November 1988 $5.00 £2.00

STUDIO SOUND

AND BROADCAST ENGINEERING

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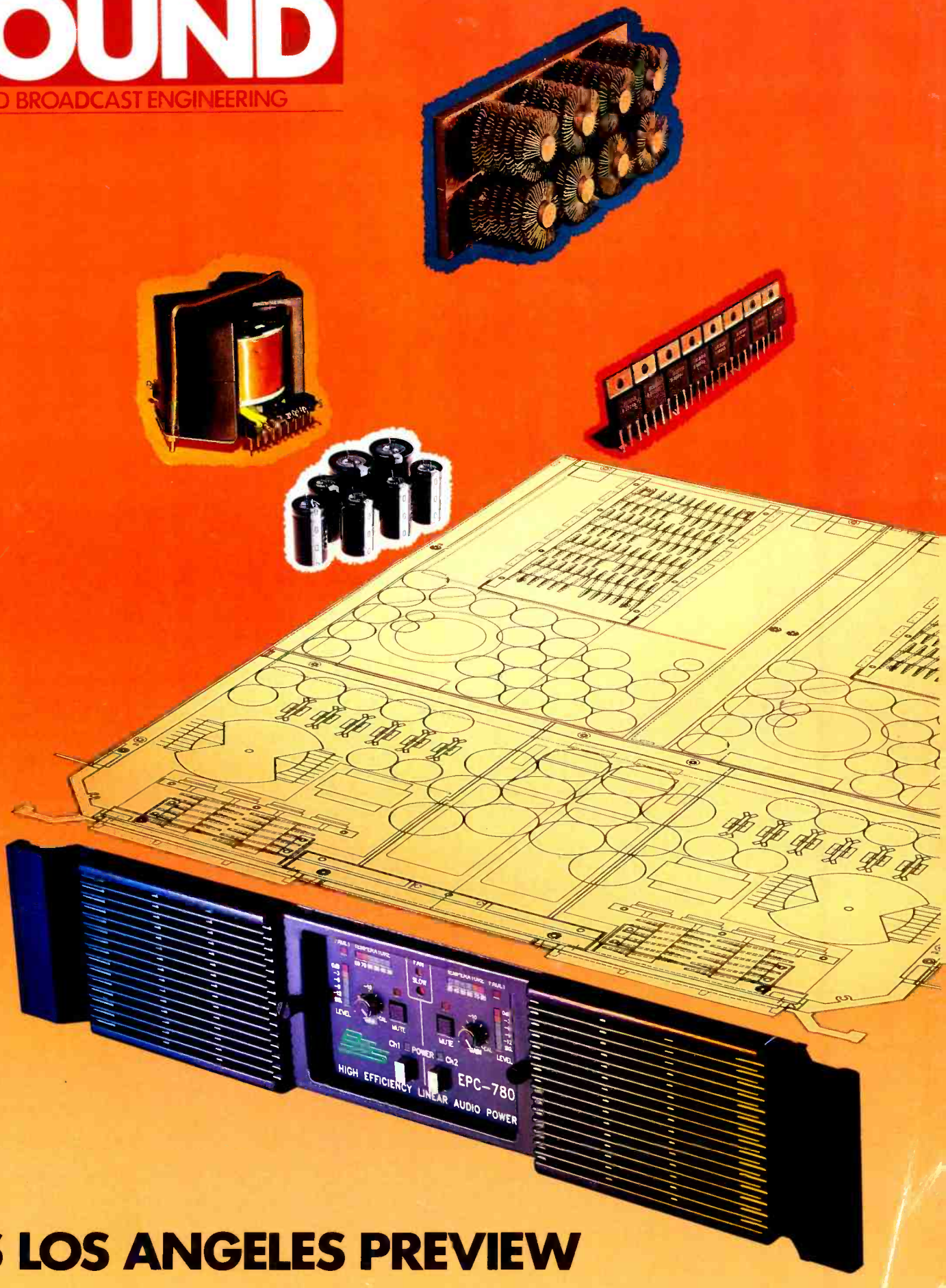

AES LOS ANGELES PREVIEW

Should audio follow video? At last, it's your decision.

It's strange that while video equipment gets more and more sophisticated, audio has been left to fend for itself.

After all, most 'video' audio mixers have either been inadequate 'switchers', or expensively adapted studio desks with an editor interface added. Both of which mean complicated, inflexible editing.

So at Soundcraft we've redressed this balance. And developed an audio mixer that's as versatile – and creative – as your video facilities.

The Series 200 BVE Audio For Video console.

VERSATILE AUDIO FOR VIDEO – AND CREATIVE FREEDOM.

What makes the 200 BVE unique, is that it gives you the choice of following the video to the frame, or cueing *independent* audio effects from your editor.

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By 'eavesdropping' on the editor/vision mixer link you'll have precise audio follow video but when interfacing the VSA24 to a GPI, automatic crossfades can be made independently of the video effect.

What's more, since it's a universal interface, you get this remarkable freedom with virtually any editor.

Of course, if your need is purely for audio-follow-video, the 200 BVE's standard parallel interface and VCA faders give you total editing accuracy.

Together with the unique BVE 'Depth Fader', which lets you pre-set partial fade depths, you'll find you can edit faster and more easily than ever before.

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The 200 BVE is not only remarkably versatile – it delivers exceptional audio performance too.

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Plus four subgroups and full monitor facilities to make the final mix as flexible as possible.

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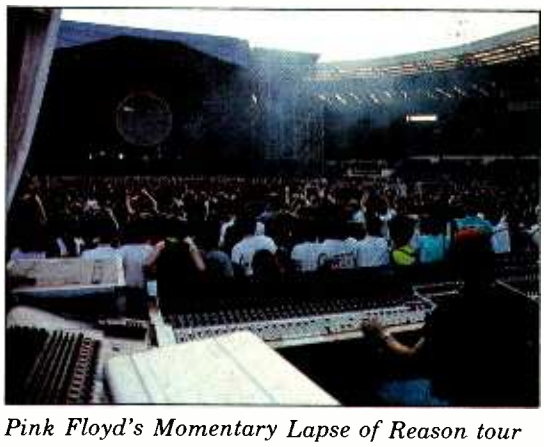


Pink Floyd's Momentary Lapse of Reason tour

MUSIC LAB RECORDING NEWS

Telephone 01-388 5392 for latest information and prices

Joining the Neotek Elite

In recent years, Neotek consoles have gained a reputation for being the best-sounding desks available at any price: not because of glossy campaigns, but from personal recommendations.

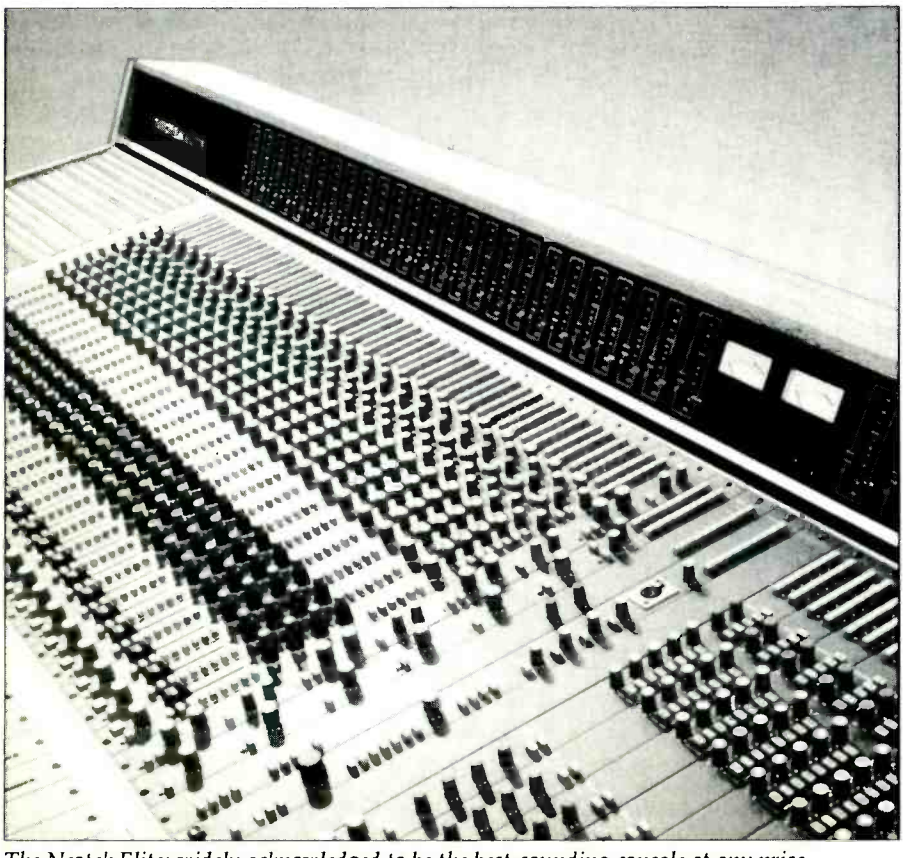
Many engineers and producers in the States have already benefitted from the superior sonic quality and flexibility of Neotek equipment. Stevie Wonder, Fleetwood Mac and Bose Corporation are a few of the many American users for whom only the best was good enough. Now Music Lab is making these sought-after consoles available to UK studios.

Sound quality and flexibility are the secrets of the Neotek phenomenom. The hybrid circuits used in the Elite help to make its technical performance *superior* to 16-bit digital recorders in terms of noise, distortion and bandwidth. This clarity, coupled with the unrivalled warmth and transparency of the four-band equalization section, has earned the Elite its reputation: and yet it actually costs *less* than many of its competitors.

The Elite also features Neotek's unique "Dual Channel Architecture". The desk behaves like two superimposed consoles, with each input module having a pair of audio paths, for unparallelled subgrouping and mastering power.

Ray Russell heard about the Neotek through the grapevine. "I got no bad reports at all, and I thought it was too good to be true: that's why I had to see it". Now his new Elite is earning its living at Last Chance Recordings. "It's the most flexible desk I've ever worked at. I can't sing its praises highly enough".

To find out more about the Neotek Elite, Esprit and Essence consoles, contact Paul Eastwood at Music Lab.



The Neotek Elite: widely acknowledged to be the best-sounding console at any price

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STUDIO SOUND
AND BROADCAST ENGINEERING

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EDITORIAL

I had a great idea for this month's editorial about how hard it is to maintain the spirit of excitement and creativity that brought many of us into the recording industry after exposure to the realities and culture of the big business it has now become. While not trying to denigrate the way the industry has developed, I was hoping to find a way to suggest that we may have reached a stage where it could be opportune to inject a little rock'n'roll back into the business lest we forget what it is all about.

Well that is what I wanted to say but after several drafts it still wasn't right and I was told by my production editor that it sounded like the whingeing of a bitter old man. Not wishing to blow my credibility just yet I dropped the full blown approach and leave you with just the skeleton of the idea.

And it was skeletons that gave me the rest of this month's column. A writer normally plans his writings by making a few notes—or if you like the bare bones of the idea—which he will then proceed to flesh out. Sometimes, however, it is not possible to flesh out the ideas for reasons that include the example we opened with. So maybe this is a very good time to unload a collection of bare bones so that you may do what I have so far failed miserably to complete.

1—There is an argument that the best recorded music is made when the creative forces of the music are pushing the recording technology. If we accept that there is a degree of historical proof to sustain this point of view, is it because the engineer is presented with a challenge to his abilities that is more stimulating than babysitting a sequencer. If technology is currently pushing music is there ever going to be a time when music will regain the lead and what kind of music could that possibly be.

2—By the time this issue is published, CDV should be available at last throughout the Western world. For rock music it would seem obvious that the video content would be the clip made to promote the tracks. In the area of classical music there would appear to be a dilemma, the outcome of which I await with interest. Most of the classical music releases so far have been operatic where you would see little other than the singers performing; or live performances before an audience. But if much of the repertoire released is of heavily edited recordings then there is no performance to film (certainly not economically). So we are presented with the choice of using *Fantasia*-type video imagery (also expensive) or the unbelievable sight of our virtuoso soloist or symphony orchestra having to mime their recording for the cameras!

3—With CD forming a greater part of the total value of record sales, the requirements of the medium are gradually coming to the fore at least to the degree of the other formats. CD, however, has a maximum playing time of varying amounts over 70 minutes. The average album seems to be in the region of 35 to 40 minutes—somewhat shorter. The public is well aware of the longer playing times of CDs and will feel hard done by if the CD album does not use more of the available time to help even out the CD price premium. Will the development of the CD market therefore mean longer sessions to record the extra material needed? With a fixed budget for the album project will we see a greater pressure on studio rates with the record company trying to squeeze out the extra 20 minutes for the same price? Should this happen, will they still be able to record digitally? And lastly are the artists up to the extra productivity of CD albums or will the 20 minutes CD single become the more viable music medium?

4—The record and film companies and their respective trade organisations are going to have to decide how they are going to react to the new recording media that are arriving or are about to arrive. The situation with DAT is well known with the consumer marketplace in a kind of stalemate where the manufacturers are reluctant to launch and become embroiled in the costly legal dispute that the record company trade associations are suggesting might descend on the first to move to market. DAT is, however, just one of many. On the video front we have the new S-VHS and Super-Beta that are significantly better than the standard formats and any pre-recorded films in these formats will make a good source for mastering the standard format from. The recordable CD is not so far away. Surely they cannot hope to contain them all as effectively as they have achieved with DAT so far.

Keith Spencer-Allen

Cover: The new EPC-780 power amplifier from BSS Audio. Photography by Norman Hodson

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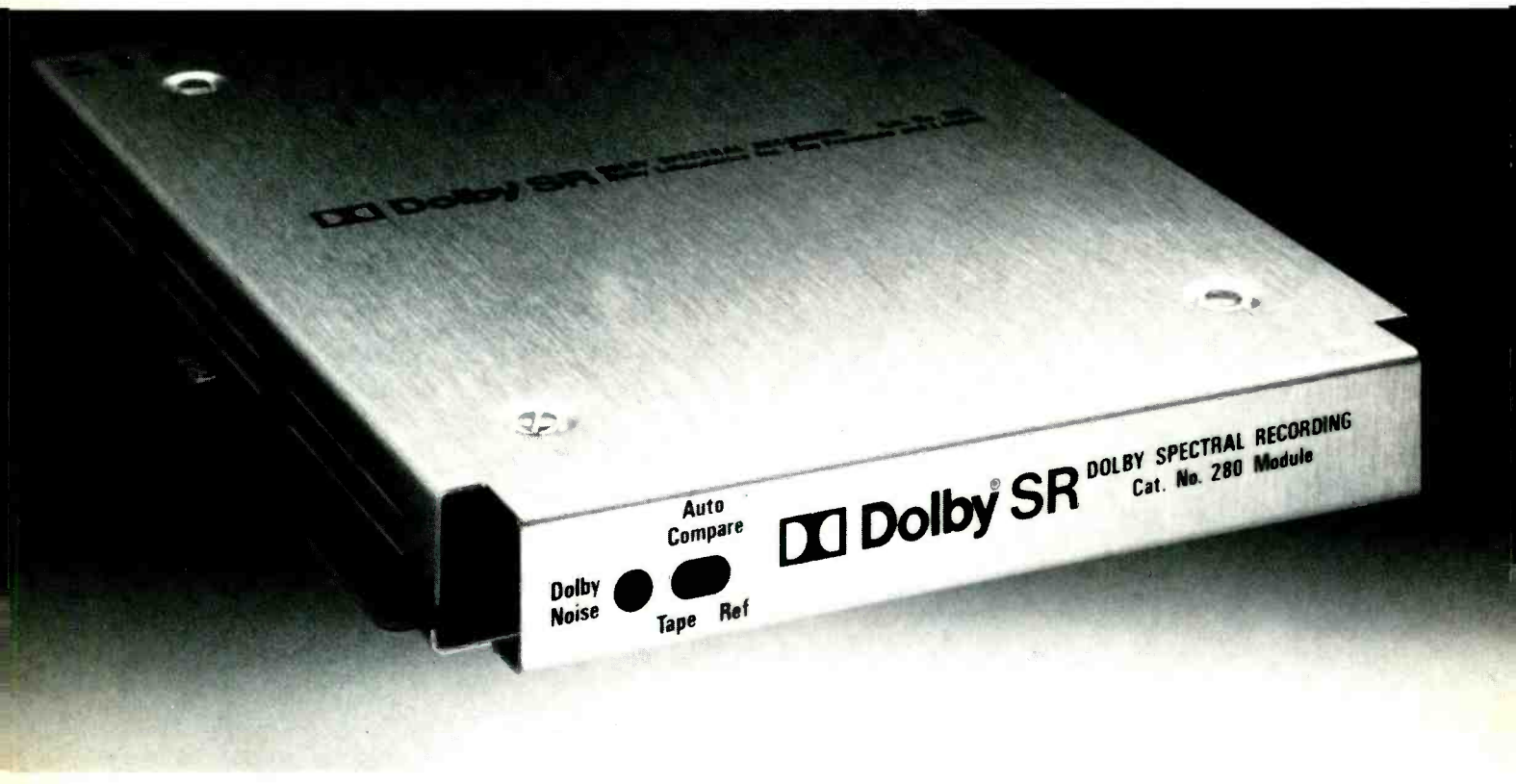

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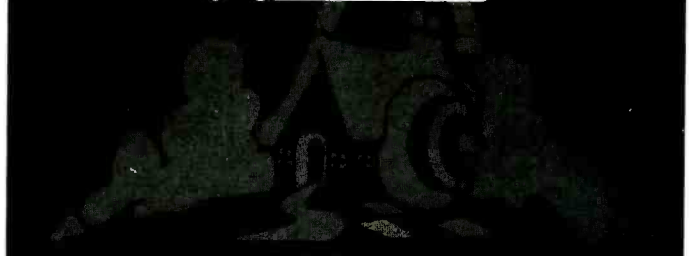

