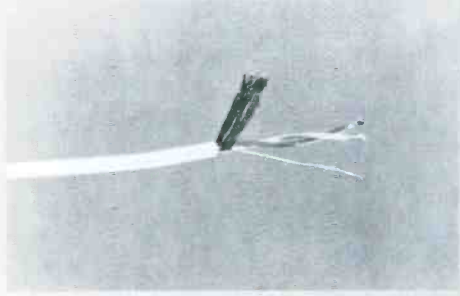
NEW



STEREO MIC. CABLE AWG #24 (0.226M²)

NEW

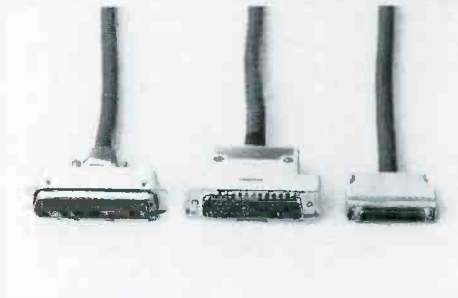
CL2 RATED SNAKE CABLES



CONSOLE WIRING CABLES

CL2 RATED SUPER-FLEXIBLE STUDIO SPEAKER CABLES

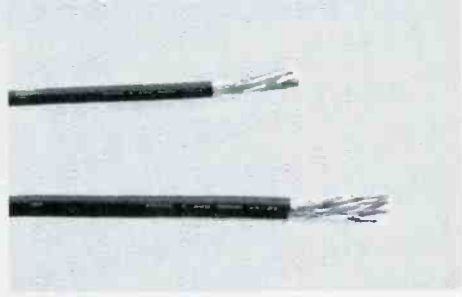
AES/EBU 110Ω DIGITAL AUDIO CABLE



SCSI -II SINGLE ENDED A CABLE

NEW

PARALLEL DIGITAL VIDEO CABLE



MULTICORE CABLES WITH AND WITHOUT OVERALL SHIELD

CALL OUR DISTRIBUTORS FOR A FREE CATALOGUE AND/OR MORE INFORMATION:

AUSTRALIA: *GREATER UNION VILLAGE TECHNOLOGY (02) 550 5488* • **AUSTRIA:** *DIETMAR KOLLER RECORDING EQUIPMENT (0222) 450 43 43* •
CANADA: *CABLETEK ELECTRONICS LIMITED (604) 942-1001* • **CROATIA:** *AUDIO VIDEO CONSULTING (38) 41 624 622* • **DENMARK:** *D A DISTRIBUTION APS (31) 61 07 55* •
FINLAND: *SOUND MEDIA OY (0) 629 669* • **FRANCE:** *D.M.2.J. SARL (1) 39 57 90 44* • **GERMANY:** *AUDIO-VERTRIEB PETER STRUVEN GMBH (04106) 6 99 99* •
HONG KONG: *ODYSSEY ENGINEERING CO. LTD. 5-8988111* • **JAPAN:** *MIT INC (03) 3439-3755* • **KOREA:** *AVIX TRADING COMPANY (02) 565 3565* •
NEW ZEALAND: *DENCO AUDIO LTD (3) 3790743* • **NORWAY:** *LYDROMMET A.S. 22 37 02 18* • **SINGAPORE:** *TEAM 108 TECHNICAL SERVICES PTD. LTD (065) 748 9333* •
SOUTH AFRICA: *EMINENTLY MORE SUITABLE S.A. (PTY) LTD. (011) 482 4470* • **SPAIN:** *MEDIA-SYS, S.L. (93) 426 65 00* • **SWEDEN:** *TAL & TON ELEKTRONIK AB (031) 80 36 20* •
SWITZERLAND: *ZAP SONO (22) 340-05-70* • **TAIWAN:** *SEA POWER CO LTD (02) 298 2688* • **THAILAND:** *VIDHYA SUVANICH (2) 321 4426* •
THE NETHERLANDS: *MAARTENS SOUND & VISION (0) 5130 29120* • **U.K.:** *STIRLING AUDIO SYSTEMS LTD. (071) 624-6000* • **USA:** *MARSHALL ELECTRONICS INC. (310) 390-6608* •

(v2.0) will also contain means of transferring audio volume, pan and EQ information. All of the audio, video, and other media data, as well as composition data (edit list, effects and so on) is contained using an Apple container format known as Bento. This is rather like a large folder in which a number of files can be included, along with a table of contents.