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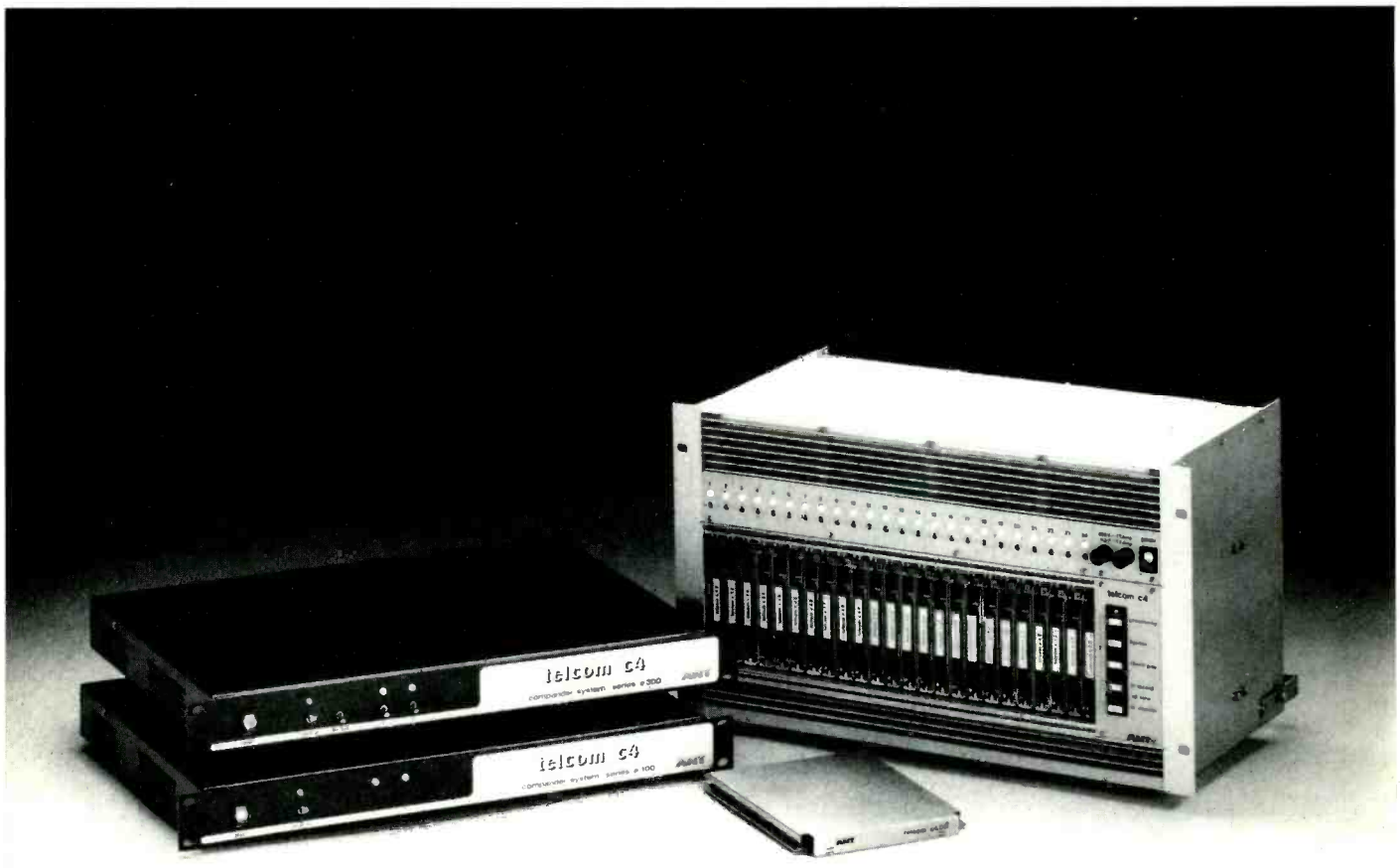

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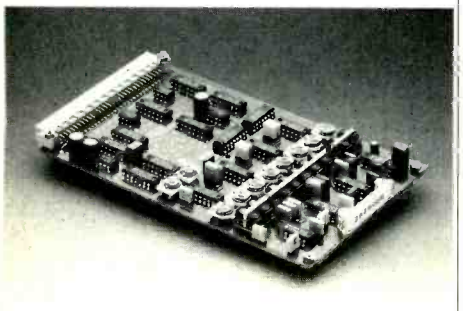

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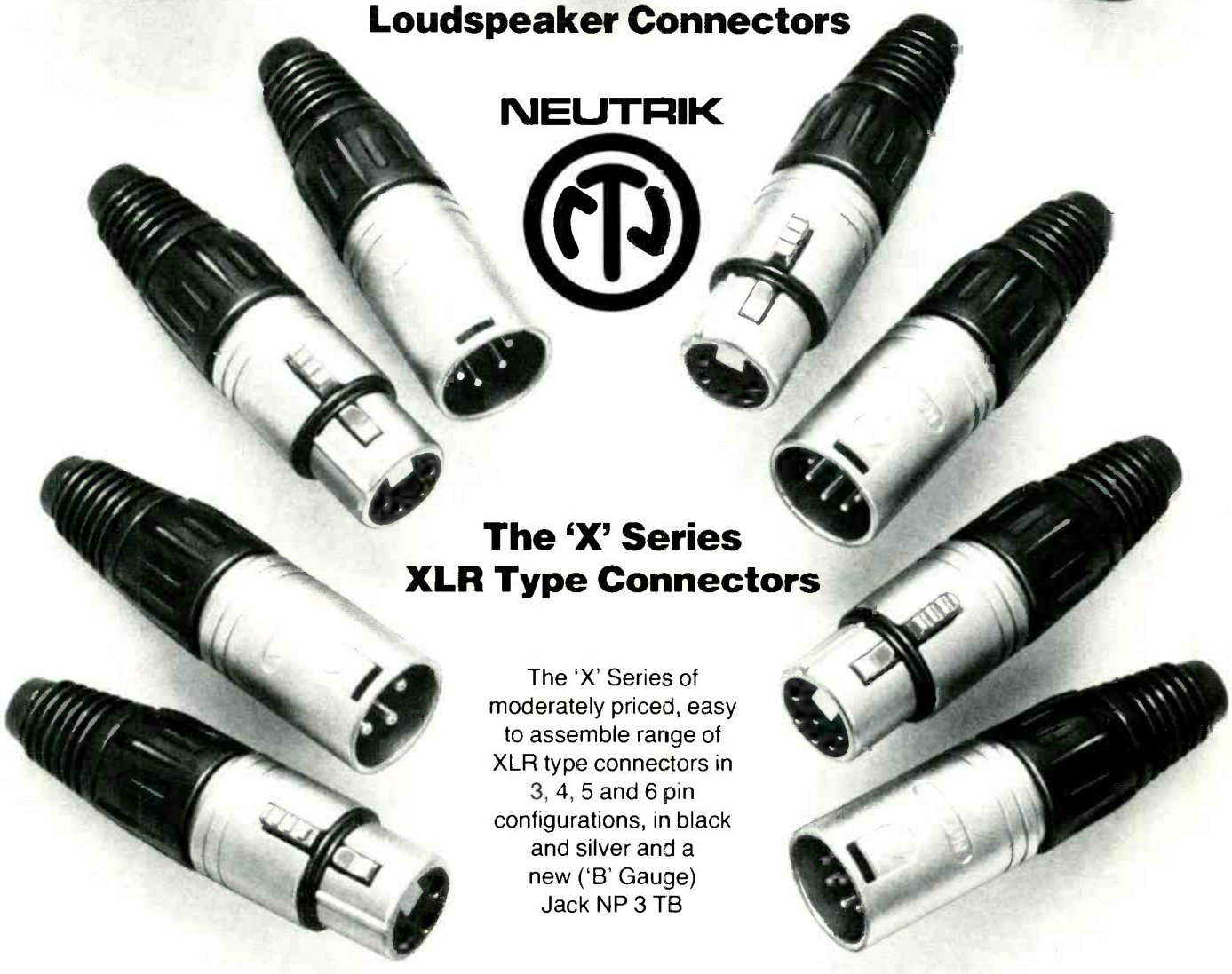

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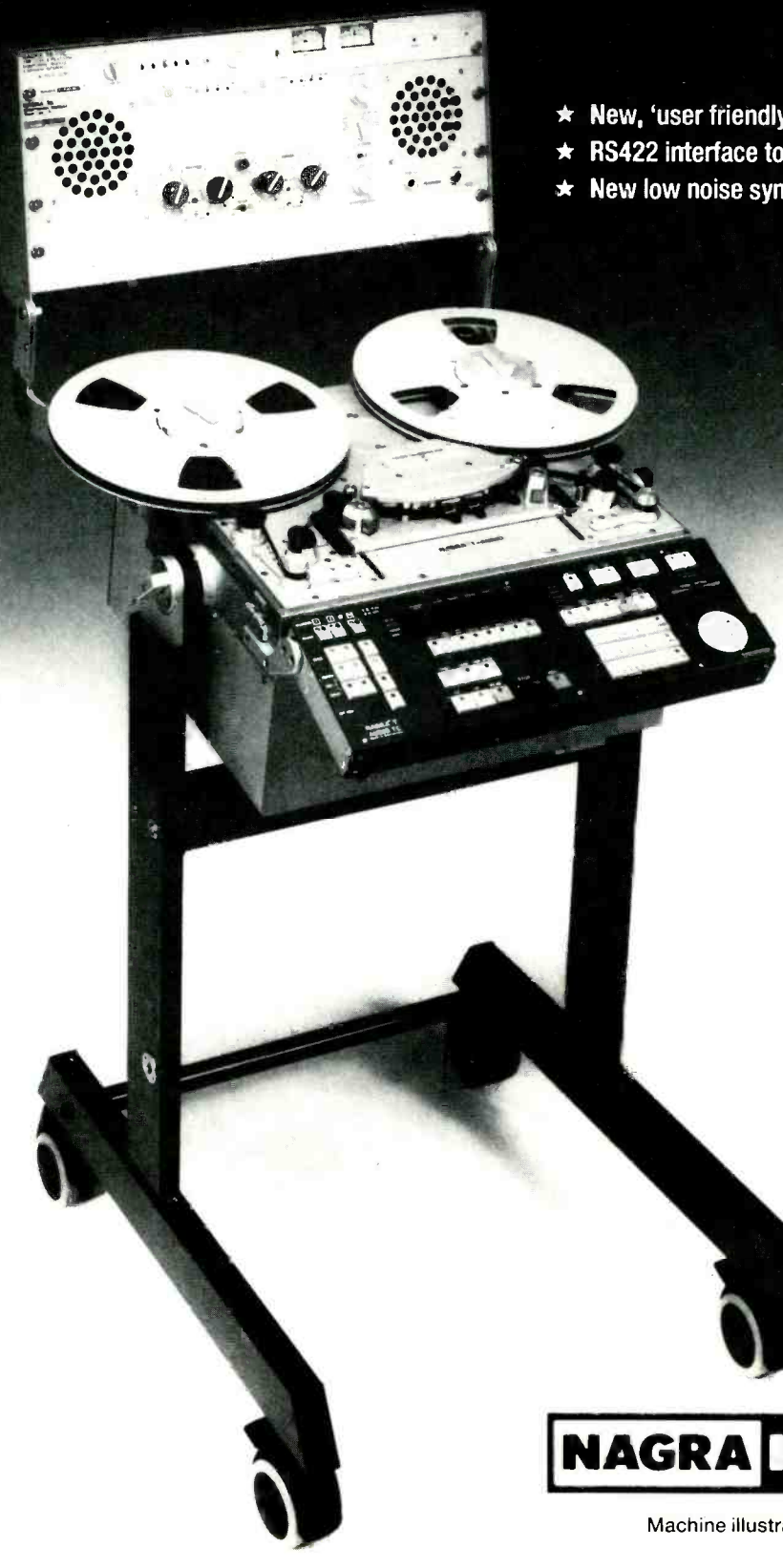

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NEWS

APRS noise at work study

EEC Directive 86/188/EEC has brought about new UK government regulations for the prevention of damage to hearing from noise at work. The APRS has acknowledged its intention to take responsible and positive action in respect of the new regulations, which come into force on January 1st, 1990. They will apply to all workplaces including recording studios.

The APRS has undertaken to carry out a preliminary survey of noise levels and exposure patterns in approximately 10 studios and 10 control rooms, before deciding on further appropriate action. This will act as a pilot study for the assessments of noise exposure that APRS members must make under the regulation.

Sandy Brown Associates have been appointed to advise the APRS on the regulations, to carry out the preliminary survey over a six month period and to set up a noise exposure assessment scheme. Details from those studios in the preliminary survey will be confidential to Sandy Brown Associates.

In addition the APRS will provide information and guidance to members on their responsibilities and on the action they should take. A scheme will be set up for undertaking noise exposure assessments and to co-ordinate the results. Under the regulations each studio must make an assessment of noise exposure taking into account noise to which people may be exposed elsewhere.

In brief

● **DDA**, UK, have once again expanded their factory space, adding two new mezzanine floors. Manufacturing space is thus increased while both office and storage are doubled.

● **Molinare Sound Studios**, London, provided all the technical facilities for PPM's recent *Rockline* series. The weekly programme is transmitted by satellite to the UK independent radio network and broadcast live to over 20 radio stations.

● **Vector Marketing** offer import and distribution services and, for the UK manufacturer, marketing, promotion and sales services and are seeking contracts. Interested UK producers should contact the company at Empress House, 70 Blackstock Road, London N4 2DR. Tel: 01-359 1298. On the distribution side they have been appointed by Renkus Heinz as exclusive distributors of the loudspeaker systems in the UK and Ireland.

● **PAG's** Video Orderline has introduced a product seeker sevice for broadcast and video engineers. The company specialises in products such as connectors, cables, microphones, small mixing units, lights, tripods and associated tooling. The seeker service aims to track down hard-to-find products that professional people do not have the time to find for themselves. Their contact network extends across both the UK and international marketplaces.

● Music Lab have become sole UK distributor for the new *AR2400* 24-track tape recorder from **Studio Magnetics.** Music Lab are at 72 to 74 Eversholt Street, London NW1 1BY. Tel: 01-388 5392.

Contracts

● Harman Studio Systems have won a large contract to supply HTV with £30,000 worth of **Fostex** 3-machine synchroniser and *E2* tape recorders. Other recent Fostex contracts have included *E2* and synchroniser to CAL Videographics and Media Communications, and a 3-machine synchroniser to REL Studios. Tape One's new recording facility Audio One has ordered a Fostex synchroniser for working with 48- and 24-track audio to picture.

● **JBL International** are to install loudspeakers and electronics in Zhong Nan Hai in Beijing following their contract to supply professional products to the Beijing Great Hall of the People. The new order includes three sets of full coverage cluster speakers in the Zhong Nan Hai Theatre for use during official government conferences and summit meeting with foreign heads of state. The equipment is to be supplied through JBL's distributor Advanced Communications Equipment (ACE).

● **Hardware House** have supplied the sound reinforcement system for the Kirov and the Moscow Classical Ballet's performances in Dublin and London. The system comprised 18 Hackney Cabs, four Hackney Sub Bass MkII, controlled by Yamaha 40-channel *PM3000* mixing desks. Other contracts include systems to Holland Park Open Air Theatre, the Old Vic Theatre and the Festival of New Circus at the Jubilee Gardens.

● **Westec** have recently supplied an *LT3000* computer-assisted mixing console to CAP Studio in Milan, Italy—their third Italian installation.

● Yorkshire Television have recently bought a **Studer** *900* series mixing console from FWO Bauch for their new PSC dubbing suite. *900* series have also been delivered to TVS, TSW, Ulster TV, Royal Northern College of Music and Townhouse Studio, London.

● Two new **Sony** *3324A* digital 24-track recorders have been supplied to CBS Studios W1—the first two to arrive in Britain.

● **DDA** have supplied a fifth *D* series console to Chop'Em Out studios in London. The new desk has been installed in a new digital audio editing suite. Meanwhile *AMR 24* sales have included Red House Studios in Denmark, Marcus Studios in London and Expotus have exported consoles to Hong Kong and Iceland. UK orders for *S* series consoles have come from the Royal Shakespeare Company and Sadlers Wells Theatre.

● Mayfair Studios have recently taken delivery of a **Mitsubishi** *X-850* digital multitrack recorder.

● Concert Sound have ordered 80 **BGW Systems** *Grand Touring Amplifiers* from Pro-Britro.

European hard disk survey

SYPHA are planning to conduct a European survey aimed at the hard disk recording market. The group is a recently formed independent digital audio consultancy whose founder members are Yasmin Hashmi and Stella Plumbridge. Hashmi's background includes design engineering for STC, service engineering for Syco and sales engineering for NED products while Plumbridge has worked on a number of research projects including the design of a custom IC for digital audio reverberation.

The planned survey will look at a representative cross-section of the audio market, including non-owners of hard disk systems, in order to analyse how the market is responding to the technology.

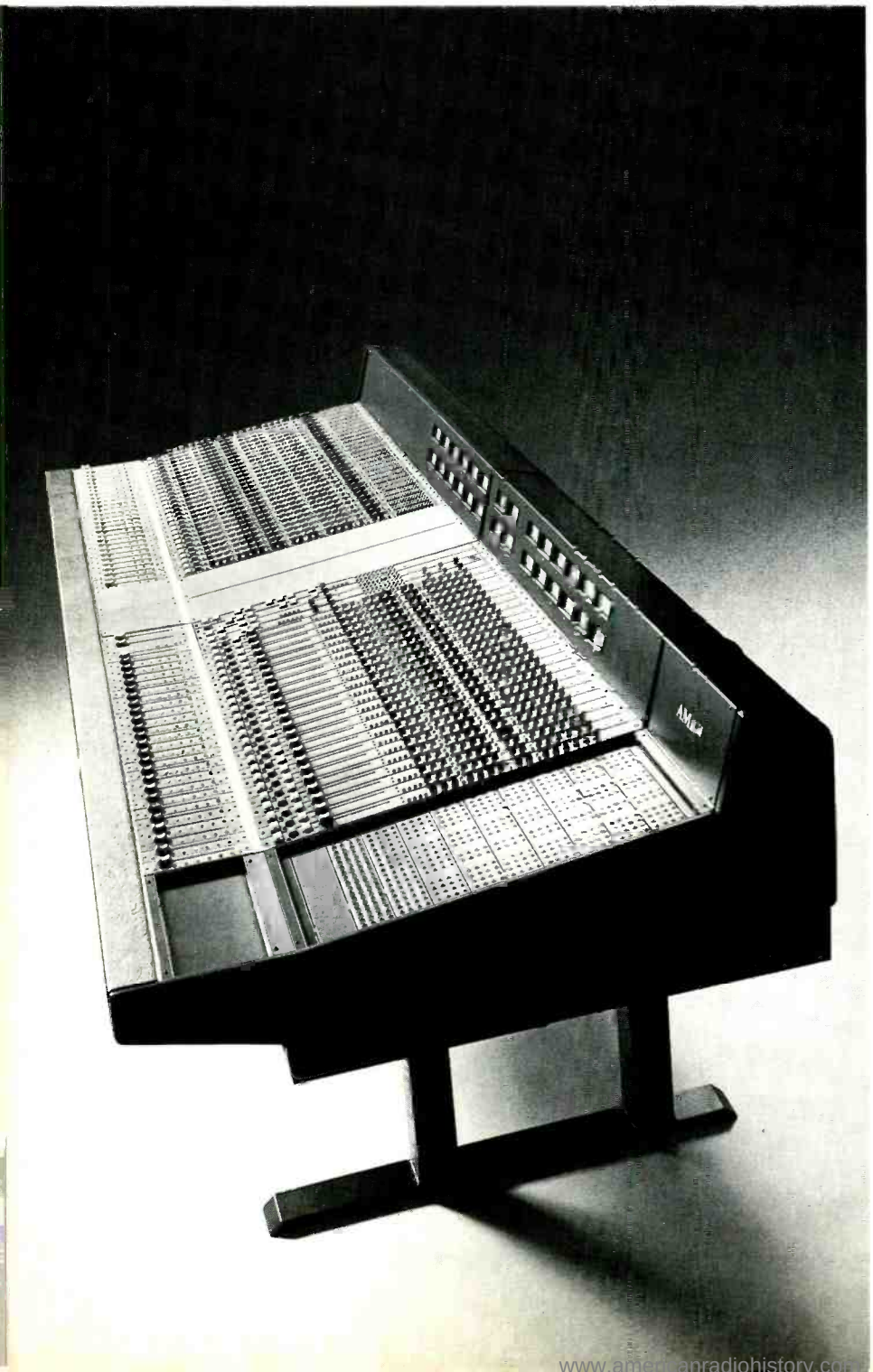
It appears that since the introduction of digital multitracking, the initial mixed response has given way to three main categories of feelings: (1) those who embrace the technology, (2) those who find it unnecessary and (3) the 'don't knows'. SYPHA feel that judging by the number of manufacturers who are now promoting their own hard disk systems the market is obviously developing although the takeup rate of the systems themselves over the past two years (estimated at less than 200 8-track systems worldwide) seems to indicate a general reticence. Although this may seem to indicate that there is not in fact any immediate need for the new technology there may well be a host of other reasons for the slow response.

The SYPHA survey hopes not only to clarify the market's current attitudes towards hard disk technology but also how it would like to see it developing and whether this corresponds with manufacturers' thoughts.

Survey results will be available for a nominal fee. A directory of hard disk system equipped European facilities will also be published.

Those wishing to take part in the survey should contact SYPHA at 216a Gipsy Road, London SE27 9RB, UK. Tel: 01-761 1042.

THE DDA STORY AN EXCLUSIVE



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NEWS

Changes at Stellavox

Swiss tape recorder manufacturer Stellavox has been taken over by Goldmund SA of Geneva, and reorganised into a new company Digital Audio Technologies SA in Neuchatel. A number of new products have also been announced including a new generation of high-tech synchronisers for film and television; a revised version of the *TD9* tape recorder with retrofittable upgrades including improved audio circuitry.

Digital Audio Technologies have also announced that the current model *TD9* will be upgradable to a new generation of digital machines that will be able to operate in the analogue domain simply by exchanging a number of pluggable elements including headblock, tensiometers and electronics. Digital pluggable add-ons will be available for different standards. In this way it will be possible to copy digital to analogue, analogue to digital, analogue to analogue or digital to digital with only two machines.

dbx/ADC and BSR change hands

Carillon Technology has acquired dbx/ADC and BSR Japan Ltd, divisions of BSR International plc.

Michael L Kelly takes over as dbx president, formerly executive vice-president for research, product development and manufacturing for Analog and Digital Systems Inc, Massachusetts.

While dbx marketing, sales and engineering will remain in the Boston area, production and manufacturing facilities will be relocated on the West Coast and other places.

ADC, formerly operated and managed by dbx is now a separate company: Audio Dynamics Corporation, and is moving to San Bruno, CA. dbx engineers will, however, continue to design and engineer products for the ADC and Audio Dynamics brands.

Exhibitions and conventions

October 17th to 19th Entertainment '88, Harrogate, Exhibition Centre, Harrogate, UK. Exhibition organiser Peter Scull may be contacted through Brintex Ltd, 178-202 Great Portland Street, London W1N 6NH. Tel: 01-637 2400.

November 3rd to 6th 85th AES Convention, Los Angeles Convention Center and Los Angeles Hilton, Los Angeles, CA USA.

1989

January 21st to 25th MIDEM, Palais des Festivals, Cannes, France. Contact: Peter Rhodes, International Exhibition Organisation Ltd, 4th Floor, 9 Stafford Street, London W1X 3PE, UK. Tel: 01-499 2317.

February 21st and 22nd Sound '89, Heathrow Penta Hotel, London, UK. Contact: Sound and Communications Industries Federation, Slough, Berks. Tel: 06286 67633. Fax: 06286 65882.

March 7th to 10th 86th AES Convention, Congress Centre, Hamburg (CCH), AM Dammtor, D-2000 Hamburg, West Germany.

April 28th to May 2nd NAB, Las Vegas, USA.

June 7th to 9th APRS 89, Olympia 2, London UK. Contact: APRS Secretariat. Tel: 0923 772907.

June 17th to 23rd ITS Montreux, Switzerland.

October 3rd to 9th World Broadcasting Symposium, Geneva, Switzerland.

October 4th to 7th Broadcast 89, Frankfurt, West Germany.

1990

March 30th to April 3rd NAB, Atlanta, USA.

News from AES

Now that summer(?) has drawn to a close we are beginning our autumn season of events. Our **Lecture Visit to Solid State Logic** at their factory near Oxford originally scheduled for September has been postponed to October 27th. There will be a lecture on their new Digital Console and a tour of their facilities. This event is for Members only, please apply to the Secretariat for further details.

The first lecture in London is on **Fourier Transforms by Peter Kraniauskas** on Tuesday November 15th. This will be followed on Monday December 12th with a lecture on **Loudspeaker Clusters** by Tony Oates of Shuttlesound.

Subjects to be covered early next year will include BBC Radio Data Transmission, Acoustic Modelling, Mixing Consoles, Design of Pipe Organs, Studio Acoustics and Analogue Digitial Converters. Details and dates will appear in due course.

Other major events in the calender are the **85th AES Convention in Los Angeles** between November 3rd to 6th 1988 and the **86th Convention in Hamburg** between March 7 to 10th 1989.

The **1989 British Section Conference** will take place on May 23rd and 24th and is on the subject of **'Planning Sound Reinforcement'.**

The AES publishes many books on audio-related topics as well as Convention Preprints, Standards etc which provide a wealth of technical information. Also two of our members have written books—John Borwick *Loudspeaker and Headphone Handbook* and John Watkinson *The Art of Digital Audio.*

For further details on any of the above or information on joining the AES, please contact: **Heather Lane, AES British Section, Lent Rise Road, Burnham, Slough SL1 7NY. Tel: 06286 63725.**

In brief

● **CBS Studios,** London W1, is planning a new post-production mastering room catering for all multiformat requirements—analogue disc mastering, CD mastering, analogue and digital copying including DAT. The new facility will be dedicated to third party customers.

● **Ampex** Golden Reel Awards have been presented to Art of Noise for their album *Invisible Silence* and Rick Astley for his *Never Gonna Give You Up* album. The studios concerned were Roger Dudley's in Herts and PWL in London respectively. Art of Noise nominated The Woodland Trust and Rick Astley the National Society for the Prevention of Cruelty to Children as recipients of the $1,000 cheque.

People

● **Carlsbro Electronics** have appointed Ivan Boniface to the position of sales and marketing director. Boniface was formerly sales and marketing director of Servis which he took out of receivership and built up into a multi-million pound concern, and before that worked for Unilever and General Signal Corporation of America.

● **WaveFrame Corp** announced the appointment of James S Mays as president and chief executive officer. He was formerly with NBI Inc in several senior management posts. He has also worked for Storage Tek, EMR Computer, Control Data and General Electric. WaveFrame have also appointed Steven Krampf senior vice-president of sales and marketing. He was formerly senior product manager for Ampex Recording Systems Division.

● J M Knopper has recently been appointed general sales manager of **D&R Electronica bv** in Holland. In addition Hans van Giffen has become sales/marketing assistant.

● David Gibbs, assistant managing director of Filmatic Laboratories has been elected president of the **British Kinematograph Sound and Television Society (BKSTS).** He was appointed vice-president in 1982 and in 1985 was awarded an honorary fellowship.

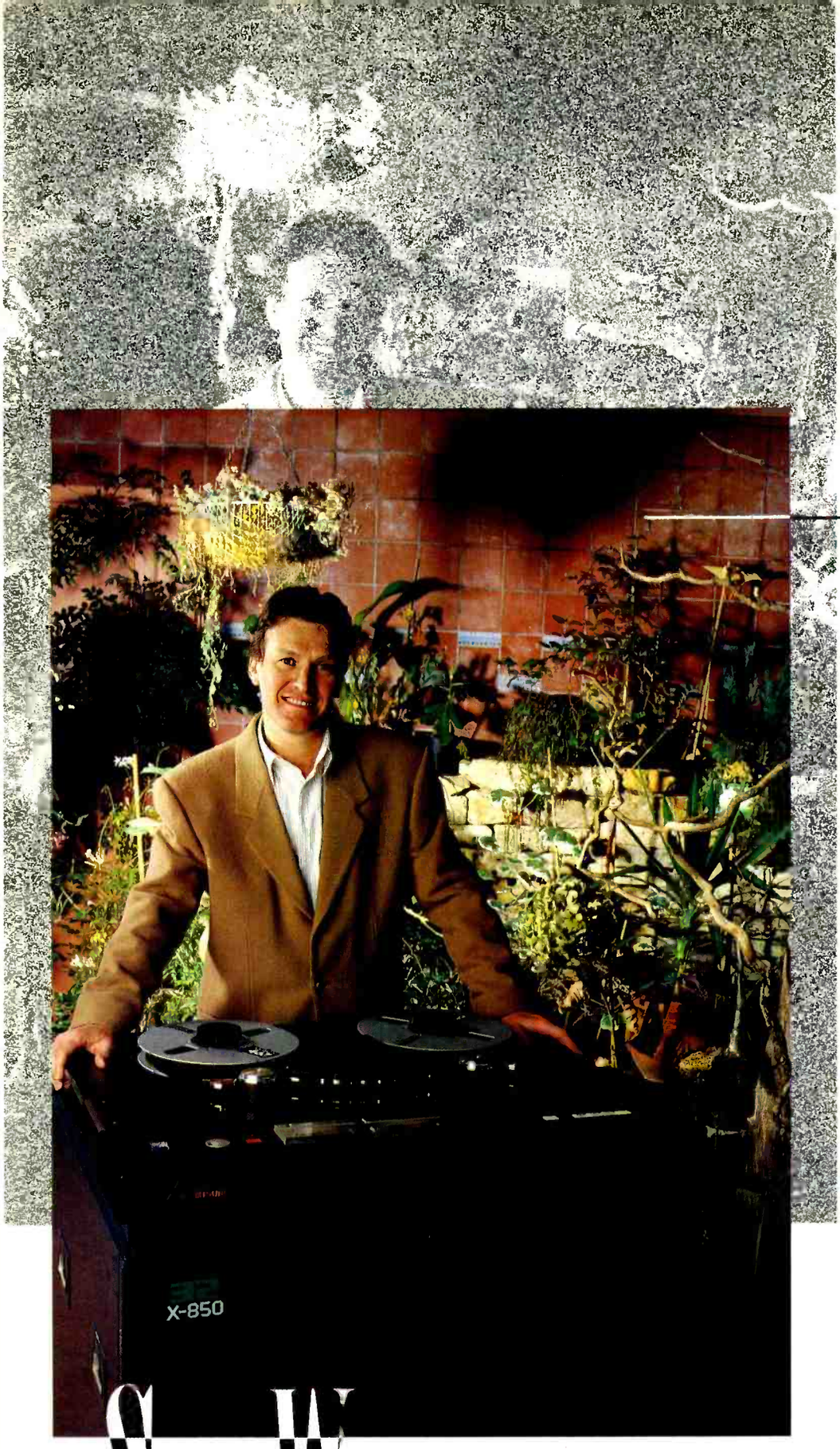
● **Harman UK** appointed Stewart Laing, formerly with Duracell and TDK, as the new marketing manager. He will be responsible for the complete range of audio products distributed by Harman.

Courses and seminars

November 3rd to 6th Reproduced Sound 4, Hydro Hotel, Windermere. Contact: Institute of Acoustics, 25 Chambers Street, Edinburgh EH1 1HU, UK.

November 6th Stereo Sound for Television, BKSTS, London WC1. Contact: Anne Fenton. Tel: 01-242 8400.

November 22nd to 24th Digital Information Exchange, Private Suite, London Zoo. Contact: DIE, PO Box 46, London SW6 7BU. Tel: 01-381 1991.



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NEWS

Live Sound Show, London

The UK Live Sound Show sponsored by European *Pro Sound News* can be thought of as a mini-AES exhibition tailored precisely to the sound engineer involved in music and speech amplification for a live audience. Slanted more towards concert PA and definitely well away from the recording studio, the promise was of displays and seminars all targeted at the live engineer, who normally has to wear out large quantities of shoe leather finding the things that interest him at larger exhibitions.

Several seminars were held over the two days. The chairman for the seminars and panel discussions was Dave Ward of the Gateway School of Music and Recording. David Mellor reports on Day 1 and Terry Nelson on Day 2.

Day 1

● Peter Mapp is an acoustic consultant who specialises in system design and building acoustics. His seminar started with a list of sound system requirements: loudness, frequency response and a need to look at the behaviour in the time domain of the sound system and room as a whole.

Frequency response measurement, though it seems simple, can be a problem area, according to Mapp. His first example showed frequency response plots of a full spectrum test signal, containing several large peaks and dips, measured in different ways. Using a realtime octave-band analyser, the signal appeared fairly flat, to within 6 dB. A ⅓-octave measurement was certainly not flat, with a 13 dB range. It was interesting that there seemed to be little correlation between the octave-band measurement and the ⅓-octave plot. This could be as a result of the different centre frequencies of the bands.

A swept frequency measurement displayed much the same problem, there was little correspondence between octave and ⅓-octave filter responses, and both were different to the realtime results—and all on the same test signal. It took a 1/48-octave analysis to get a result anything like correct.

He showed how a plot of impulse response relates to frequency response. An example plot showed a series of Early reflections that translated into an extremely 'dippy' frequency response. By placing absorbers near the loudspeaker, both the impulse and frequency plots looked very much cleaner.

Mapp continued with a description of the *Techron* TEF (Time Energy Frequency) analyser and showed the unit (via two large video monitors) processing some previously obtained measurements.

Although accuracy of measurement is vital, Mapp also stressed the need for intelligent interpretation of results. It's no use taking TEF plots as gospel truth unless the capabilities of the operator are taken into account.

● There seemed to be a general nodding of heads in the audience towards Mapp's use of complex equipment and advanced techniques. This put the next speaker, Jim Cousins of Cousins Design, in a tricky situation because he was about to introduce a simple frequency response analyser—the *Scanalyser*—which seemed to be everything Mapp was campaigning against.

Cousins' argument was that a simple tool that could be used before a live show would be of considerable benefit. Not as good as a full-blown analysis but useful nonetheless. Cousins said that he considered the sound at an average concert to be poor with respect to that heard on a domestic hi-fi. The problem is not with the equipment in use but the way it is being operated.

The first of three major PA problems described by Cousins is that many venues currently used for concerts are in no way designed for that purpose. There is often no acoustic treatment, and it is sometimes difficult even to get drapes hung up to damp down reflections.

The second problem is that few so-called sound engineers know much about sound, as a physical phenomenon, and they know even less about engineering—the discipline of applied science. Some sound engineers are able to produce good results without any specialised knowledge; others, he feels, are totally out of control.

The third problem is the lack of time and money available for proper analysis.

Cousins explains that the first step towards controlling sound in a room is to pay attention to the arraying of loudspeakers. To aim them at the audience rather than the walls, and to be aware of their directivity patterns. After that, equalisation can help. The problem with EQ is that few concert halls have their room modes set to ISO frequencies, so graphics are of little use. Parametric EQ is better but difficult to adjust by ear.

The *Scanalyser* is a ⅓-octave swept-frequency analyser that is hand-held with a built-in microphone. Cousins claims that this device fills the gap between realtime analysers, such as the Ivie, and more expensive and time consuming techniques such as TEF.

● Steve Dove, a consultant designer for Clair Brothers, started the Sound Engineering section with a talk about large-scale PA systems and why they are so good (?).

Dove also sees three problems for any PA: money, the right equipment, and the right mix engineer. For concerts with audiences of 10,000 plus, these problems tend to have been solved. There remains the acoustic problem.

Dove described how nearly every decent-sized city in the USA has its own 10-20,000 seat arena and how their acoustics tend to be uniformly nasty. But, he says, they are the best places to hear any act.

With a small PA, it is usually easy to get a good sound. There are probably only four components to the speaker system (two bins and two horns) so any problems with how the output of these cabinets combines should be minimal. Medium-sized PAs with more speaker components have more problems with the way their outputs interact. Lobes tend to be produced in the directivity pattern, which means that sound is not firing out in equal quantity in all directions. Some sections of the audience are suffering from too much level, some from too little.

For a large PA system, Dove maintains that there are so many loudspeaker components, and so much interaction between them, that such a multiplicity of lobes is created that they tend to fill in any nulls and average out.

Dove continues by describing, with the aid of diagrams, how if several speakers are placed in a straight line, they will become very directional. This directionality increases with the size of the array and with frequency. Low frequencies need a very large array to get any directional effect. Many of the arenas in his experience have domed roofs, with long RTs in the roof volume. A large PA system means a large physical size and therefore good low frequency directivity. The problem is solved.

● Terry Nelson is an operator of the medium-sized PAs Dove describes as having problems. But in the 200 W to 16 kW range there is a large requirement for systems of this type, and there is a difference between a medium-sized PA operated well and one operated badly.

Nelson is aware that multiple loudspeaker systems need careful arraying. Since he uses a bin and horn system, rather then the shaped-to-be-arrayable unitary systems which are now becoming popular, the time taken to set up precisely the system for each concert could be excessive.

The answer is to hire a warehouse and perhaps a *Techron* and operator for two or three days, and to align the system carefully so that the directivity patterns mesh together well. Then metalwork can be made up so that the system is very quick to erect and almost arrays itself.

As an aside, Nelson pointed out that if delay lines are used to align components of a loudspeaker system in time, different delay times will be necessary according to the air temperature and humidity. If physical spacing is used to bring the units into alignment, then they will all shift together.

Nelson went on to describe some of the interesting problems he has come across, such as bands wanting their studio engineers to mix their live sound—even though they have no PA experience. He finished by offering his own solution to room analysis: watch how the levels on a ⅓-octave realtime analyser die away. Any bands that hang on are the problem areas.

● It was apparent that there is much that engineers and designers want to talk to each other about. The panel discussion on mixing console design lasted around two hours and hardly got off the subject of whether muting should be controlled by manual switching or by software. A conclusion reached by the end was that the manufacturers were trying to give engineers what they want but if engineers keep asking for the world on a console, then they shouldn't be surprised when some of the functions have to be controlled by a microprocessor. The debate will surely continue.