As indicated above, although people may use optical discs or Exabyte tapes as a means of transferring OMFI files between workstations from different manufacturers, the standard does not say anything about this, neither does it say anything about the filing system or hardware platform associated with the files. Those working with OMFI at Avid claim to have investigated a platform independent filing structure known as TAR which might be recommended as a possible move towards being able to specify more about the filing structure of OMFI data. TAR drivers could then be used on any hardware platform needing to mount volumes containing OMFI data, no matter what filing system was native to the platform concerned.

One of the useful things about OMFI audio files is that they can be used as the native format for a workstation's audio storage. This might not be an optimal solution from a performance point of view, but the standard has apparently been designed for this to be an option.

Premastering for CD

The issue of standard formats for the interchange of data destined to be mastered onto CD is similarly fraught with confusion. The old Sony *1630* format is gradually being replaced with more recent developments, the most popular of which are Exabyte tapes containing DDP data and PMCDs (ordinary audio CDs with a burst of modulated PQ subcode data at the start). Sony are trying to push their *MSdisc* format as the format for carrying audio all the way through from original recording to CD pressing plant, but with little clear success to date. The DDP format is available to anyone who wants to use it, and, as mentioned earlier, is not tied to any particular physical format, although most people are currently using Exabyte since it is relatively cheap, almost error free, and quite robust. The transfer rate to and from Exabyte is also relatively high, allowing CD masters to be dumped at speeds in excess of real time—a factor which will become of increasing importance as pressing plants begin to cut CDs at many times real time.

The fact that many ignore about DDP is that it is really a transfer protocol, not designed specifically for replaying audio in real time. One hears people saying things like 'I don't know a workstation that can replay a DDP tape', but that is not particularly surprising. PMCDs, on the other hand, are not really any different from ordinary CDs, and can therefore be played in an ordinary CD player. It is perhaps an advantage that DDP is simply a means of describing the contents of a CD to a glass mastering system, because it is unlikely to be played or modified by anyone other than the pressing plant. If the time comes when mastering houses or studios are connected via high speed networks to the outside world, then CD masters could be dumped using DDP to a pressing plant without the need to go via a physical transfer stage.

Where next?

It is certain that the less end-users know about the issues involved in open systems interchange of audio data the more they will be at the mercy of manufacturers who insist that they must buy everything from the one source. This is not an entirely healthy situation, since it limits freedom of choice and system flexibility, but it has its merits in that the user can be sure he knows who to blame if it doesn't work. The next stage in the maturing of this relatively new field seems to be in the tentative partnership between small groups of manufacturers, such as DAR and Lightworks, who decide to collaborate over making their systems talk to each other. We may not quite be at the stage where multimedia systems consultants can be brought in to pick and mix equipment from different sources, with the appropriate network and file system drivers to make them talk to each other, but we are not far off.

Be prepared—as the Boy Scouts put it. ■

NEWS FROM TUBE-TECH LCA 2B

The new TUBE-TECH LCA 2B stereo compressor/limiter is based on the very successful LCA 2A (released April-93). The LCA 2B features ouput level control and limiter on/off switch.

AUSTRIA (02) 236 26 123, BELGIUM (08) 941 5278, BRASIL (011) 34 8339, DENMARK (43) 99 88 77, FINLAND (90) 592 055, FRANCE 87 77 00 00, GERMANY (089) 609 4947, HOLLAND (02) 0613 1521, ITALY (051) 766 648, JAPAN (03) 5489 3281, KOREA (02) 741 7386, NORWAY (55) 951 975, SINGAPORE 7489333, SWEDEN (046) 32 03 70, SWITZERLAND (01) 840 0144, TAIWAN (886) 2719 2388, UK (069) 1658550, USA (212) 586 5989.

LYDKRAFT

Lydkraft Aps • Ved Damhussøen 38
DK 2720 Vanløse • DENMARK

AKG
acoustics

Sound This Legendary Only Comes Around Twice In A Lifetime.

Introducing the AKG C 414 B-TL II. Not since the 1950´s has a microphone so faithfully captured the warmth and character of the original AKG C 12 mic. Now the legendary presence and openness are back, thanks to an acoustically perfect re-creation of the original C12 capsule. What´s more, transformerless C414 circuitry allows the B-TL II to exceed all of today´s digital requirements. So you get the best of two legendary sounds, in one affordable mic. AKG . **It all comes back to the sound.**

AKG

H A Harman International Company

AKG Akustische u. Kino-Geräte Gesellschaft m.b.H.
A-1230 Vienna, Lemböckgasse 21-23, Austria
Tel: +43 1- 86 654-0, Fax: +43 1- 86 654-202