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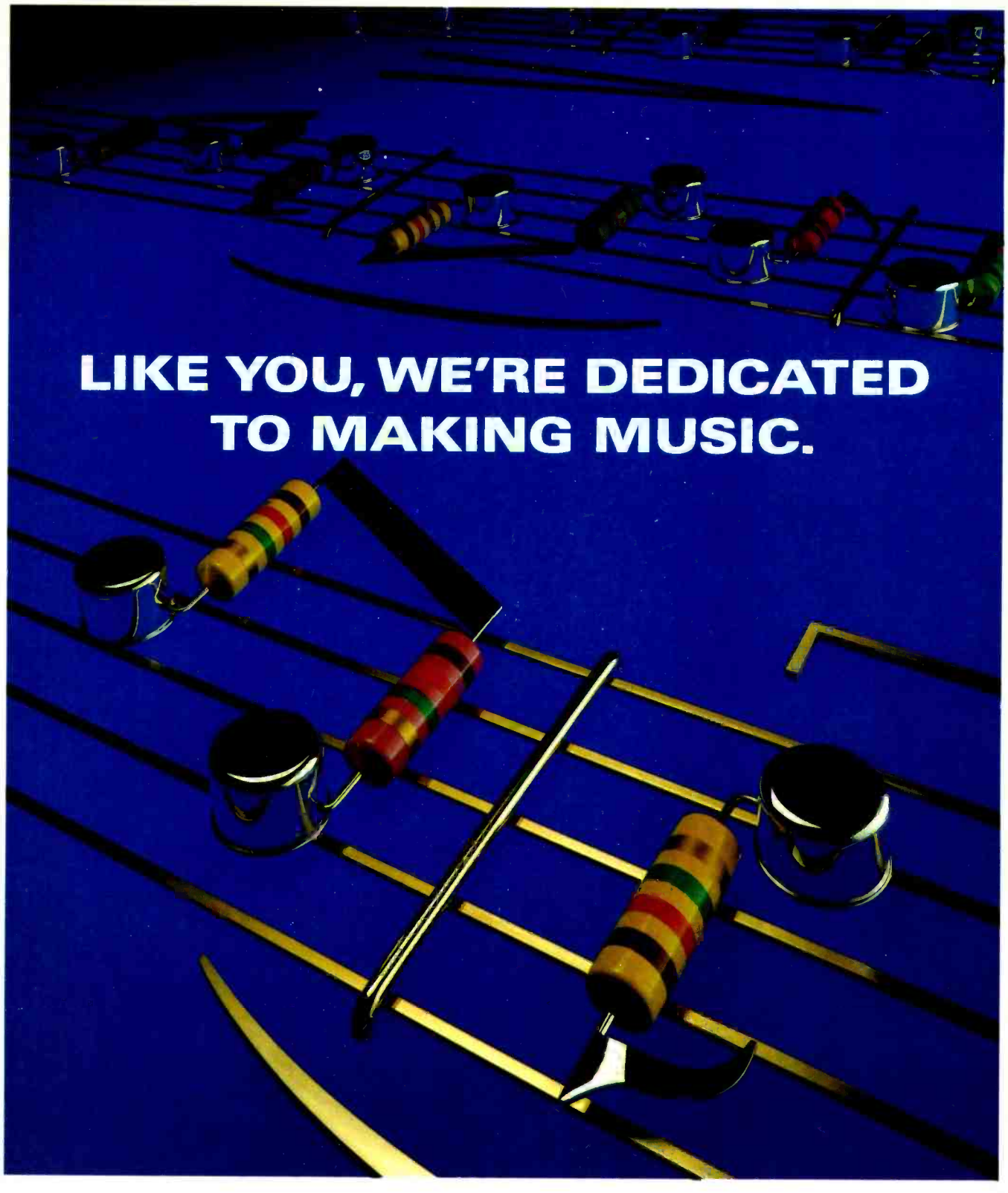

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PIONEERS IN AUDIO ACCESSIBILITY

NEWS

Day 2

The second day of seminars was divided into four sections: the rental market, education, amplification and loudspeaker and enclosure design.

• The rental market session began with Kevin Swain, Geoff Eaton and Colin Duncan talking about the special needs of the conference sector, encompassing conferencing, product launch presentations, fashion shows, etc.

The key word here was probably 'pre-production', ie find out as much as you can about the gig beforehand. What will the decor be? Does the client really have a firm idea of what he wants and is it possible? (Even if it isn't, you still have to work miracles.) Try to find out what the working conditions will be; can you get enough intelligible level to cover the air conditioning/heating blowers?

Steve Dove put in a second appearance to air several thoughts on large-scale touring and though he feels that the market itself has reached a plateau, the future is nonetheless looking very exciting. He ran through a brief history of the tour market and the development of equipment, showing how the major companies of today have risen to importance by working with major acts. His main word of advice to newer companies—or small ones struggling to get into the top league—was "Find your rising act now!"

Dove then made a brief foray into digital audio for live sound together with future control systems that reflected more the human interface aspect and that maybe 'less is more'.

• Ken Walker (Sound & Communications Industries Federation) showed a video outlining the Government plan for vocational standards for industry and warned that it was up to 'the industry' to represent itself properly and lay down a set of qualifications (a difficult task for something where results are subjective)—"otherwise somebody outside will do it for you".

• The amplification section started with an outline of the various types of technology employed in amplifier design given by Ben Duncan and Jerry Mead. This led to a panel discussion between a large number of amplifier manufacturers' representatives on the different aspects of their designs together with energetic interventions from the floor.

• The final section—loudspeaker and enclosure design—opened with the history of the development of the Turbosound system, which was explained (with drawings and blueprints) by Tony Andrews and John Newsham. This led to a detailed description of the Turbosound cluster system and its applications in different environments.

Gary Margolis of JBL went on to talk about the "necessary evil of the compression driver" pointing out that if you want the output, you have to use it. Latest developments in compression driver technology were then discussed with particular reference to the new JBL *2450J*, which uses a neodymium magnet structure and other innovative technology such as a very advanced phasing plug for smooth response throughout its range.

Dave Martin of Martin Audio followed on with a presentation of his new *F2* system. This revolves around two cabinets of equal size—a bass cabinet and a mid/high enclosure—and is interesting in that the mid/high is a rack system enabling different horns to configure the final array as required, eg some cabinets for short and medium throw and others for long throw.

John Dodson of Bose presented their new acoustic cannon for bass frequencies and the *Acoustimass* powered speaker system. Basic principles were outlined together with types of installation.

Nevertheless the final panel discussion between the manufacturers/representatives of speaker systems was still very lively and a packed audience was there to listen to them 'fight it out' as well as provide a constant stream of input and questions. Subjects that arose included point source arrays, phasing and systems with controllers.

The latter evoked quite a bit of discussion, especially on what degree of control should be afforded the engineer. A statement from the floor postulated that the sound system in a live situation was there to provide the interface between the musicians, event, etc, and the audience and that, above all, it should be musical.

• The seminars were brought to a close by the chairman, Dave Ward, who thought that the event had served its purpose by stimulating interest.

Considering the timing and short lead-in to the event, the seminars at the Live Sound Show have to be qualified as a success, both from the point of view of people who were there and those that couldn't make it but would have liked to. There is a definite need for a dedicated event for the live sound industry as opposed to it being a part of the studio-orientated shows.

PMI acquires SSM

SSM Audio Products formerly Solid State Micro Technology for Music Inc has been acquired by Precision Monolithics Inc of Santa Clara. SSM designs and markets proprietary analogue ICs to generate music and to process audio.

The alliance is said to be mutually beneficial affording greater financial and manufacturing resources to SSM while providing PMI with an entry into the professional audio IC market. SSM's high end consumer circuits will lead market development with PMI's related products in new designs. The acquisition brings with it a significant product line, patents and established market position in professional audio ICs.

The new company is headed by vice-president, new product development and marketing, Donn Soderquist to whom SSM founder Ron Dow and partner Dan Parks now report. Ron Dow joins PMI as staff director, design engineering, responsible for design and development of audio products. Dan Parks' responsibilities are for marketing management for the SSM product line which currently has applications in synthesisers, organs, mixing consoles, studio equipment and broadcast systems.

Agencies

• **Brüel & Kjaer** have appointed distributors in France and Ireland. Lazare Electronics, 23 Rue Rabelais, 93400 Saint-Ouen, Paris, will be handling French distribution. Tel: 40 10 09 00. Fax: 40 10 18 10. In Ireland the new representative is CTI Ltd, Grand Canal House, Lower Rathmines Road, Dublin 6. Tel: 01 96 68 66/01 96 64 64.

• **HH Electronics** have named three new distributorships: CGD Videosound spa of Milan is exclusive distributor of professional products for Italy; SKS Communications represents all HH products in the Republic of Ireland from their premises in Dublin; and Scottish professional product representation is now handled by Clyde Electronics in Clydebank.

• **ARX Systems,** formerly Audio Research Technology of Australia have announced the following distributors: ARX Systems, Victoria, Tel: 03 555 7859; Panabrook P/L, New South Wales, Tel: 02 85 7163; Island Agencies, North Queensland, Tel: 070 31 1717; Australian Audio & Lighting, South Australia, Tel: 08 223 6282; Sounds HQ, Western Australia, Tel: 09 328 7121; Complete Festivals, Tasmania, Tel: 003 91 2277; Live Sound Ltd, New Zealand, Tel: 64 09 78 9863; Tai Sheng Trading, Taiwan.

• Studio TimeLine has been appointed by **Alphaton** and **Thum+Mahr Audio** to distribute the Crystal ECD 8-channel denoiser and the latest *Optifile II* automated mixing system respectively. Contact Tim Thompson, Studio TimeLine, Lamb House, Church Street, London W4 2PD. Tel: 01-994 4433. Fax: 01-994 9522.

• **DDA** have appointed Trans European Music in Holland to represent the DDA range of consoles in the Benelux countries: Trans European Music may be contacted by telephone on 76 812 872. The New Zealand territory is being represented by PROTEL, NZ, Tel: 4 854 874.

More Sky channels

In preparation for the November 8th Astra satellite launch from French Guyana, the British operator of Sky Channel, International Newspapers, has announced a new group Sky Television representing all the company's TV interests.

News International has leased four channels on the 16-transponder Astra satellite via British Telecom International. On these they will present Sky Channel—an upgraded version of the existing family entertainment channel; Sky Movies—free films for the UK and Ireland; Sky News—24-hour news; Sky Radio—non-stop adult contemporary hit music, and Eurosport, a multilingual sports channel, which is a joint venture between News International and 16 members of the European Broadcasting Union, including the BBC.

To cater for all this, a new television centre is being constructed at Centaurs Business Park in Osterley, West London. These include four television studios, four transmission suites, two audio studios and 15 edit suites. Sky Television News will have a self contained area including studios.

Test signals are due for transmission on Astra in December, and the channels proper will be launched in February, supported entirely by advertising. It is anticipated that manufacturers such as Amstrad plc will be marketing 24 and 28 inch receiver dishes at a starting price of £199 including VAT.

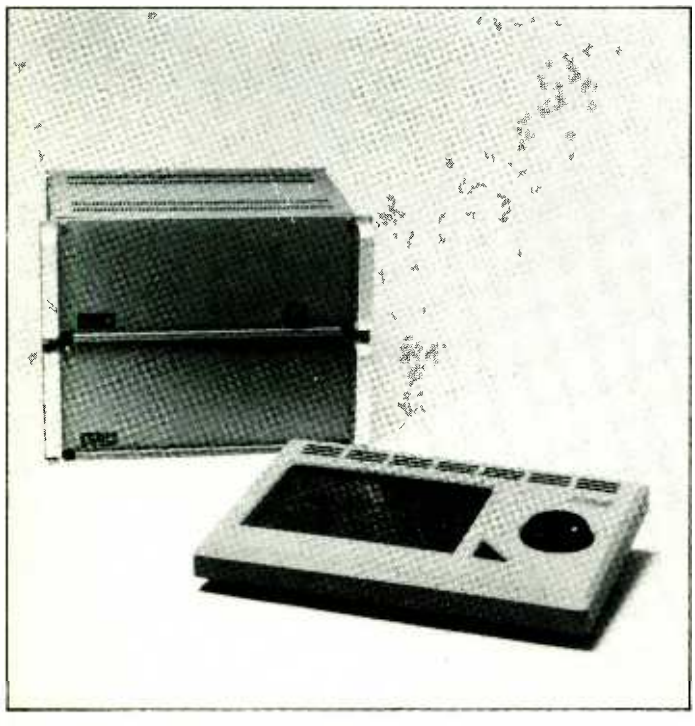
NEWS

Real World Research Audio Tablet random access editor

The Real World Research *Audio Tablet* is a random access audio editor, providing two channels of storage/editing in linear 16 bit format at 48, 44.1 or 32 kHz. Analogue ins and outs incorporate Apogee anti-aliasing filters and 4× oversampling DACs, while both AES/EBU and SPDIF2 digital interfaces are provided. The unit reads and generates SMPTE and a MIDI interface is fitted. The basic *Tablet* gives an hour of stereo recording, expandable to six hours, and audio and edit data may be archived on to a high-speed 2 Gbyte streamer.

Real World Research's approach has been to design a dedicated rather than general-purpose device and the *Tablet* uses a large pressure-sensitive touch screen, dividing the editing process into a series of 'virtual' panels and incorporating tactile and aural feedback to maximise operator confidence and operating speed. RWR claim that the unit can perform a cut edit in about half the time it takes to make a razor-blade edit. Additional editing applications will be dealt with by new application software packages from RWR, with new sets of virtual panels to fit the application.

Real World Research, Bath, Avon, UK.
UK: Syco Systems, 20 Conduit Place, London W2. Tel: 01-724 2451. Fax: 01-262 6081.



API model 4032 console

API have installed their first new console for five years at Bias Recording Studios, Springfield, VA. Custom designed for maximum versatility in split format, it has 48 inputs with 32-channel monitoring, and up to 14 effects sends per channel with stereo linking facilities. The circuitry is discrete throughout, making use of API's *2520* op amp and the Hardy *990*, which API say allows various choices of routing for different tonal qualities.

The console incorporates all seven of API's equalisers, which are movable to any location so that specific modules can be selected for each instrument. API claim a good noise performance thanks to a new configuration of stereo busing, and a high clip level of +30 dBm; future consoles will use API's new high voltage version of the *2520* op amp to give clip levels in excess of +32 dBm.

API Audio Products Inc, 7953 Twist Lane, Springfield, VA 22153, USA. Tel: (703) 455-8188.
UK and Europe: Syco Systems Ltd, 20 Conduit Place, London W1. Tel: 01-724 2451. Fax: 01-262 6081.

Wembley MC1 Minicube

The Wembley Loudspeaker Company are producing a small 2-way loudspeaker designed for reference monitoring, the *MC1 Minicube*. With a claimed power handling of 100 W and a 40 Hz to 20 kHz frequency response, it measures only 18 cm in each direction, and although the standard finish is black other colours are available to order. A B&K plot supplied with the leaflet shows it to have a very similar frequency response to that of the established BBC-designed *LS3/5A*.

Wembley Loudspeaker Co Ltd, 75 Jeddo Road, London W12 9ED, UK. Tel: 01-743 4567.

ARX Systems D.I.-6 and SS 600 VC

The first of two new items from ARX Systems (formerly ART Australia) is the *D.I.-6 DI* system. This is a mains powered 6-channel active DI box with the added feature of a simple on-board mixer producing a single mono output. Each channel has its own level control giving adjustment from fully off to +15 dB of gain and an earth lift switch. Another unusual feature is a headphone output, which ARX describe only as 'LOUD'. Obvious applications suggested by ARX include multiple keyboard setups and PA use.

Also new from ARX is a scaled-down version of their *SS 1200 VC* power amp, the *SS 600 VC*, giving 200 W/channel into 8 Ω.

ARX Systems, 33 Advantage Road, Highett 3190, Victoria, Australia. Tel: (03) 555 7859.

BEFORE: AFTER:

12 BIT

Resolution:	12 Bit
Noise Level:	-86 dBV
Sampling Time:	11.7 sec. @ 16 kHz Bandwidth
Bandwidth:	80Hz - 16 kHz (-3dB)
Linearity:	20 dB @ 80Hz-16kHz

16 BIT

Resolution:	16 Bit
Noise Level:	-101 dBV
Sampling Time:	11.7 sec. @ 18kHz Bandwidth
Bandwidth:	18Hz - 18 kHz (-3dB)
Linearity:	7 dB @ 18Hz-18kHz

In a studio, 12-bit samplers are often just not good enough. The sampler that was a studio standard when you bought it a few years ago isn't up to what you or your clients demand.

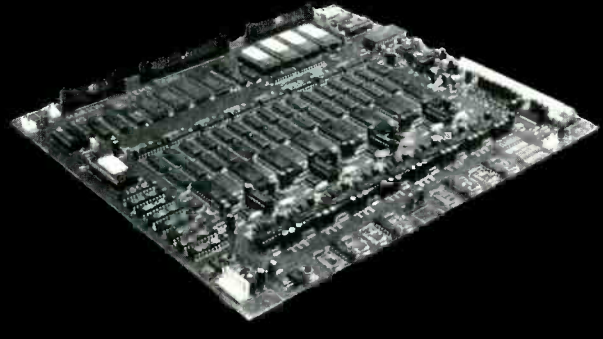
You've been thinking about getting a new sampler, but a 16-bit machine is still a big investment.

Also you don't want to throw away all the samples you made because the latest model doesn't accept the disks.

Tom Oberheim's new company took the Akai S-900* apart and designed an easy-to-install upgrade circuit, turning it into a stunning 16-bit sampler.

Now, the S-900* has better-than-CD sampling quality at an upgrade- price much lower than even an 8-bit machine.

And, if someone comes along with regular S-900* sounddisks, you can still play them. They will even sound better than before!



The Difference: MS 9-C from Marion Systems

Distributed in Europe by:
Synton Electronics B.V.
Computerweg 1
3606 AV Maarssen
Netherlands
Tel: 31-3465-67424 Fax: 31-3465-73330

* Akai and S-900 are registered trademarks of Akai

NEWS

Ariel SYSid test instrument

Now available following final Beta testing is the *SYSid* acoustic testing system, a software package and hardware interface from the Ariel Corporation running on IBM PCs and compatibles. The hardware is Ariel's *DSP-16* Data Acquisition Processor, giving two channels of 16 bit PCM data at up to 50 kHz sample rate for the software to analyse.

Available test signals comprise chirps, impulses and tones, and the analysis results from the system under test include transfer function (magnitude and phase), distortion, impulse response, noise floor and so on, all under detailed user control. Results are shown in graphic screen displays, and hard copy can be printed; data can also be saved on disk. Suggested applications include transducer testing and analysis, room acoustics, research, filter design, A/D converter testing and impedance measurements.

Ariel Corporation, 110 Greene Street, Suite 404, New York, NY 10012, USA. Tel: (212) 925-4155. Fax: (212) 966-3981.

Steinberg CCR

Steinberg have now launched their *Computer Controlled Recorder*, a hard disk-based digital audio recording system. A 360 Mbyte disk provides 30 minutes of stereo recording at 44.1 kHz sampling; 32 and 48 kHz are also provided. AES/EBU digital ins and outs are fitted, and analogue modules offer a choice of 16 or 18 bit resolution, with 4× oversampling in the D/A modules. The basic unit is a 2-channel/stereo module, and up to eight of these may be used together providing 16 channels or eight stereo pairs. The host computer for the system is a *Macintosh II*, giving a graphically-orientated user-interface for controlling all parameters. These include sound handling functions such as Move, Copy, Start and End points, and other parameters such as volume and time correction, all of which are manipulated graphically on-screen. Steinberg's suggested applications include post-production, recording studios, jingles, radio work and CD mastering.

Steinberg Digital Audio GmbH, Billwerder Neuer Deich 228, 2000 Hamburg 28, West Germany. Tel: 040 78985 16/66. Fax: 040 78985 14.
UK: Evenlode Soundworks, The Studio, Church Street, Stonesfield, Oxford OX7 2PS. Tel: 099389 228.

Allen & Heath Saber mixing consoles

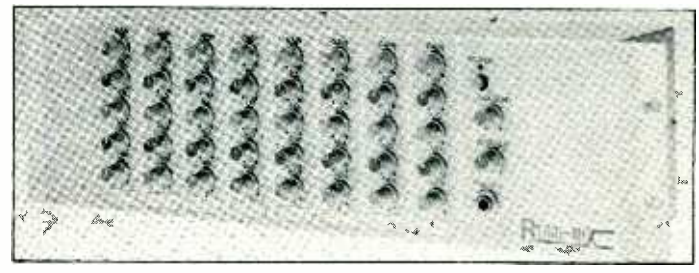
Allen & Heath follow their successful *Sigma* consoles with a compact range of desks known as the *Saber* series, aimed at commercial and large home studios and live sound applications. Three frame sizes are offered, with module options for custom configurations, and an important feature is a mute processor system enabling all input and monitor mutes to be controlled and recorded via MIDI. EQ is 4-band, with overlapping swept mid sections and switched-range HF and LF controls.

Allen & Heath, 69 Ship Street, Brighton BN1 1AE, UK. Tel: 0273 24928. Fax: 0273 821767.
USA: Allen & Heath, 5 Connair Road, Orange, CT 06477. Tel: (203) 795-3594. Fax: (203) 795-6814.

Nomad Reddi-Mix

Targetted at the keyboard mixer market, the Nomad *Reddi-Mix* is a 3U rackmount mixer with outboard PSU. Its format is 8/2, expandable to 16/2, and each channel includes mic and line inputs, 2-band EQ, pan, aux send and input gain control. Nomad claim the microphone input circuitry is tailored to handle both low and medium microphone impedances.

Nomad Ltd, North Road Farm, North Road, Wendy, Nr Royston, Herts SG8 0AB, UK. Tel: 0223 207770.



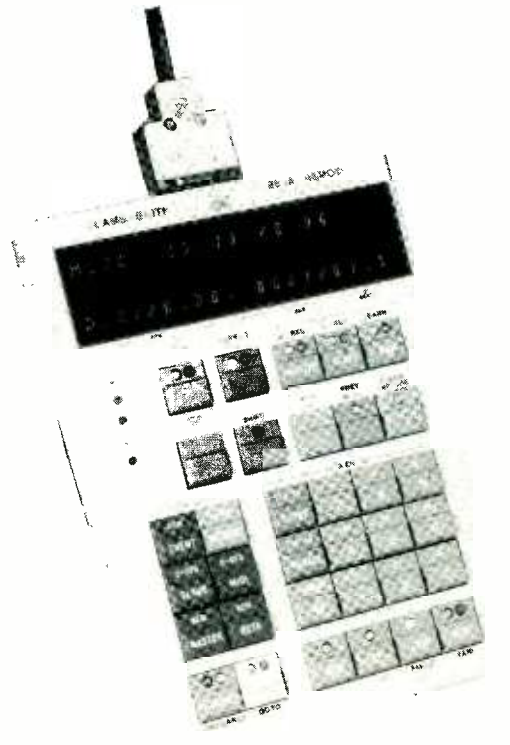
Adams-Smith Zeta-Remote autolocator/controller

The Adams-Smith *Zeta-Remote* autolocater/controller for the *Zeta-Three* audio/video/MIDI synchroniser is now fully available, offering facilities aimed at composers, small studios and those involved in music scoring and mixing to picture.

The unit can control up to four *Zeta-Three* synchronisers and adds new functions to the system. It contains a 100-point autolocator featuring tach-only autolocation, and displays and locates in both bars/beats and timecode. Existing *Zeta-Three* functions are extended by the addition of a data entry keypad and dedicated display keys and by doubling the existing alphanumeric display capabilities.

Additional features include an independent memory, which stores 100 edit set-ups, six user-programmable function keys and a tempo map beeper. The unit connects to a *Zeta-Three* via a single small-diameter cable.

Adams-Smith, 34 Tower Street, Hudson, MA 01749, USA. Tel: (508) 562-3801. Fax: (508) 568-0404.
UK and Europe: Adams-Smith UK Ltd, Barnwell House, Barnwell Drive, Cambridge CB5 8UJ. Tel: 0223 410104. Fax: 0223 215293.



THEN THERE WAS LIGHT.

For years, inventors have been trying to marry the touch and subtlety of a grand piano, with the range and versatility of electronic sound.

The most difficult problem was in the keyboard; any interference with the sensitive balance of key and hammer, and the effect on the "touch" was immediately noticeable.

Until Yamaha had the idea of using light sensors.

Three tiny fibre optic light beams detect which key is being played, and with what expression.

So, without physically interfering with the keyboard, and without delay, the light sensors can send control messages to a synthesizer or tone module.

Giving you access, through MIDI, to thousands of electronic sounds and effects, which you can select with the flick of a switch.

This innovation opens up a whole new world for the composer, musician and performer.

A world of new sounds for your palette, together with the acoustic richness and delicate touch of the renowned Yamaha C3E or C7E Grand Piano.

The Yamaha MIDI Grand is more than a new piece of technology.

It is a virtuoso instrument, with enormous potential. Its influence will be significant.

YAMAHA

Grand piano meets electronic sound. Fibre optic light sensors scan every 4 micro-seconds. Access to MIDI with four out-sockets and one in-socket.

The Yamaha MIDI Grand Piano will be in concert near you soon. Send the coupon for more details and a free leaflet. Send to: Yamaha-Kemble Music (UK) Limited, Piano Department, Mount Avenue, Bletchley, Milton Keynes, MK1 1JE.

Name:_____ Address:_____

SS 11/88

NEWS

In brief

• The **AMS** *DMX 15-80S* range of pitch changer/samplers has been redesignated *S-DMX* to identify the introduction of new extended memory cards of 6.5 and 13 seconds, which will be used in all future systems. The basic system configuration will now be 6.5 seconds stereo as opposed to the present 1.6 on the *DMX 15-80S*, with a new maximum memory of 52 seconds. A MIDI interface is now supplied as standard.
AMS Industries plc, AMS Industries Park, Billington Road, Burnley, Lancs BB11 5ES, UK. Tel: 0282 57011. Fax: 0282 39542.
USA: AMS Industries Inc, 3827 Stone Way North, Seattle, WA 98103. Tel: (206) 633-1956. Fax: (206) 547-6890.

• In response to repeated requests, **Trident Audio** USA have introduced patchbay versions of the series *24* consoles. A 364-point TT patchbay is available on the 28-input frame and a 468-point bay on the 36-input frame. Both use Mosses and Mitchell all-metal patchbays.
Trident Audio Developments Ltd, Trident House, Rodd Industrial Estate, Govett Avenue, Shepperton, Middx. TW17 8AQ, UK. Tel: 0932 224665.
USA. Trident Audio USA, 2720 Monterey Street, Suite 403, Torrance, CA 90503, USA. Tel: (213) 533-8900.

Alpha Audio PKA

Alpha Audio's *Boss* system is now enhanced by the addition of the *PKA* remote keyboard. Essential system functions are provided and any other keystroke or macro can be transferred from the main *Boss QWERTY* keyboard. All 44 keys are programmable and a set of snap-on keycaps is provided to cover the most common functions. Also provided is a jog knob giving subframe accuracy. The operating software for the *PKA* keyboard has been incorporated in *Boss* software since version 4.14 so the unit should be immediately usable with existing *Boss* systems.
Alpha Audio Automation Systems, 2049 West Broad Street, Richmond, VA 23220, USA. Tel: (804) 358-3852. Fax: (804) 358-9496.

E-mu Systems EIII rack

The recently-introduced *EIII* keyboard from E-mu Systems is now joined by the *EIII* rack, functionally identical but in a 5U rackmount format. The *EIII* is a musical instrument, post-production workstation and digital effects processor, and incorporates 16 bit stereo sampling, up to 8 Mbytes of RAM giving 135 seconds sampling time, and a 16-track sequencer with an SMPTE cue-list mode, cut-and-paste music editing, segment/song organisation, parametric quantisation and full MIDI support. The system will operate with 300 Mbyte hard drives and Optical Media's CD-ROM; a stereo waveform editing package from Blank Software is on the way and the *EIII* sound library on floppy disk already comprises over 180 disks.
E-mu Systems Inc, 1600 Green Hills Road, Scotts Valley, CA 95066, USA. Tel: (408) 476-4424.
UK: Syco Systems Ltd, 20 Conduit Place, London W2. Tel: 01-724 2451. Fax: 01-262 6081.

Neve Necam high resolution fader

Neve are now offering a new high resolution fader system for *Necam 96*, giving a doubling of resolution compared with previous *Necam 96* systems. Neve claim the improvement results in smoother fader replay, more accurate fader repositioning, better matching of stereo channels and more accurate group replay. The fader is available on new systems and as a simple retrofit to existing systems, and related software upgrades include compatibility of old mixes with the new system and automatic conversion to the new format when loaded into *Necam*.
Neve Electronics International Ltd, Cambridge House, Melbourn, Royston, Herts SG8 6AU, UK. Tel: 0763 60776. Fax: 0763 61886.
USA: Rupert Neve Inc, Berkshire Industrial Park, Bethel, CT 06801. Tel: (203) 744-6230. Fax: (203) 792-7863.

Time Machine audio processor kits

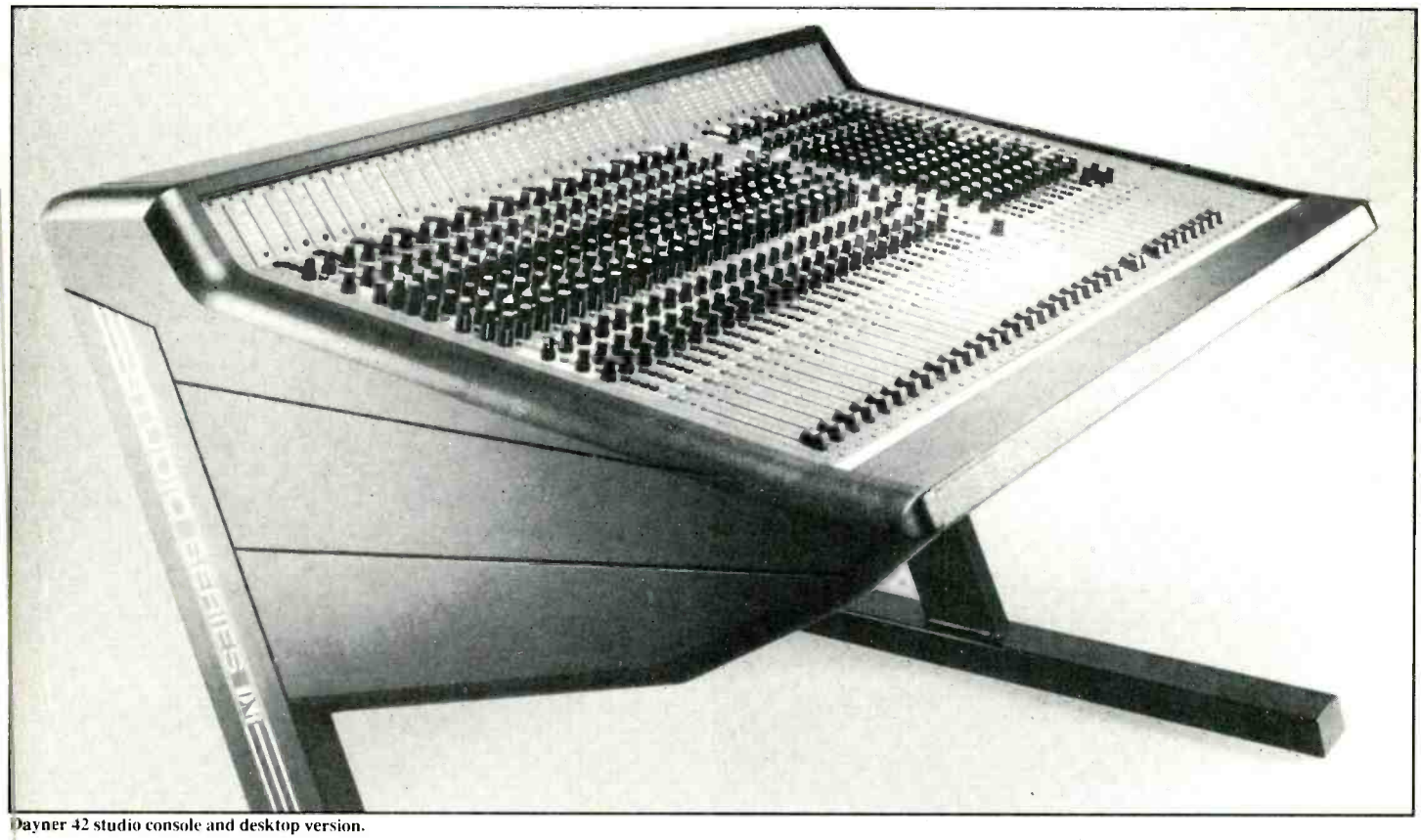
A new range of rackmount signal processing units from Time Machine Sound Engineering is unusual in being available in DIY kit form. The initial product line includes an enhancer known as the *Activator*, a dual noise gate/fader/panner, a compressor/expander and the *Silencer* single-ended noise reduction system, and this range should eventually be extended to include a guitar processor, an amplifier, a crossover and a line mixer. Other plans include a modular mixing console in kit form to be launched in 1989. All units are 2-channel/stereo with balanced operation as standard and a claimed headroom of +21 dBm, and are 1U rackmount format.
Time Machine Sound Engineering, Abbotsford, Deer Park Avenue, Teignmouth, Devon TQ14 9LJ, UK. Tel: 06267 2353.

JL Cooper PPS-100

The *PPS-100* from JL Cooper is a low-cost SMPTE event generator and a SMPTE/MIDI synchroniser, converting SMPTE to MIDI Sync with song position pointers and sending any MIDI commands at any user-programmed time. The unit stripes and reads all formats of SMPTE and shows it on an LCD display and will also generate MIDI Time Code, DIN sync, Direct Time Lock and PPQN sync.

The Event Generator can be used as a simple SMPTE-locked realtime MIDI data recorder or can have events entered off-line from the front panel. Optional software for the *ST* or *Mac* allows for cue sheet entry of events. The events themselves can be any MIDI data, from note commands to program changes and even System Exclusive messages, and the unit also incorporates two programmable relays for timecode-referenced switching.
JL Cooper Electronics, 1931 Pontius Avenue, West Los Angeles, CA 90025, USA. Tel: (213) 473-8771. Fax: (213) 479-7607.
UK: Evenlode Soundworks, The Studio, Church Street, Oxford OX7 2PS. Tel: 099389 228.

Sooner Or Later You'll Need A Dayner!



Dayner 42 studio console and desktop version.

D&R 's Dayner series offers more inputs in less space than any other console. Up to 56 input modules (112 mix inputs) in less than six feet. Ideal for space-limited control rooms and MIDI oriented studios.

Yet despite its compactness, the Dayner is long on features. Split EQ, Floating Subgroup System (FSS), 8 aux send busses and digital quality specs are just a few.

Whether you have 8, 16, 24, or 32 tracks and the most elaborate MIDI set up, the Dayner is all the recording mixer you'll need for years to come.

If you prefer the traditional split format, the innovative in-line format or both, your Dayner can be custom configured to fit your particular needs in just minutes.

Don't you deserve the best now rather than later?

Contact the D&R sales/service distributor in your area for a little free consultation or call us.

DAYNER SERIES BEYOND COMPARISON

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D&R Electronica b.v.	D&R USA	D&R (UK) LTD	D&R Electronica GmbH
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1382 GS WEESP	Arlington, TX 76012	Gerrards Cross	D 5100 Aachen
THE NETHERLANDS	U.S.A.	Bucks, SL9 7HH U.K.	
Phone (--) 31 2940 18014	Phone (817) 548 1677	Phone (0753) 884 319	Tel 0031-2940-18014
Tlx 18503 dr nl			Tlx 0031-18503 dr nl
Fax (--) 31 2940 16987	Fax (817) 277 6066	Fax (0753) 889 133	Fax 0031-2940-16987

AUSTRALIA, AUDIO&RECORDING, 2019 Sydney, 36-38 Daphne St Botany phone: (02) 6669935. **AUSTRIA,** KÜNL & WURZER, A 4020 Linz, Waldeggstrasse 68, phone: 731668125.**BELGIUM,** ASE pvba, 2800 Mechelen, Kon. Astridlaan 216, phone: 15 421152. **CANADA,** J-MAR, M4H 1E9 Ontario, 6 Banigan Drive, Toronto, phone: 4164219080. **DENMARK,** P.S.S. 2200 Kobenhavn n, Aboulevarden 38, phone: (01) 390037. **FINLAND,** SAHKOLIKKEIDEN OY, 01301 Vantaa 30, P.O. Box 88 Sahkometsa, phone: 908381. **FRANCE,** METTLER AUDIO, 75009 Paris, 1-3-5 Blvd de Clichy, phone: 14878291 1. **HONGKONG,** JOLLY SOUND Ltd, Tower B, RM 1214-1215, Hunghom comm. centre 37-39, Ma Tau Wei Rd KLN H.K., phone: 36202025. **ICELAND,** SAMSTARF, P.O.box 1197, 121 Reykjavik, phone:354153055 .**ISLD. CANARIAS,** MUSIC ACCORD, S. Cruz de Tenerife Puerta Causeco 35, phone: 22-289506 **ITALY,** PROFESSIONAL EQUIPMENT SRL, 20142 Milano, Viale Famagosta 37, phone: 02-817839/02-8910241/2/3. **NORWAY,** VEDUM ELEKTRONIKK, N-1381 Heggedal, Aamotveien 2, phone:2798990. **PORTUGAL,** JORSOM AUDIO VISUAL, 1000 Lisboa, Rue Eca de Queiroz 20-3 phone: 19562850 .**SPAIN,** BOSE SA, 28027 Madrid, Aristoteles 3, phone: 4050611. **SWEDEN,** MONTEZUMA RECORDING, 10265 Stockholm, Kocksgatan 17, phone:8436291. **SWITZERLAND,** ISLER AG, 8048 Zurich, Badenerstrasse 808-810, phone: 14321444. **VENEZUELA,** SOUND AND POWER, 1070 Caracas, P.O. box 76766, phone: 2223201.

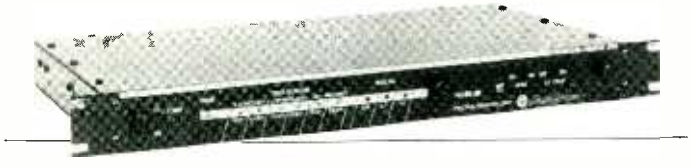
NEWS

Renkus-Heinz Smart systems processors

Renkus-Heinz have introduced a new range of processors, their third generation, for use with their *Smart* speaker systems. The two units are the *X-22* (2-channel, bi-amp) and *X-31* (3-channel, tri-amp). New features include front-panel plug-in modules providing equalisation, crossover, time correction, relative gain settings and protection functions for each *Smart* system enclosure. Protection of all drivers against excursion and thermal damage is provided by proprietary systems called Sense Fail detection circuitry and patented Spectrum Power Transfer, and a front panel diagnostic LED matrix shows complete system status. The hum and noise performance is claimed to be improved, partly by the use of instrumentation type inputs.