Harman Audio, Harman International Industries Limited
Unit 2, Borehamwood Industrial Park
Rowley Lane, Borehamwood, Herts WD6 5PZ, England
Tel: +44 81 - 207 5050, Fax: +44 81 - 207 4572

ADV 469/1/E

CLASSIFIED

Rates: All sections **£30** per single column centimetre (minimum 2cm x 1)
Box Numbers: **£10.00** extra per insertion
Published: Monthly
Copy deadlines: Contact Mark Lenthall/Richard Lawn

To place an advertisement contact: Studio Sound (Classified), Miller Freeman House, Sovereign Way, Tonbridge, Kent, England, TN9 1RW, UK
Tel: 01732 377422 Fax: 01732 368210 Telex: 95132
International: Tel: +44 1732 377422 Fax: +44 1732 368210
All box numbers replies to address above

APPOINTMENTS

MARTIN AUDIO

As a prestigious world leader in professional loudspeaker manufacture, Martin Audio are seeking a

Marketing/PR Executive

to fill a vacancy within a company which is enjoying rapid expansion and growth within all areas of the pro audio market.

Reporting to the Sales & Marketing Manager, the successful candidate will be responsible for all promotional activity including PR, literature production, advertising, exhibition organisation and product launches.

Experience of PC/Windows desktop publishing would be a distinct advantage. For an application form please reply in writing enclosing your career details to:

Sara Kendrick
Martin Audio Limited
19 Lincoln Road
Cressex Business Park
High Wycombe, Bucks
HP12 3RD

SALES OPPORTUNITIES £18-35K

UK and international sales to broadcast, post production and pro-audio markets. Direct and through distributors.

SERVICE ENGINEER £12-17K

Maintenance and repair of analogue and digital tape machines.

PLEASE CONTACT MIKE JONES OR VANESSA CONNOLLY, BROADCAST & COMMUNICATIONS PROFESSIONALS, UNIT 9B, INTEC 2, WADE ROAD, BASINGSTOKE, HAMPSHIRE RG24 8NE
TELEPHONE: 01256 470704
FACSIMILE: 01256 844054

BCP

BROADCAST & COMMUNICATIONS PROFESSIONALS

SOUND RECORDING ENGINEERS WANTED

Midlands based Production Company urgently requires Sound Engineers for media/voice-over recording. Cut and splice editing skills essential. Full and Part-time Posts. Hourly rates negotiable and dependent on experience.

Please reply to BOX NO. STU 002 with curriculum vitae.

Royal College of Music

Recording Engineer Producer (0.6)

Applications are invited from suitably qualified and experienced Classical Recording Engineers/Producers for this part-time position based in the Studios of the Royal College of Music.

Applicants must be committed to developing the role of recording within a conservatoire environment specialising in the education and training of performers and composers.

Salary on the Academic Related pay scale, depending on experience, 0.6 pro rata.

Further details from
W. M. Morgan Esq., Bursar,
Royal College of Music,
Prince Consort Road,
London SW7 2BS
Tel: 0171-589 3643 (24hr answerphone)
Fax: 0171-589 7740

Application including CV and covering letter to be received by June 12th 1995.

STUDIO DESIGN

40 Clarendon Rd West, Chorlton, Manchester, M21 0RL

Worried about your image?

Poor imaging is a common complaint even in some of the most expensive control rooms.

The Early Sound Scattering control room from ESS diffuses the early reflections, rendering it difficult to localize the loudspeakers, and so masks the conflicting spatial information which would otherwise corrupt the stereo illusion.

It is also free from midrange fringing and comb filter effects, providing unprecedented consistency of frequency response and image stability throughout the room.

If you're serious about your new control room, you should be talking to

ANDREW J. PARRY
on *0161 861 0857*
ELECTROACOUSTIC SYSTEM SPECIALISTS

design AND build!
FROM TV STUDIOS TO BASEMENT MIDI SUITES

- Free initial site visit
- Fixed price quotations
- Full 3D visuals on ACAD 13
- In-house construction teams
- Custom racking/furniture
- Full wiring package
- Full MLSSA analysis

acoustics

The acoustics experts for a cost effective solution!

TELE: 01263 720379 MOB: 0850 292440

COURSES

MEDIA

AUDIO VISUAL TRAINING

Bon Marche, Ferndale Road, London SW9 8EJ

The following courses are available.

One year full-time diploma course in:

Advanced Sound Recording and Production

Practically based tuition from internationally recognised specialists, supplemented with new technology from leading manufacturers.

Starting 1st May & 25th September '95.

Three months full-time Certificate courses in:

Analogue Sound Recording and Production

Starting 25th September '95.