Renkus-Heinz Inc, 17191 Armstrong Avenue, Irvine, CA 92714, USA. Tel: (714) 250-0166. Fax: (714) 250-1035.

UK: Vector Marketing, Empress House, 70 Blackstock Road, London N4 2DR. Tel: 01-359 1298.



Altec Lansing products

Among new products from Altec Lansing are two mixer/amplifier systems incorporating the *1781A* programmable input modules. The *1700A* mixer/preamplifier system is a variable-configuration rack, which can be set up as anything from a 6/1 microphone mixer to a 6-way DA according to the components selected. The *1781A* module incorporates a compressor/limiter, HF and LF shelving EQ, muting, remote volume control capability and tone generator. Further options include system-wide remote muting using a slave mode with programmable priority and a mic level output pad. The rack can be used as an expander to the *1707B* mixer/power amplifier system; this is a similar set-up with the addition of a 75 W fully protected power amplifier.

Other additions to the range include two new single-channel power amplifiers, the *1407A* and the *1415A* (75 and 150 W respectively); features include a 300 Hz HPF, 15 dB pad, input bridging transformer and rear-mounted level and configuration controls to reduce the risk of tampering in permanent installations. There are also two new ⅓-octave equalisers, the *1750A* (cut only) and the *1753A* (cut and boost). Both include 28 ISO-centre bands, variable 18 dB/octave high- and lowpass filters and a 20 dB gain control.

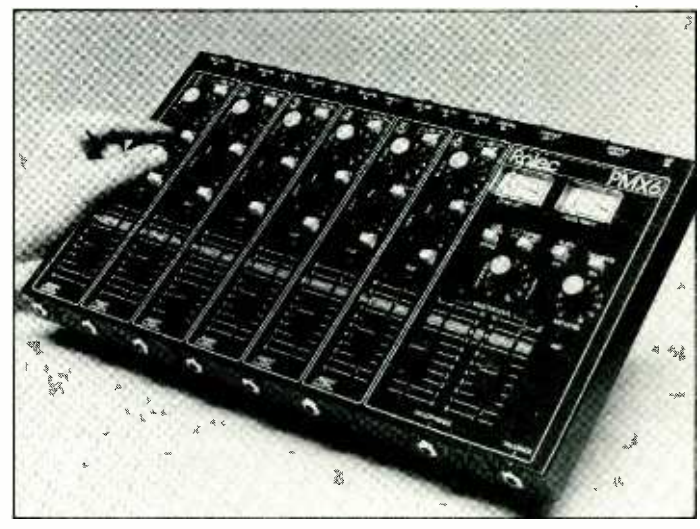
Altec Lansing, PO Box 26105, Oklahoma City, OK 73126-0105, USA. Tel: (405) 324-5311.

UK: Shuttlesound Ltd, Unit 15, Osiers Estate, Osiers Road, London SW18 1EJ. Tel: 01-871 0966.

Rolec PMX6 portable mixer

At the APRS exhibition Rolec launched a new compact portable 6/2 mixer, the *PMX6*, aiming to combine rugged portability with high performance particularly in terms of microphone input noise. The basic unit incorporates switchable RIAA equalisation on all channels, overload LEDs, insert points, built-in slate microphone and line-up oscillator. Available as separate add-on units are six channels of graphic EQ and a 6-way *XLR* input module, which provides 48 V phantom powering.

Rolec, Unit 210, Belgravia Works, Marlborough Road, London N19 4NF, UK. Tel: 01-281 4776. Fax: 01-281 4565.



Studio Power SUB2000 loudspeaker system

The recently-launched *SUB2000* loudspeaker system from Studio Power adopts the approach of small midrange/treble cabinets (known as satellites) and larger subwoofer cabinets that can be concealed anywhere in the room without, apparently, affecting the stereo image. Each driver has its own overload protection circuitry, and the bass cabinets use two 8 inch drivers, each with 4-layer voice coils, arranged in opposition to create a push-pull effect. The system will handle 90 W continuous.

Studio Power Loudspeakers, Studio House, 65 Victoria Road, Guiseley, Leeds LS20 8DQ, UK. Tel: 0943 870057. Fax: 0943 870040.

DDA D series stage monitor console

The latest console configuration from DDA is a 16-output stage monitor desk in the *D* series range. Three frame sizes (20, 36 and 44 inputs) are offered and 16 outputs are provided using PA modules, plus the existing stereo mix output. Its other main feature is the provision of dual microphone inputs on each channel (as well as the line input) allowing two stage setups to be connected simultaneously and switched over when required. All the usual DDA options are available, and the desk can be fitted with multiway connectors for the mic inputs.

DDA, Unit 1, Inwood Business Park, Whitton Road, Hounslow, Middx TW3 2EB, UK. Tel: 01-570 7161. Fax: 01-577 3677.

USA: Klark-Teknik Electronics Ltd, 30B Banfi Plaza North, Farmingdale, NY 11735. Tel: (516) 249-3660. Fax: (516) 420-1863.

FAST, FUNCTIONAL FIDELITY

INTRODUCING SOUNDSTATION II

THE SECOND GENERATION DIGITAL AUDIO RECORDER AND PRODUCTION CENTRE

Recording and editing with SOUNDSTATION II is quick, simple and accurate. Multi-channel digital recording, combined with comprehensive edit control and signal processing extends the abilities of the audio engineer with boundless creative latitude. Direct access of recorded elements from magnetic disks or removable optical media results in productions completed ahead of schedule with unmatched sonic accuracy.

Dedicated controls together with the flexibility of the Touch Screen provide intuitive operation to accomplish both conventional and advanced audio production functions. Tasks normally requiring multiple recorders or external processors, such as track slipping or time compression, are achieved immediately and effortlessly by SOUNDSTATION II.

High resolution 18 bit conversion, direct access editing and the preservation of original multi-channel recorded sound fidelity distinguish SOUNDSTATION II as the practical solution to demanding audio production requirements.

Contact Digital Audio Research for a demonstration of the unsurpassed flexibility and performance of SOUNDSTATION II, the second generation digital audio recorder and production centre.

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TELEPHONE 415-376-2760 · FAX 415-376-9081

DAT. Whoever said it woul

With portable recorders now available, the DAT format can fulfil its promise as the digital two-track standard for any professional audio application.

Europe's leading pro-audio centre now stocks the full range of Sony DAT recording technology. Not only is HHB the leading independent distributor for Sony Broadcast professional audio products, but the company has been officially appointed the first independent pro-audio distributor of Sony's 'consumer' DAT recorders, the DTC 1000ES and the remarkable carry-anywhere device, the TCD-D10. This guarantees full service support and Sony spares back-up.

The stunning and compact TCD-D10 is supplied with a full range of accessories including carrying case, power unit, battery, battery charger and stereo microphone. The recorder even offers remote control recording functions. The DTC 1000ES is already an HHB best-seller, providing superb digital quality at a highly competitive

d never get off the ground?

price. For DAT performance with professional facilities, the Sony PCM 2500 carries a full range of digital inputs and outputs, including SDIF 2 and AES/EBU for recording at sampling rates of 44.1kHz as well as 48kHz.

For fully professional recording on the move, the PCM 2000 heralds a new digital era – at a stroke. Sturdy design and built-in time code facilities are backed by two times oversampling in record and twin A to D and D to A conversion.

Put simply, the PCM 2000 sets new standards in digital recording performance. Period.

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JANUARY 1989

MIDI and Automation are to be featured in this issue.

THE YEAR IN FOCUS

An Authoritative Publication providing a comprehensive overview of major product launches will be published along with the January issue. It will also contain the customary index of 1988's articles as well as a detailed listing of all pro-audio related events in 1989.

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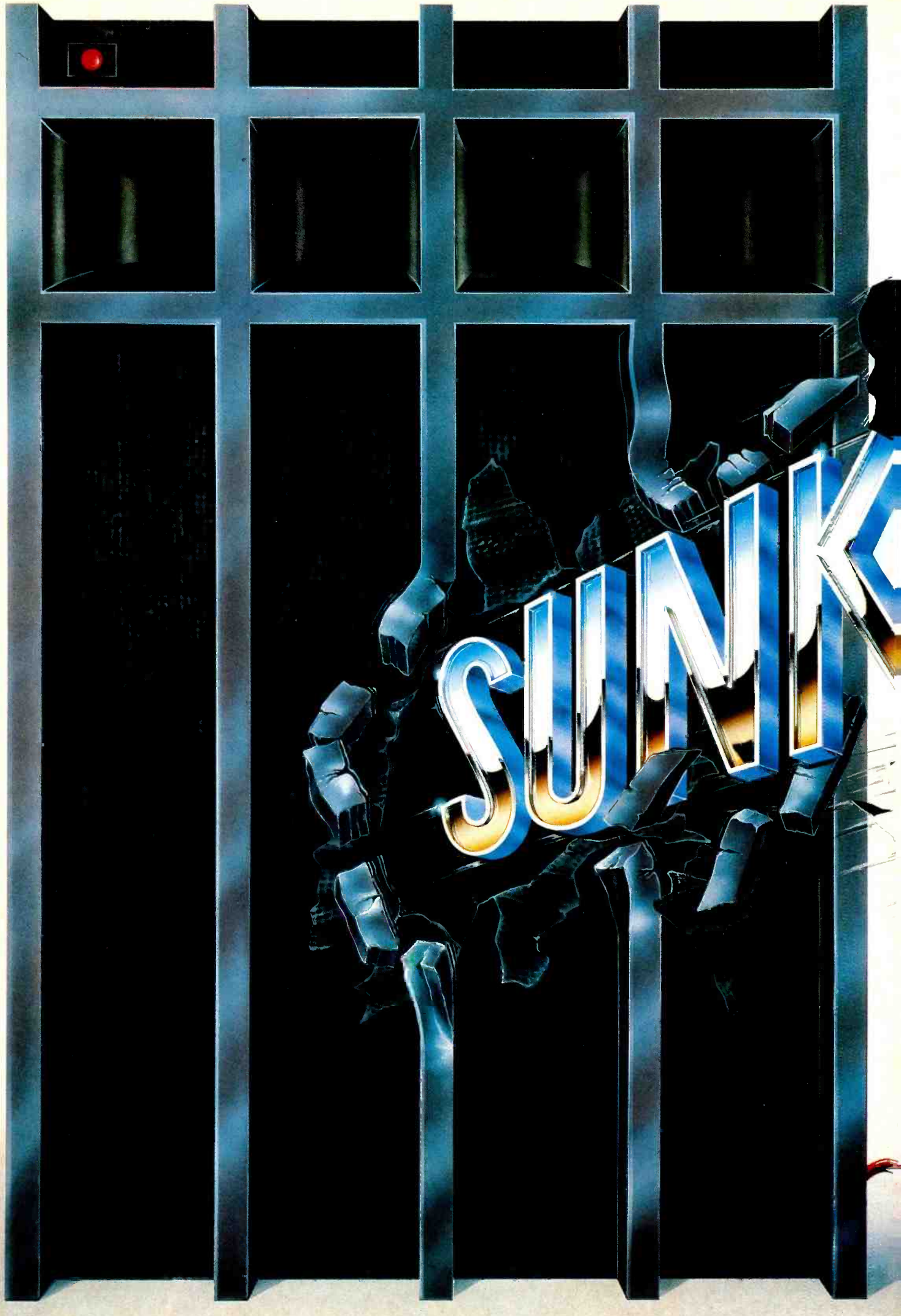

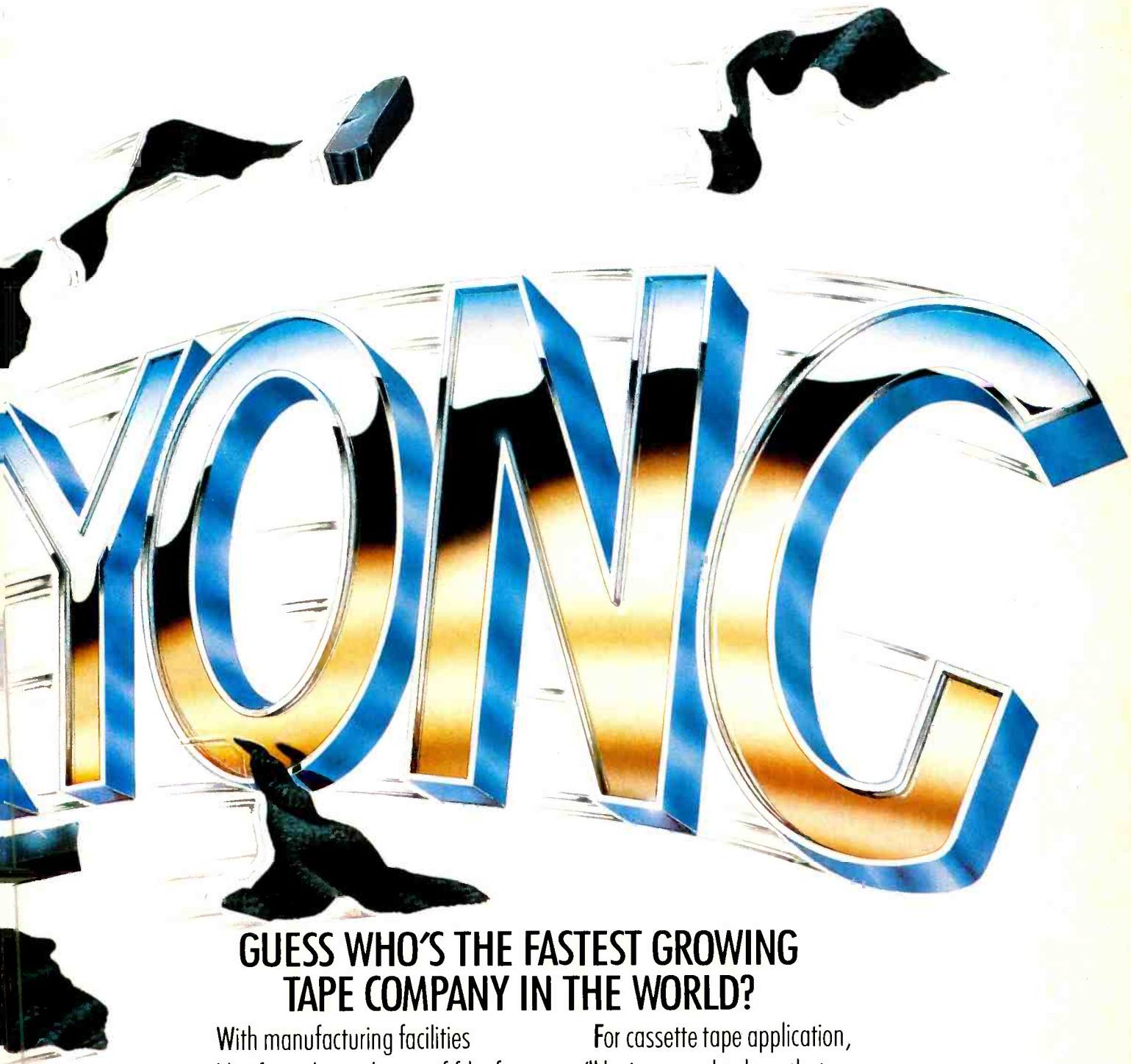

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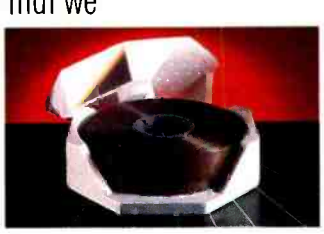

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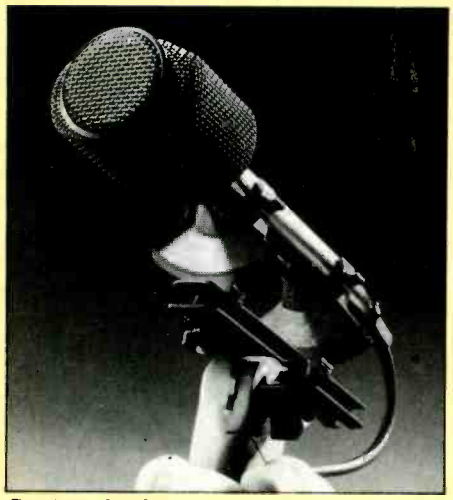


Sanken CMS-9

Clarity MIDI/XLV

• **Audio/Digital:** along with the established *ADD* series of digital delays for time alignment, Audio/Digital will introduce several new products including the *GC-800/16*, a digitally controlled 8-channel gain package. Other new products will be announced at the Convention. • **Audio Intervisual Design/Sanken:** AID is national distributor for Sanken in the USA and will be highlighting new microphones: the *CU-44X* transformerless dual-capsule condenser mono microphone and the *CMS-9* portable MS-stereo cardioid for all indoor and outdoor broadcasting and film applications. • **Audio Kinetics:** will include the *ES 1.11* synchroniser in its exhibit as well as *ES Eclipse* controller, being shown as part of an ESbus system. *Reflex* automation will be on display—a centrally-controlled fader, muting and aux switching system that can be fitted to any console providing both off and on line facilities. Other recent products include *Wiper* video wipe or countdown inserter that provides a visual cue facility for artists, producers and anyone involved in the post-production process. Established products to be shown include *Pacer, Pacer Pad 2, Striper, Gearbox, VTL, MasterMix* and *Q.Lock.* • **Audio Precision Inc:** featured will be a DSP module for the *System One* audio test set that will allow full test facilities to be applied to a signal in the digital domain. Also on show will be the recently introduced *DCX-127* multi-function module and *SWR-122* switchers. • **Audio-Technica:** are exhibiting a range of microphones including *AT4051* unidirectional condenser, *AT4031* unidirectional condenser, *AR4071* and *AT4073* shotgun condensers and the *AT871 UniPlate* boundary mic. The *AT4462* stereo portable ENG mixer will also be shown along with a selection of radio microphones and microphone accessories. • **Audio Video Consultants:** are showing the Tapematic range of duplicating equipment including equipment for tape loading, packaging and testing.