One week full-time course in:

Introduction to Sound Recording and Mixing

An entirely practical foundation course.
Starting 18th September '95.

Telephone 0171-737 7152
or 0171-274 4000 ext 338

DUPLICATION AND MASTERING

Make it with us . . .

Sound Recording TECHNOLOGY

•D•I•R•E•C•T•

- COMPACT DISCS
- FULL MASTERING
- LATEST 32-BIT DSP
- SUPER BIT MAPPING
- 20 BIT DIGITAL RECORDING STUDIO
- 20 BIT EDITING
- SOUND RESTORATION, DE-CLICK etc
- COPY MASTERS
- DIGITALLY DUPLICATED CASSETTES
- PRINT/REPROGRAPHICS

MARKET LEADERS
☎ 081 446 3218 LONDON
☎ 0480 461880 CAMBRIDGE

A 2 Z

0171 267 8000

THE ONLY NUMBER YOU NEED FOR DESIGN AND MANUFACTURING

The complete manufacturing service

A TO Z MUSIC SERVICES
12 OVAL ROAD
CAMDEN • LONDON
NW1 7DH
TELEPHONE: 0171 267 8000
FAX: 0171 284 3188

New York Office
Tel: 212 3460653/73
Fax: 212 3460679

- 7" singles
- white label & commercial 12" promo runs
- albums, compact disc, cassettes & vinyl
- sleeves, labels, booklets & inlays
- posters
- point of sale
- leaflets & brochures
- repro
- multimedia

Incorporating the "Enigma Design Studio"

- full specialised design for all the above
- corporate
- exhibitions
- photography
- artwork
- typesetting

For full design services contact:
Audley Clakesmith
Head of Design
Enigma Design & Communication
Tel: 0171 267 8000

Production/Sales fax: 0171 284 3188
General/Accounts fax: 0171 284 3166

- **Hard Disc CD Mastering**
- **One-off CDs from £15.00**
- **Real time cassette copying**
- Laser printed labels and inlays
- Every copy individually checked
- Excellent quality and presentation
- Copy masters and editing
- Unparalleled service, best prices
- Fast turnaround – hours not days

Magnetic Image Mastering
0181-960 7222

Compact Discs · Pro-Mastering · Digibin Cassettes
Reprographics · Print

HILTONGROVE
where sound advice counts . . .

Tel: 0181 521 2424 Fax: 0181 521 4343

REAL RECORDINGS

THE CASSETTE DUPLICATING SPECIALISTS
Real time & high speed loop pin duplication, printing & packaging. Blanks wound to length.
TEL: 0161 973 1884 FAX: 0161 905 2171

---

jbs records
MUSIC and SPEECH
REAL-TIME/HIGHER-SPEED Quality Cassette Duplication and Blanks from 1-1000.
Computer printed Labels.
Solo, ¼" reel, Sony Betamax or R-DAT recording. Fast Security Delivery service.
FILTERBOND LTD, jbs records div, FREEPOST 19 SADLERS WAY, HERTFORD, SG14 2BR
01992-500101

CdL
MANUFACTURER

Studio de la Croix des Landes
72650 LA BAZOGE (FRANCE)
Tél. + (33) 43 25 43 76
Fax + (33) 43 25 44 43

PRODUCTS & SERVICES

AIR CONDITIONING & VENTILATION TO SOUND STUDIOS IS OUR SPECIALITY

We provide design only or design and installation for many well known clients, whether it be for displacement, free cooling, V.A.V., V.R.V., split, unitary or centralised call Mike Hardy of **Ambthair Services Ltd** on
01403 250306 or Fax 01403 211269

FAIRLIGHT SERIES TWOS AND THREES

Sold, repaired, serviced, hired.
Stock constantly changing, please phone or fax for list.
Tel: +44 (0)171-700-1852
Fax: +44 (0)171-607-1410
23a Benwell Road, London N7 7BL
HORIZONTAL PRODUCTIONS

Accusound

CLOSE MICROPHONE SYSTEMS FOR ALL ACOUSTIC INSTRUMENTS

AS USED BY: BALANESCU QUARTET: CHRIS LAWRENCE: RONNIE SCOTTS CLUB: STEVE PHILLIPS: NIGEL EATON: SENSIBLE MUSIC: HOLY TRINITY: BROMPTON.

ACCUSOUND MICROPHONES SYSTEMS
TEL/FAX: (44) (0) 1455-552306
19 Bitteswell Road, Lutterworth, LE17 4EL UK

[EUROPE AUDIO RENT]

the no. 1 pro audio rent on the continent

We rent out analog and digital multitracks (4-8-16-24 tracks), consoles, mics and all modern outboard equipment. Also samplers, soundmodules, DAT (with timecode), U-matic, synchronizers.