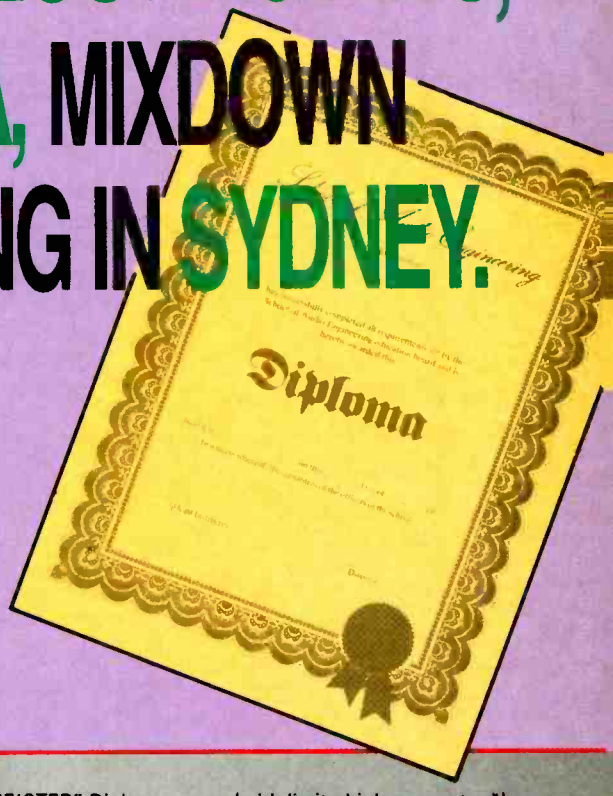
B

• **BASF Corp:** full range of magnetic tape products including digital audio tape, analogue audio tape, loopbin mastering tape, duplication tapes and the range of calibration tapes and cassettes. • **BBE Sound:** range of sonic enhancement processors. • **B&B Systems:** wide range of stereo audio signal display systems. • **Beyer Dynamic:** Beyer will be introducing many new products including the *Tour Group* range of vocal and instrument mics for sound reinforcement; the *MCE 86* ENG/EFP shotgun mic; the *M 58* ENG/EFP interview mic; the *S 186* handheld and lavalier wireless systems; the *SHM* podium series mics; and the *DT 770* pro studio monitoring headphone. • **BGW Systems:** wide range of power amplifiers including the recently introduced *GTB.* • **Bose Corp:** examples of their range of sound contracting and small scale live sound products. • **Brainstorm Electronics:** will show their range of studio accessories including the *TB-4 Communicator* infra-red remote for console talkback systems introduced last year. Two new remotes will be introduced that will operate at greater distances including outdoors with applications including lighting and multi-media presentations. • **Broadcast Electronics:** as a manufacturer of radio broadcast equipment, Broadcast Electronics will display their modular on-air console *Mix Trak 90* in a live studio setting. This console is available in 12 or 18 channels with a choice of 14 auxiliary and accessory modules. Other products on demonstration will include the *Phase Trak 90* record/replay stereo cart machine and the *DV-2* solid state digital voice recorder/reproducer. • **Bruel & Kjaer:** will be showing the full range of music recording microphones and accessories. • **Bruel & Kjaer Instruments:** are to launch their new *2123* and *2133* digital filter analysers, which feature extensive front panel programmability, PC-DOS compatible disk and IEEE 488 bus. User programming enables custom measurement and display setups, measurement autosequences and flexible post-processing of single or multiple measurements. Intended applications include room acoustic measurements, sound intensity and production QC testing of loudspeakers and other products. B&K are also showing their head and torso simulator, the *4128* for conducting measurements on electroacoustic systems for talking and/or listening. The *3544* laser velocity transducer set for calibrated measurements on loudspeaker diaphragms or musical instrument structures will be shown. • **Bryston:** will show the *10B* electronic 2-way stereo (3-way mono) crossover, featuring independently selectable crossover points for high- and lowpass, plus selectable crossover slope, from 6, 12, or 18 dB/octave. Also on show will be their range of amps and preamps, including *BP-1* broadcast preamp, the *70* series professional amps. • **BSS Audio:** are featuring the *EPC-780* 2-channel modular power amplifier giving over 1000 WRMS/channel into 4 Ω. Other products being shown are the *DPR-502* noise gate, *MSR-604* microphone signal distribution system, *FDS-360* frequency dividing system and *DPR-402* compressor/limiter/de-esser.

C

• **Cal Switch:** electronic component products. • **Cetec Gauss:** will be showing the series *2400* high-speed cassette duplication system featuring the model *2480* combined master and loopbin that operates at up to 480 in/s. Also on show will be the Gauss line drive units and studio monitor speakers. • **Cetec Vega:** will display their range of wireless microphones and intercom systems. • **Cipher Digital:** will be showing their *Softouch-PC* edit controller, which integrates *PC*-type computers with the *Softouch* system and offers editing for simulcast, stereo TV, videodisc, and post-production editing of audio, audio for video and film; synchronisation of multiple ATRs, VTRs and film transports plus automated sound effects assembly, sweetening, dialogue replacement and Foley for post-production. Also on display will be the *4810* phantom VTR/VCR transport emulator for controlling audio transport via video editing systems; also timecode readers, microprocessor-based timecode generators, *CDI-750* timecode system and *Shadow II* synchroniser controller. • **Clarity:** will feature the *XLV* effects automation interface which uses MIDI as the automation protocol, allowing control of all parameters on the Lexicon *224XL* and *480L,* AMS *RMX-16* and Quantec *QRS* as well as automation of digital delay lines, VCA-based processors, analogue synthesisers and other devices. • **CMX:** will be showing their *CASS 1* computer-assisted editing system, which offers optional console automation, for sound in audio/video and film post-production applications. • **Collins Automatic Tape Joiners:** range of manual tape editing systems. • **Community Light & Sound:** will exhibit their range of sound reinforcement equipment including the *M4* compression loudspeaker, a series of glass fibre pattern control horns and the *CS* series II loudspeaker systems. • **Connectronics Corp:** wide variety of cable reels and range of patchbays, stagelink systems and assemblies. Also the complete range of cables and ancillary hardware for pro-audio, music and broadcast applications. • **Conquest Sound:** no information available. • **JL Cooper Electronics:** products on demonstration will include an improved MIDI switchbox, the *MSB Plus Rev 2,* which is an 8-input and 8-output MIDI switching system that now features Program Change Mapping. Also on show will be the *MixMate* low-cost self-contained automated mixdown system for 8-track applications. A totally new product to be launched at the show will be the *PPS-100,* which is an inexpensive SMPTE event generator and SMPTE/MIDI synchroniser. • **Countryman Associates:** will show their range of miniature microphones for studio, broadcast, sound reinforcement, podium, TV and film applications. • **Crest Audio:** will introduce two new models to its power amplifier range, the *CC150* and *CC300.* Both are convection cooled and incorporate accessory input sockets for optional crossovers, transformers, etc. The amplifiers are available with or without meters. • **Crown International:** will be showing examples of their wide range of microphones, amplifiers and the Techron *TEF-12*

IMAGINE RECORDING IN LOS ANGELES, OVERDUBS IN VIENNA, MIXDOWN IN LONDON & MASTERING IN SYDNEY.



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analyser. Featured will be the *M2400* amplifier, the *CM* mic series and the *Power Base 2*. • **CST Manufacturing & Sales:** no information available. • **C-T Audio Marketing:** two new products will be launched; *Drum Wizard* is a microphone/mixer/MIDI system for acoustic drums incorporating software developed at Cambridge University in the UK. By triggering with microphones no audible delay between the mic sound and MIDI signal is incurred. *Drum Wizard* features eight microphones/triggers, two MIDI outputs, 8/2 stereo mixer and 100 MIDI programmes, one of which is factory preset. The *C-ducer Lost Cord* is an under the saddle mounting condenser transducer for acoustic guitar. Mounting under the bridge it takes the form of a continuous capacitor, which captures the sound of each string equally, with a flat response. The full range of *C-T* studio contact microphones will also be shown alongside the range of *Session* amplifiers.

D

• **DIC Digital:** no information available.
• **Digidesign:** no information available.
• **Digital Audio Research:** will be showing *SoundStation II* second generation digital audio recording, editing and production system. Applications include music and dialogue editing, stereo mastering and video post-production. New 8-channel and 2-channel configurations first shown in the UK at IBC will be shown to suit a variety of budgets. • **Digital Audio Technologies:** no information available.

• **Digital Creations Corp:** will exhibit an upgrade to their *Diskmix* second generation moving fader console automation, which provides higher system speed, greater data storage resolution and quicker user control. They will also show their *Video Interface Computer (VIC)*, which will perform basic audio console crossfades under the control of any video editor which supports ESAM I/II protocols. • **Dimension Music:** no information available. • **DOD Electronics:** will show products from their range of signal processors including the *DigiTech DSP-128* MIDI controllable digital signal processor with a variety of reverb and delay effects and 128 presets; effects development software will be shown allowing new effects to be written; *SC-31* ⅓-octave band graphic EQ will be shown in Audio Logic range along with *R2D3* 3-tap digital room correction delay. • **Dolby Laboratories:** the Dolby *SR* system will be the featured theme of the stand. The whole range of Dolby products for music recording, film and TV post-production, cassette duplication and transmission systems will be shown. The recently introduced *SDU4* Surround decoder will be shown, designed to enable monitoring of TV or video Dolby Stereo soundtracks. • **Dorrough Electronics:** are to show their full range of audio metering products for loudness indication.
• **Drawmer Distribution:** will be showing their new *DF320* universal noise filter single-ended noise reduction system, which combines programme dependent noise filter with auto-attack expander and can operate at −10 or +4 dB and *E101* passive coil equaliser 4-stage single-channel passive equaliser, which uses precision wound coils in order to reproduce the EQ sound of the '50s and '60s. Other products on show include the recently introduced *M500* 2-channel dynamics processor, the *DS 201* dual noise gate, the *DL 221* compressor/limiter, the *DL 231* expander/compressor, the *1960* valve compressor, the *LX-20* compressor/limiter, the *M401 Midiman* and the *T102* gate interface.

E

• **Editron USA Inc:** is introducing a new option for the *520* audio synchroniser/editor in the form of multi-standard sync card. With this option timecode, bi-phase pulses (from a film chain), tachometer pulses, pilot-tone of mains video sync (SPG) may all be used as the reference signal and allocated as systems master, enabling the system to accept a signal from a non-interfaced machine and use it as a master. • **Electro Sound:** on demonstration will be *80:1 Master Speed Kit* and *80:1 Slave Speed Kit* for the *8000* series cassette duplication systems. These kits introduce mechanical and electrical modifications to the current *8000* models to allow the 20% increase in duplication speed from 64:1 to 80:1. • **El Mar Plastics:** no information available. • **E-mu Systems:** will be showing the *Emulator III* featuring stereo sampling, 16 voices, 16-bit linear data sampling (30 and 44.1 kHz) and oversampling on output channels. Also *EMAX-HD* digital sampling system with 20 Mbyte hard disk drive and *SP-1200* 12-bit sampling percussion system. • **Euphonix:** no information available.
• **Eventide:** the full range of sound processing products. Featured will be the *H3000 UltraHarmonizer* with the ability to create true musical harmony. • **Everything Audio:** will be showing a selection of the products for which they are dealers and distributors.

F

• **Fairlight Instruments:** hardware and software developments for the *Series III* including the *MFX* keyboard dedicated post-production tool designed to allow control of sound effects and tape machines. It features touch and position sensitive sound keys and a jogger wheel, which can be used as a master incremental controller or combined with transport switches to form a locator for any ESbus driven transports and synchronisers; *Series III* can be driven entirely from *MFX*'s control panel or any combination of keyboards. The *Waveform Superviser* is a replacement card for the *Waveform Processor*, which offers improved loading speed from hard disk, and faster page changes. New analogue/digital sampling card provides AES/EBU digital input, and will form part of Fairlight's stereo Disk Recorder/Editor. Also recently introduced are ESDI-based 380 Mbyte hard disks and optical WORM drives with 400 Mbytes per side for large sound archives.
• **Fane Acoustics:** will show their range of hand built *Studio* series co-axial speakers, the range of bass drivers and the *B* series glass fibre horns and *HT100* and *HT150* constant directivity horn tweeters. • **FM Acoustics:** will be presenting their range of *Forcelines* high energy transfer cables including the latest *Forcelines 7* for smaller monitors and nearfield monitoring systems. The full range of precision power amplifiers, linear phase electronic crossovers, the *FM213* precision balanced line driver and *F216* precision line level interface will also be shown. • **Focusrite:** are showing for the first time in the USA the latest dynamics unit featuring compressor/limiter and noise gate with full access side chains which will fit into the same racks as the existing *ISA 110* range of channel amplifiers. There will also be a new version of the 7U rackmounting frame for

The Church Chose AMEK

G2520

When "The Church" decided that they needed to upgrade their Studio B console, they conducted exhaustive research into the choices available that would meet their criteria for sonic quality, flexible signal management and ease of use.

The AMEK G2520, famous for it's outstanding equalisation, was selected as the obvious choice. The model installed is a custom frame 48 input, fitted with Audio Kinetics Mastermix fader automation.

For a demonstration of how the AMEK G2520 can satisfy your critical demands contact Chas Rowden at the AMEK office at HHB, or any authorised AMEK distributor worldwide.

AMEK

EMPHASIS ON ENGINEERING

Head Office, Factory and Sales: Amek Systems and Controls Limited, New Islington Mill, Regent Trading Estate. Oldfield Road, Salford M5 4SX, England. Telephone: 061-834 6747. Telex: 668127 AMEK G. Fax: 061-834 0593.

AMEK/TAC US Operations: 10815 Burbank Blvd, North Hollywood, CA 91601. Telephone: 818/508 9788. Fax: 818/508 8619

London Office: AMEK at HHB, 73-75 Scrubs Lane, London NW10 6QU.Telephone: 01-960 2144

AES PREVIEW

the *ISA 110*s and dynamics units. • **Fostex Corp of America:** will be unveiling the model *D-2* professional R-DAT recorder with SMPTE/EBU timecode, slave machine functions, off-tape monitoring, punch in/out, pitch control and external sync facilities. A selection from other Fostex products will also be shown. • **French Expositions in the US:** details and support for French pro-audio manufacturers marketing into the US. • **Full Compass Systems:** no information available. • **Full Sail Center for the Recording Arts:** recording school will be introducing their new Tapeless Studio Course in association with New England Digital for the *Synclavier* system. They will also announce the opening of their new Video and Film Production School.

G

• **Gefen Systems:** no information available. • **Gentner Electronics Corp:** no information available. • **Gold Line:** will exhibit their entire range of products including 10-band ⅓-octave realtime analysers, crossovers, gates, limiters, oscillator/frequency counter/dB meter and audio test sets. • **Gotham Audio Corporation:** will display a full range of audio products including the full line of microphones from Neumann featuring the *TLM 170* and the *RSM 190* stereo shotgun; the *DMM* mastering system for vinyl and CDs from Neumann and Teldec; the Harmonia Mundi Acustica digital processing system in several versions with new modules for digital dither, A/D conversion and limiting/compression; from EMT, the *448* hard disk digital audio recorder and complementary *448e* EPROM memory card will be shown for the first time; portable mixing consoles from Audio Developments; cable products from Gotham; metering products from NTP; and Klein & Hummel loudspeakers.

H

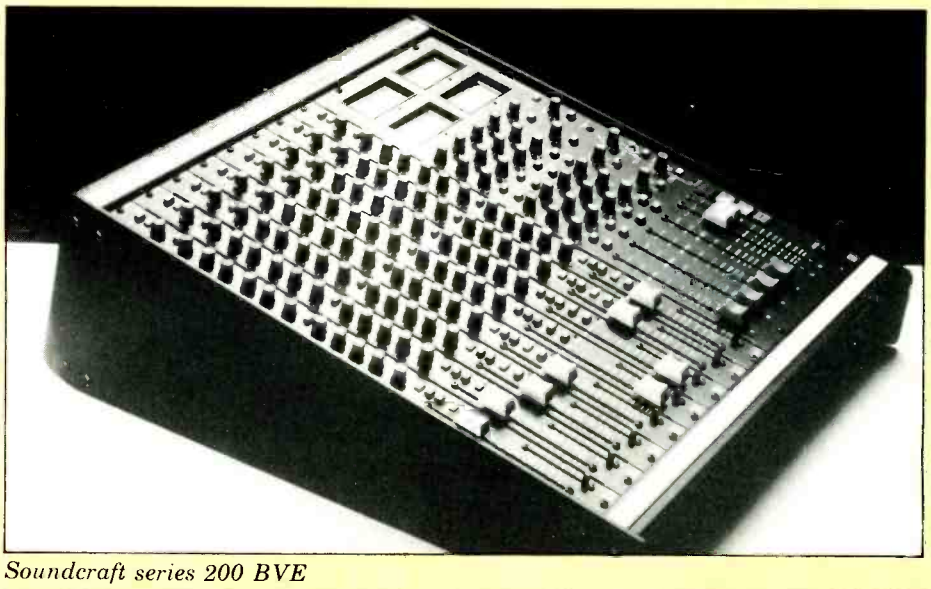
• **Harrison Information Technology:** exhibiting under the corporate name of H I Technology Inc will be announcing restricted dealerships at the show. The *GP* series graphic equalisers will be shown alongside *SP* series installation mixers, *AC* series active crossovers, *Xi* series MOSFET amplifiers and *DSA* series digital amplifiers. • **Harrison Systems:** will be showing a selection of mixing consoles from their wide range of broadcast, live sound and recording consoles. Featured will be the *SeriesTen* and its latest updates. • **Howe Technologies Corp:** range of audio broadcast consoles and tape phase correction devices.

I

• **ILP Manufacturing:** no information available. • **Heino Ilsemann:** will be showing labelling, sorting, packaging and foil wrapping machines for audio cassettes, packaging and foil wrapping machines for video cassettes, packaging machines and handling systems for compact discs. • **Industrial Strength Industries:** no information available. • **Innovative Electronics Designs:** will display products from their range of audio processing systems, automatic mixers, power amplifiers, ambient noise analysis systems and microcomputer controlled audio systems for installation applications. These will include a new microcomputer-based audio management system for hotel ballroom and meeting rooms and the model *540* ambient analysis system. • **Integrated Media Systems:** no information available. • **International Music Co/Akai:** will be showing Akai recording and music products. Featured will be the *DR1200* digital multitrack recording system and the *S1000* sampler.

J

• **JBL Professional:** will be showing the full range of Soundcraft Electronics products including Series *6000* recording console with new MIDI computer module, *VSA24* Serial Interface for the Series *200 BVE* audio for video console, which will be making its US debut. Soundcraft *SAC 200* on-air/production console, series *8000, 500* and *TS12* plus *200B* and *200SR* will also be shown. • **JRF Magnetic Sciences:** will show the *PLX* series of direct replacement magnetic heads for ¼ inch mastering, recording and broadcast equipment, including Sony/MCI *JH110*, Scully *280*, Ampex *440*, Otari *MX5050B* and *MTR 10/12/20* machines. Also a line of direct replacement heads for 16 and 35 mm mag film equipment. • **JVC Professional:** series *900* digital audio mastering system along with other professional audio products, including the PS editor and the *MU-6200E* microphone.