New: Sony 3324S - ring for our competitive prices

PHONE HOLLAND (31) 3465.70670 • OR FAX (31) 3465.72707

FLIGHT CASES

Custom-built to high quality specification.
Workmanship guaranteed.
Genuine savings on price.

Tel: (44) 0116 273 3035
Fax: (44) 0116 249 0845

MIDLAND FLIGHT CASES
Ask for Stuart.

CRYSTAL | WHY PAY MORE FOR DATS?
ALL DATS ARE NOT THE SAME - SOME COST TWICE AS MUCH!

DAT STORAGE RACK-£3.50+VAT!
* HOLDS 10 DATS * LOCKS TOGETHER * FREE STANDING OR WALL MOUNTED

COMPACT 1U PATCHBAYS
ONLY 35.99+VAT!
32 WAY JACK/JACK
24 WAY JACK / 8 WAY MIDI
EASILY REVERSIBLE NORMALISING

DATR30	- FROM £2.75 + VAT!
DATR46	- FROM £2.95 + VAT!
DATR61	- FROM £3.20 + VAT!
DATR92	- FROM £3.70 + VAT!
DATR122	- FROM £4.19 + VAT!

TEL/FAX 01223 208937 | CREDIT CARDS ACCEPTED

NORTH ROAD WENDY ROYSTON HERTS SG8 0AB

PRODUCTS & SERVICES

- MOBILE REVOX SERVICE -
Phone 0181 909 2497
(24 hrs inc w/e)
Mobile 0973 408580
(24 hrs inc w/e)
- THERE IS ONLY ONE LIKE US -
Head change from £100 until June 1995

HEAD TECHNOLOGY
NEW TAPE HEADS
Supplied for most makes,
Tape Head Re-Lapping/Re-Profiling.
Same day turn round.
HEAD TECHNOLOGY
11 Brittania Way, Stanwell, Staines, Middx, TW19 7HJ.
TEL: 01784 256046

ISDN USERS
The
DIGITAL DIAL-UP LIST
A Worldwide Directory of Studios, Broadcasters, Producers, Artists, with Digital CODECS &/or FILE TRANSFER CAPABILITIES
Get on the list *FREE*. Single issue price: US $30
DIGIFON 1-203-254-0869. Fax: 1-203-256-5723
47 Colonial Drive, Fairfield, CT 06430 USA

STUDIOHIRE
0171 - 431 - 0212
0171 - 431 - 0212
equipment - EXCELLENT!
expensive? - *NOT!*

INSURANCE

Sound Insurance
PHONE KEVIN OR DAVID FOR YOUR FREE QUOTATION
HENCILLA CANWORTH
INSURANCE GROUP
0181 686 5050
Insurance House,
27/29 Brighton Road,
Croydon CR2 6EB

EQUIPMENT FOR SALE

TONY LARKING
PROFESSIONAL SALES LIMITED
WORLDWIDE DELIVERY

ENGLAND'S LARGEST STOCKIST OF
NEW & USED
PRO-AUDIO EQUIPMENT
CALL NOW! TEL: 01462 490600
FAX: 01462 490700

DIAL A FAX
FOR A COMPLETE UP TO DATE EQUIPMENT LIST ON YOUR FAX
Dial 0336 413 733 on your fax machine & press start when instructed. Some machines may need to be switched to polling mode to use this service. Calls @ 39p per minute cheap rate and 49p per minute all other times.

USED GEAR WANTED
CONSOLES . 16 TRACK . 24 TRACK . ADAT . OUTBOARD
MONITORS . STUDIO MICROPHONES . PRO VIDEO
Why continue on with your old equipment when Tony Larking Professional Sales can give you a cracking good part exchange deal - or purchase your unwanted equipment for cash?
PLUS: FINANCE AVAILABLE - USE YOUR EXISTING EQUIPMENT AS A DEPOSIT!

EQUIPMENT WANTED

WANTED
NEVE 8087 CONSOLE any modules or spares
UREI 1176LN LIMITERS
PULTEC EQUALIZERS · NEVE 1081 EQs
Fax (001) 213 851 8604

TANNOY SPEAKERS WANTED!
Best prices paid for early models: Guy Fountain Autograph, GRF, York, Lancaster, Chatsworth, Canterbury, Lockwood, Any pre-1975 Drive Units, X Overs, Empty Enclosures or Spares.
TEL: (UK) 0171 372 3724

MERCENARY BOSTON
"THIS IS NOT A PROBLEM"
AUDIO

THE CONNECTION
THE SOURCE
THE PROFESSIONALS
TEL: 508-543-0069
FAX: 508-543-9670

EQUIPMENT FOR SALE

SOUNDS Incorporated

Sounds Incorporated

☎ 44 (0) 1892 861099

nick ryan

fax: 44 (0) 1892 863485

Selling used Quality Recording Equipment
to Studios throughout the World

AUDIO TOYSHOP

PHONE: +44 (0)117 946 7711
FAX: +44 (0)117 973 0505

USED EQUIPMENT LIST

CONSOLES:

Neve 5316 classic, mainly discreet, console with 29 × 33114 eq's, 4 × 33314A compressors. Arranged 24/8/4 xtl p/b. Superb condition, refurbished - come and see it on our stand 352 at APRS ..... SOLD
Neve VR 60 2 available! 1 with flying faders, 1 with GML, all fully loaded ..... £call
Neve V3 flying faders, 48 channel, superb £110,000
Neve 8108 56 channels, in line, bar graphs £50,000
SSL 6072G 56 fitted, ext patch ..... £call
Amek Hendrix 56 channels, Supermove (flying faders). 15m old, £107k new. Interesting history! £70,000
Amek Angela 28 ch. VCA's, P&G's £7,995
Amek Mozart 80 channel! £52,000
Amek Mozart 40 frame, supertrue £37,000
Amek BC 01 12/4, f/c, PPM's, MINT £2,995
Soundtracs Jade 32, automation, dynamics, as new £25,000
Yamaha DMC 1000 MINT, V 2.0 ..... £12,750
Yamaha DMP 7 Digi console 4 of them £750

DIGITAL RECORDERS:

AMS Audiophile v.5, 2 in 8 out; 1hr £2,500
AMS Audiophile head ideal for sharing 2 rooms with 1 Audiophile £750
Real World Audio Tablet sold as seen £595
Panasonic SV 3700 brand new ..... £call

ANALOGUE TAPE MACHINES:

Studer A 80 Mk2 good runner £4,950
Studer A 80 Mk2 16/24 frame, rem £3,000
Studer A 80 Mk2 ¼" 2-track, excellent £675
Otari MTR 90 Mk2 remote, t/c locate £11,500
Otari MTR 90 Mk2 spares ..... £call
Ampex ATR 800 ½" £500
Studer B 67 ¼", trolly, meterbridge £695
Revox B 77 Mk 2 1 left at only £495
Saturn 624 full remote £7,000
Fostex G 16 MINT, hardly used £2,500
Dolby MT 24 SR automated, 18 cards £9,000
Dolby SP 24A 24 channels, Dobley A £1,250
Dolby A 361 12 in stock £195

OUTBOARD:

Neve/Amek 9098 in stock, on demo ..... £call
Neve 1073 stop and shop at the APRS
Neve 2254E 4 in stock
Neve 33135 Vintage Eq's we love them!
Neve spares psu, modules etc, loads ..... £call
Urei 546 parametric eq £425
Klark Teknik DN 360, 2 in stock £795
Audio and Design F 760XRS + E 500RS £595
Drawmer DL 221 compressor £275
BSS DPR 502 dual MIDI gate £325
Valley Gatex quad gate £175
Klark Teknik DN 510 dual MIDI gate £425
BBE 822 sonic maximiser £275

FX:

AMS RMX 16 remote £250
Lexicon 224 another in stock £1,295
Lexicon LXP 1 mini wee thing £295
Eventide H910 Harry Harmonizer £295
Eventide H949 Dirty Harry £295
Yamaha SPX 90 Mk1 ..... £225
Yamaha EMP 100 Yamy wee thing! £99.99
EMT 244 Medical quality delay £795
Roland Dimension D grab it quick! £550
Roland DC50 Digital Chorus £275
Korg SDD2000 digi delay w. sampling £295
Deltalab Echotron Eh? £150
TC M 5000 new, in stock, on demo ..... £call
Yamaha R 1000 crusty! £120

MICROPHONES:

Neumann U 47 tube *VF14, matched pair, conseq. serial nos. on bodies and capsules! These are SERIOUS* ..... £call
Neumann U 47 tube VF14, yet more ..... £call
Neumann U 47 tube AC701 tube! ..... £call
Neumann U 48 tube VF14/AC701 ..... £call
Neumann U 67 tube original, 2 left ..... £call
Neumann SM 69 only 1 left ..... £call
Neumann KM56c 76, 74 ..... £call
Telefunken M 221b, only 1 left £495
Beyer M 380 bass drum mic £120
Calrec C820c w. CC50 caps £225
AKG 414 EB silver £500
AKG C 28A tube £350
AKG D202 ..... £125
AKG D900 Like a 202 w. CK9 shotgun £225
AKG 451EB/CK9 big brother shotgun £275
AKG 451/CK8 little sister shotgun £255
AKG 451EB/CK1 black £175
AKG 451/CK1 silver £150
AKG 451 bodies only silver & black £100
AKG 058 buckets of them, cheap! £19.99
AKG D541 on gooseneck £55
AKG D190 E & C £65
Sony ECM 30 Lavalier mics £75
Sennheiser MD 441 2 available £175
Sennheiser 415T boxed, rifle £225
Sennheiser MKH405 pair with PSU £450pr
Amcrown 3DGPD PZM 1 left £95
MB stereo PZM looks seriously Dada, but sounds pretty groovy £125
Shure SM57 *NEW* £90

HEADPHONES:

Beyer DT 100 *BRAND NEW!!* ..... £90 ea.

VARIOUS:

Sony DAE 1100, 1610 complete system £11,000
Fostex 4030/4035 excellent £595
Sony 5630 lo band U-Matic £395
Fairlight CVI vwld, video fx manipulater £2,500
Audio Kinetics Facer & Pad £750

COME AND MEET US AND SOME OF OUR TASTY INANIMATE FRIENDS AT STAND 352 AT THE APRS

PRICES EXCLUDE VAT
MOST OF THE ABOVE ITEMS ARE IN STOCK

WE WANT: Studer A800, 827; Lexicon 480L, 224XL, PCM 70; Fairchild, Teletronix Compressors, all valve mics and anything you have in the studio closet!

WE P/X, BUY, SELL AND BROKER ALL STUDIO EQUIPMENT AND COMPLETE STUDIOS THROUGHOUT THE WORLD, SPECIALISING IN ESOTERIC AND TUBE EQUIPMENT – CALL US WITH YOUR REQUIREMENTS.

OTHER SERVICES: Studio design, installation and servicing. Custom modifications, racks for Neve eq's, compressors and mic amps; phone for client list and details. New equipment supplied, please phone for a competitive quote on any new equipment, packages tailored to your requirements.

VISA

Barry Fox

American indecision over DAB compression systems and the BBC's maverick approach to audio codec systems for ENG

Bell Labs, the research wing of AT&T, recently demonstrated a prototype solid-state personal stereo for joggers, and predicted that the price of 'memory chip music' could start to compete with tape by the next century. The prediction does not rely solely on memory prices falling, it relies also on Bell's work on digital audio compression. The system is called PAC, Perceptual Audio Coding, and Bell developed it for use in DAB (Digital Audio Broadcasting).

Several DAB systems are competing to become the national standard for the US. They all use terrestrial transmitters, to broadcast in the current FM band, using the current 200kHz channels. Each existing analogue station always has an unused channel on either side to prevent interference. So the DAB systems will put low-level digital signals in the taboo channels. As long as the digital taboo signal is at least 35dB below the FM signal in the neighbouring channel, there should be no interference to existing stations. So they can simulcast the same programmes in both analogue and digital form. Whether the low strength digital signal will be jammed by distant FM stations remains to be seen.

The rival DAB systems use several different ways of distributing the digital code. But the instigators are also split over what type of audio compression system to use. Some back Musicam, as used for Europe's Eureka digital broadcasting system, and others prefer Bell's PAC.

PAC works by splitting the audio signal into narrow frequency bands, analysing the sound waves in each and digitising only those that the human ear will notice. Europe's Musicam works in the same way. But whereas Musicam splits the sound into a few hundred bands, PAC uses over a thousand. This adds to complexity but allows more accurate analysis.

Also, whereas Musicam digitises the left and right stereo channels separately, PAC continually analyses the difference between them. If the music is mainly mono, for instance a solo voice or musical instrument, there is no difference between the left and right channels. So PAC saves bits by coding only a mono signal. when the whole orchestra strikes up to make a wide stereo spread, PAC transmits all the bits needed for accurate reproduction. Memory buffers keep the average data rate constant.

PAC currently delivers near-CD quality from a data stream running at 128 kbit/s, compared to around 1.4Mb/s for CD. This compression ratio of over 10:1 is more than twice that ratio used by MiniDisc and DCC.

Bell are confident of 20:1 compression by 1998, and 40:1 by the year 2000. Although CDs can run for 74 minutes, most albums run for less than 60, so one CD equates to 16Mb of chip memory. By the turn of the century memory should be down to $0.5 per Mb. This is still more expensive than a pressed CD, but it opens up the possibility of squirting a CD down a 64 kilobit/s phone line in around half an hour.

Mix cost-cutting with Armani management and you get a lethal combination. No, I am not talking about the British National Health Service and hospitals, I am giving just one example of the BBC's creeping internal corrosion.

When the BBC started using ISDN for audio, someone, somewhere decided to standardise on the G722 standard for 64 kilobit/s mono links. So studio control rooms now have racked G722 codecs to match portable G722 codecs carried by reporters.

But the independent local stations and news networks chose the apt-x standard instead. They thought the quality was better and the processing delay shorter, which makes the cue feeds less distracting. So all these stations and their reporters now have mono apt-x codecs.

It is not hard to see why the BBC chose G722; it was available earlier and the Belfast company that developed the very clever apt-x technology have done a very poor job of selling itself. When apt-x coding was chosen for the DTS cinema sound disc system used for *Jurassic Park*, the Belfast company fumbled the chance to make valuable publicity capital out of the big break. The BBC's news room in Belfast did not run the story because, they admitted later, they 'did not believe it could be true'.

Obviously there are times when the two worlds of news radio, BBC and independent, need to communicate. They may need to pool a story or share a reporter. so the independent news stations have installed a few G722 codecs.

Inside the BBC's Broadcasting House (BH) there is just one apt-x mono codec. It lives inside the EOC (Engineering Operations Centre) and if you find the right person to talk to it can be used to dial out to a reporter's codec. The feed is then patched through to any studio inside BH. It is even possible to patch incoming G722 and apt-x feeds together to produce an interview between two remote locations which is apparently coming from inside BH or any other regional studio.

I have tried the EOC patch and it works like a dream, but only if the bureaucracy stays out of the way.

Recently we tried and failed for a full hour to connect with an apt-x codec as a succession of studio engineers all thought they knew best, dialled out with G722 codecs and then complained of faulty equipment. This makes as much sense as trying to ram a Betamax cassette into a VHS recorder.

Someone in the EOC then said the BBC had got rid of their solitary apt-x encoder. They were mistaking it for a stereo unit which normally also lives inside the EOC, but had been temporarily shipped to East Germany for broadcasts from Belsen. On other occasions the EOC have tried to dial a mono codec with one leg of the stereo unit. That fails too. And behind it all there is the running sore that use of the EOC's prize codec should be prebooked with paperwork through the Schedules Department. The paper pushers do not always bother to pass on the vital instruction that the codec is apt-x mono. All in all it's a great way for Britain's national radio station to handle hot news.

The bureaucratic corrosion even extends down to the reception desk. I nearly missed a live broadcast recently because the one security clerk on duty did not have the phone numbers of the studios to call when guests arrive. ■

ILLUSTRATION: CARL FLINT

MUSICTAXI VP®

THE ONE AND ONLY ISO/IEC 11172-3 VARIABLE PROCESSING AUDIO CODEC WORLDWIDE

THE BASIC FACTS:

ALGORITHMS:	MUSICAM (56..384kbps) Layer III (32..320kbps) G.722/G.711
AUDIO IN/OUT:	AES/EBU S/PDIF Sample Rate Converter Analog
EXTERNAL SYNC:	XLR, BNC
AUDIO MODE:	Mono, Dual Mono, Stereo, Joint Stereo
SAMPLING RATE:	32, 44.1, 48 kHz
REMOTE CONTROL:	RS232
ANCILLARY DATA:	RS232/ZI according IRT
ALARM/CONTROL:	8 Bit bidirectional
DATA INTERFACE:	X.21
SMPTE TIMECODE:	LTC and VITC (Option)
B-CHANNEL SYNC:	ITU-T J.52
ISDN INTERFACE:	3 x S_0 (Basic Rate Interface)
SOFTWARE UPDATE:	Download via ISDN and PC

THAT´S VP!

DIALOG4®

A Worldwide Leader in ISO/MPEG Audio, ISDN and Satellite Transmission, Networking and Storage.

For detailed information please contact the Headquarters:
DIALOG4 GmbH · Businesspark Monrepos · D-71634 Ludwigsburg (Germany) · Phone + 49-7141-2 26 60 · Fax +49-7141-2 26 67

...how times change ...

Equalisation that thinks and learns from experience

Experience intelligent EQ

by **VARICURVE™**

BSS Audio Ltd Linkside House, Summit Road, Potters Bar, Herts EN6 3JB England
Tel: +44 (0)1707 660667 Fax: +44 (0)1707 660755

A Harman International Company