Soundcraft series 200 BVE

Focusrite ISA 130 dynamics unit

K

● **KABA:** no information available. ● **Kenwood USA Corp:** is showing a small PCM audio laboratory with test and measurement instruments including jitter analysers, error rate counter, encoders, decoders for R-DAT tape deck and BS-equipment, CD mastering and optical disc playback machines. Error detection, encoding, decoding, measurement of jitter distribution and error rate counting will all be demonstrated. ● **King Instrument Corp:** will be introducing their new R-DAT cassette loader as well as the new microprocessor-controlled *2797* fully automated dual supply audio cassette loader. Also on display will be the *2500* dual supply VHS video cassette loader. ● **Klark-Teknik Electronics:** will be showing their full range of products including new additions to the series *700* digital delay lines: *DN726* stereo broadcast delay; *DN773C* broadcast profanity delay; and *DN775* disc cutting delay line. The recently acquired Midas range of mixing consoles will also have a new product line, the *XL2* mixing console for outside broadcast, touring and hire company application. Klark-Teknik series *300* graphic equalisers, *DN60* realtime spectrum analyser, *DN780* digital reverb and series *400* parametric equalisers will be shown alongside the Klark Acoustic *Jade* active monitors. ● **Klipsch & Associates:** no information available. ● **Klotz:** samples and catalogues of their 58 different types of cable for audio and video applications. Also on show will be the Audio-Line range of patchbays available in TT phone or *PO 316* formats, cable drums, active and passive DI boxes including a battery and phantom powered model. ● **Korg:** will be showing examples of their range of synthesisers and signal processing equipment.

L

● **Lexicon:** full range of products including the *PCM-70* digital effects processor and its associated latest software, the *480L* digital effects system, *2400* stereo audio time compressor/expander and *Opus* audio production system.

M

● **Magnefax International:** audio tape duplication equipment. ● **Marshall Electronic:** range of rackmount effects processors and the Quantec range of products. ● **Marshall Electronics (Mogami):** range of high quality audio cables. ● **MB Electronic/Josephson Engineering:** no information available. ● **Meyer Sound Laboratories:** Meyer have a demonstration booth that will feature Meyer *UPA-1A* loudspeakers, *USW-1* subwoofers, the *833/834* studio reference monitor system, *UM-1A UltraMonitor*, *UPM-1* loudspeaker, the *MS-1000A* amplifier, the *CP-10* complementary phase parametric EQ, and a practical demonstration of SIM equalisation with the opportunity for discussion of SIM and other topics. ● **MicroAudio:** will be displaying computerised equalisation systems. ● **Minim Electronics:** will

be showing new models in their range of Ambisonic surround sound products plus latest additions to the *Studio Clock System*.
● **Mitsubishi Pro Audio Group:** are launching the new *X-880* 32-track digital recorder, which features advanced LSI technology, improved status display, autolocator and range of functions, optional chase synchronisation enabling electronic editing between *X-880* and other PD format recorders plus chase coherent 64-channel operation. The *X-86C* and *X-86HS* 2-channel digital recorders will also be shown with the *XE-2* digital audio editor as well as established digital products including *X-850* 32-track, *X-400* 16-track and *X-86* 2-track. *Westar* and *Superstar* mixing consoles will also be on display. ● **Mix Publications:** US recording magazine.
● **Motorola:** no information available. ● **Music Maker Publications:** range of musician orientated magazines. ● **Musik Produktiv:** no information available.

N

● **Nady Systems:** wide range of radio mic systems. ● **Neutrik:** will exhibit the *TT402* audio transmission test set, which is an enhanced version of the *TP401*, the *Audiograph 3300* modular measuring system for audio and electroacoustic applications, plus the entire range of Neutrik pro-audio connectors including the *Speakon* amp to speaker connector system. New developments include an extended range of connector modules for added flexibility in user-designed adaptors and new patch cables incorporating the *NP3TT* tiny telephone and *NP3TB* B-gauge plugs. ● **Neve:** principal exhibit will be a *V* series multitrack console with *Necam 96* automation in a TV post-production demonstration. Also on show will be a fully working *DTC 1* digital audio transfer console together with examples of all other Neve products. ● **New England Digital:** are running demonstrations for *Direct-to-Disk, Synclavier* and the *Tapeless Studio*. These aim to show the speed and flexibility of *Direct-to-Disk* and the use of the optical disk WORM with 5½ hours of recording space per disk. The Music Printing Station, which can produce engraved standard music manuscripts from any form of music in the *Synclavier* memory, will be shown.

O

● **Optical Disc Corp:** compact disc mastering system. ● **Orban Associates:** will exhibit the *222A* stereo spacial enhancer, which detects and enhances psychoacoustic directional information. Also on show will be the *624B* parametric EQ notch filter; the *764B* fully programmable stereo analogue parametric EQ/notch filter, which memorises up to 99 full sets of control settings; the *787A* programmable parametric equaliser, de-esser, noise and compressor gate, which also stores 99 settings; and the *9105A* optimod-SW short wave audio processing system designed for international broadcasting. From the established range of products there will be the *8100A/1* Optimod-FM audio processor/stereo generator, *464A* co-operator level control system and the *8100A/XT2* 6-band limiter accessory for Optimod-FM. ● **Otari Corp:** will show a selection from their wide range of audio tape machines and duplicators. Featured will be the *MTR 100A* 24-track machine offering full auto-alignment for both record and playback. Pre-wiring for noise reduction is available as an option with a Dolby *cat.300* card being available offering both Dolby *A*-type and *SR* on a single card. Also being shown is the new *MX50* low cost twin-track machine. Centre-track timecode is now an option on the recently introduced *MS55*, which has also an optional console and overbridge added. ● **Oxmoor Corp:** will be showing the *DCA-2* digital control attenuator and the *RC-16*, which translates knob movements into digital pulses to control audio levels. Also *DEQ-29* ⅓-octave programmable EQ with no physical control panel.

P

● **Pacific Radio Electronics:** no information available. ● **Panasonic Industrial Co:** will feature the Ramsa line of pro-audio products including speaker systems for sound reinforcement, power amplifiers, microphones, mixing consoles for live sound and recording applications. Also on display will be CD and DAT products from Technics. ● **Passport Designs:** software for synthesis, sequencing and MIDI applications. ● **Penny & Giles:** will be featuring their motorised studio fader as well as the complete range of studio faders and other audio/video controls. They will also show Mosses and Mitchell jack sockets and jackfields. ● **Post Logic Systems:** no information available. ● **Pro Co Sound:** will show multichannel patchbay systems, a wide range of interface boxes, mic splitters and mic combiner, an audio visual interface, DI boxes, stereo headphone junction box, and ranges of rack mount versions of the similar products. Additionally, Pro Co will have on display a wide variety of cables.
● **Professional Audio Systems:** are launching their latest studio monitoring system, which provides high output levels using Time Offset Correction and an Active Filter Network. There is an optional subwoofer system. PAS will also introduce stage monitor and sound reinforcement products. ● **Professional Sound Corp:** no information available. ● **Publison America:** will be showing their *Infernal Machine 90* with the current range of software options, SMPTE and hard disk interfaces.

Q

● **QSC Audio Products:** complete line of professional 2-channel power amplifiers, plug-in accessories including isolation transformers, precision attenuators, active limiters and crossovers. ● **Quested Monitoring Systems:** will be showing examples of their studio monitoring systems including the *Q012, Q210, H210* and *HM 415* studio monitors. Also details of their studio design services.

R

● **Real World Research:** on demonstration will be the *Audio Tablet*, a hard disk editing system designed for 2-channel uses, a touch sensitive screen for control of facilities and differing software for specific operating needs. ● **Re-An Products:** will be exhibiting their new control knob design in a range of collet and slider knobs featuring computer controlled 2-colour manufacturing technology with indicator lines moulded into the body of any component. Samples and information will be available on the stand.
● **Recording Engineer/Producer:** US recording magazine. ● **Richmond Sound Design:** have updated the software on their *Command/cue* theatre system giving storage of 800 cues on a single disk plus many new programming enhancements. There is also a new master screen giving full colour display of the *Command/cue* control facility. ● **ROH/Anchor Audio:** will show the *Ensign* tabletop lectern with integral 50 W MOSFET power amp and a dual speaker array with condenser microphone and two phantom powered mic inputs. They will also show the ROH model *302* intercom station. ● **Roland Corp:** will feature the *R-880* digital reverb and *E-660* 2-channel 4-band or single-channel 8-band digital parametric equaliser. Both use 16 and 28 bit processing with MIDI capability. On the synthesis side, the *D-10, D-20, D-110, D-50* and *D-550* will be shown alongside the digital sampling modules

Neve V series console

For £95, Mickey Mouse will never trouble you again.

Otari's MX-55 is quite some machine. A new compact ¼" tape recorder, crammed with all the features the true professional could demand.

4-memory "mini locator"? Built-in test tone oscillator? +-20% vari-speed? Noise-free punch in and punch out? User-friendly control design?

All standard. This is an Otari, after all.

But if you do a lot of voice editing, there's an optional feature that could interest you even more.

It's called VEM. And it lets you edit at twice speed without the squeaky "Mickey Mouse" effect. By holding the pitch constant while you double the tape speed.

It's a simple feature that could save you hours of working time each week.

And at only £95 extra on the MX-55's asking price of £2414, you'd be goofy not to check it out.

MX-55. The two track mind.

OTARI

MX-55N. Part of a new range of Otari Compact Tape Recorders. For details of models and optional extras, including Centre Track Time code, write or telephone:

Otari Electric (UK) Limited, 22 Church Street, Slough, SL1 1PT, Berkshire. Telephone: (0753) 822381. Telefax: (0753) 823707
Otari Corporation of America, 378 Vintage Park Drive, Foster City, CA 94404. Telephone: (415) 341 5900. Telefax: (415) 341 7200
Otari Electric Co Ltd, 4-29-18 Minami-Ogikubo, Suginami-ku, Tokyo 167. Telephone: (03) 333-9631. Telefax: (03) 331-5802
Otari Singapore Pte Ltd, 625 Aljunied Road, 07-05 Aljunied Ind. Complex, Singapore 1438. Telephone: 743-7711. Telefax: (743) 6430
Otari Electric Deutschland GmbH. Rudolf Diesel Strasse 12, D-4005 Meerbusch 2, West Germany. Telephone: 010 49/2159/50-861 862 or -863. Telefax: 010 49 2159 1778

AES PREVIEW

S-330 and *S-550* sequencer software and the *HD-5/80* hard disk interface. Also on display will be the *MC-500* MkII sequencer with *Turbo 500* software, the *TR-626* rhythm composer, the *SBX-80* SMPTE sync box, the *M-160* and *M-240* line mixers and the range of Boss *Micro Studio* modules. • **RPG Diffusor Systems:** in addition to the Complete Acoustical Treatment System RPG will announce *The Wall* broad bandwidth Full Spectrum Diffusor, which combines low and mid-high frequency components into a single structure. Recent installations utilising the system include Peter Gabriel's Real World Studios in the UK and INXS' Rhinoceros Studios in Australia. Studio designer Neil Grant will be attending on the stand. Other new products to be shown include the *Home Concert Hall* for high end user home listening rooms. • **RSEC:** no information available. • **RSP Technologies:** no information available.

S

• **Saki Magnetics:** line of long life ferrite heads for Ampex, MCI, Otari, Scully, Sony and Studer tape machines. • **Samson Technologies:** will be showing their *Broadcast* series of wireless mics. Features include 10 selectable frequencies on receiver and transmitter, true diversity and dbx noise reduction. • **Schoeps/Posthorn Recordings:** will feature the *Colette* series of Schoeps studio condenser microphones, a modular mic system with 16 capsules with different directional patterns and frequency response curves. This series features a relatively new sub cardioid capsule, the *MK 21*, which has a good off-axis response with only rear sound being attenuated by 10 dB. • **Selco/Sifam:** a comprehensive range of Sifam vu and ppm meters plus low cost audio level meters and other panel products including control knobs. • **Sellmark Electronic Services:** are showing a working model of their *MF-100* series motorised fader which has no moving parts plus new rotary and linear potentiometers using conductive plastic tracks. • **Sennheiser Electronic:** is showing the full range of condenser microphones, pre-polarised condenser microphones and dynamic microphones, wireless mic systems for any number of channels, headphones, headsets, infra-red systems and mobile mixing consoles. • **Shep Associates:** specialists in restoration and customisation of Neve consoles. Also own products and consultancy service. • **Shure Brothers:** are to introduce the new *W15HT* series handheld wireless microphone range utilising *SM58* dynamic or *SM87* condenser cartridge. The *SM99* miniature condenser gooseneck microphone will also be receiving a first showing—a podium microphone it features supercardioid pickup pattern, integrated low noise preamplifier, and full RFI protection. The full range of *SM* series microphones will also be shown as well as *FP* series portable mixers and amplifiers, the *Automatic Microphone System* (AMS) and *BC* series broadcast phono cartridges. • **Solid State Logic:** are showing the *01* digital production centre comprising edit suite, 8-channel mixer and extensive signal processing including digital filtering, equalisation and dynamics control as well as hard disk storage of 1 hour of stereo audio (expandable to 2 hours). The *G* series options for the *SL4000* series mixing console will also be shown as will the *M* series versions of the *SL5000* audio production and film post-production

Studer A807 ½ inch 4-track

systems. • **Solid Support Industries:** wide range of stands. • **Sonic Solutions:** no information available. • **Sontec:** wide range of analogue signal processing products featuring parametric equalisers. • **Sony Corp:** digital product will be heavily featured including the *PCM-3324A*, the upgraded 24-channel digital multitrack and the *PCM-3348* DASH 48-track. Other products on show will include the new *DAE 3000* editor that will also give edit control for *PCM-3402* twin DASH machines and the *PCM 1630* to form the heart of a CD mastering system. On the analogue side there will be the *APR-24* 24-track, *APR-5003V* 2-track, with video interface for editors, *MXP-3056VF* mixing console, *WRR-28* wireless mic system and the *RM-KIT 3310* software upgrade for the *PCM-3324*. • **Soundcraftsmen:** are debuting the new *300X4* MOSFET multichannel power amplifier offering a choice of 2-, 3- or 4-channel operation giving 600 W/channel (2-channel) or 210 W/channel (4-channel) into 8 Ω. Features include two independent power supplies, two separate power transformers plus clipping indicators for each channel. • **Sound Ideas:** on display will be the Sound Ideas Sound Effects Library which contains over 5,000 stereo sound effects on 50 compact discs; the Sampler Library, which contains a full range of over 3,100 instrumental samples and sound effects on six CDs; and the Production Music Library, which is a collection of new original music themes for audio visuals, broadcast, film and commercials. • **Soundmaster International:** will be showing the Soundmaster system-integrated audio editing which incorporates *Synchro* programmable synchronisers and provides sophisticated machine control through parallel communication between an IBM computer and up to *16 Synchros*. Features include Smart Sync which enables varispeeding functions, external device tripping, software designation of master machine from the keyboard and many other edit functions. • **Sound Technology:** will be demonstrating their range of audio test equipment. • **Soundtracs:** will introduce three new mixing consoles to the US market. The *In-Line* series, which features an analogue specification matching or exceeding that of *ERIC*. The Broadcast on-air version of the *FM* range will be on demonstration in its completed form for the first time, aimed at local community radio customers. A production version of *Tracmix* automation will be demonstrated. The full range of existing Soundtracs consoles will be represented. • **Sound Workshop:** will show the *VD-3* three-man video dubbing stage console with on-board graphic equalisers, integrated software, definable machine control/monitor switching and *Diskmix* moving fader automation. Also new is a console for production work on ADR/Foley stages; modular with six mic inputs and 24-track monitoring with custom hardware/software package. System allows complete automation of ADR/Foley process. • **SPARS–Society of Professional Audio Recording Studios:** will provide literature and information on their activities. • **Stanton Magnetics:** will be displaying selections from their range of professional cartridges and styli, professional preamp equaliser and disco headphones. • **Star Case:** will be showing their range of flight and carry cases. • **Steinberg Digital Audio:** are to launch the new *Computer Controlled Recorder (CCR)* audio processor for digital recording and

Soundtracs CP6800

playback. Initial models offer storage of approximately 30 minutes phase aligned stereo on 360 Mbyte hard disk. Steinberg plan to replace the hard disk with optical storage. Two types of A/D D/A modules offer either 16-bit or 18-bit resolution, switchable between broadcast (32 kHz), CD quality (44.1 kHz) and professional (48 kHz). The D/A modules feature 4x oversampling. The system comprises 2-channel rackmountable modules, a maximum of eight of which may be connected. Applications include video and film post-production, recording studio, jingle recording and computer controlled playback, radio playlist and sound archiving and compact disc mastering. There is an optional timecode and MIDI interface as well as 18-bit A/D module with digital compressor/limiter. • **Stewart Electronics:** no information available. • **Studer Revox America:** will introduce the *A807 VUK* recorders—a highspeed (7½/15/30 in/s) stereo version for recording studio and high performance applications; and the 4½ inch *VUK* 4-track for studio and broadcast production applications, high-speed only with overbridge metering. New from Revox is the *C270* series of 2- (¼ inch), 4- (¼ inch) and 8-channel (½ inch) for applications in broadcast on-air and production, multitrack and video post-production. There are additional low speed versions for logging. The *DE4003* digital audio electronic editing system for compact disc pre-mastering on *D820X* 2-channel twin DASH machines will also be shown alongside the *A730* professional CD player. • **Studio Equipment Distribution:** will show the Court *Signature* series of soft dome studio monitors for which they are worldwide distributor. The range comprises *SN20* 150 W, *SN30* 250 W and *SN60* 400 W. • **Summit Audio:** will be showing the range of valve/tube based signal processing devices. • **Sunkyong:** details of range of tape products for duplicating applications including audio pancake tape, blank cassette tape, open reel tape and C-0s. • **Symetrix:** will be showing the *511* single-ended noise reduction system, as well as their *200* series, comprising half-rack headphone amplifier, microphone preamplifier and parametric equaliser. • **Syrinx:** will be showing the *USM 09* digital processing system offering mixing and level control capabilities with solid state memory storage.

T

• **Tannoy North America:** will be showing the recently introduced *Eclipse* compact nearfield monitor with a rated power handling of 90 W. Also on show will be the *DTM-8* small desktop monitor, which uses the 8 inch dual concentric, the FSM-U studio monitor, which uses a 15 inch dual concentric with an additional 15 inch bass unit, and the *SR840* power amplifier. • **Tascam:** showing the new *M-700* custom in-line mixing console with 40 inputs/outputs, 32-group bus, 12 auxs with bargraph meters and 4-band EQ. Also on show will be the *DA-50* professional DAT recorder/reproducer which features twin A/D and D/A converters, oversampling digital filter and separate power supplies for digital and analogue sections; and the *ATR-60-16* 16-track recorder with built-in dbx. A full selection of established Tascam products can also be seen including the *ATR-80-24* 24-track, the *ES50/51* synchroniser, the *CD-501* professional CD player, *ATR-60* series tape machines, the pro cassette machines and the *300, 500* and *600* series of mixing consoles. • **Telex Communications:** their complete range of wireless microphones including diversity types, intercom systems, broadcast series headsets and wireless mics for video cameras. • **3M/Magnetic Media:** full range of magnetic tape products for broadcast, music and video applications. • **360 Systems:** no information available. • **Timeline:** will feature their *Lynx* timecode synchroniser modules with all the latest software updates and controller system. • **Trident:** will be showing the Trident ranges of mixing consoles including new models and some restyling. • **Turbosound:** will be showing examples from the wide range of sound reinforcement products.

U/V

• **US Audio:** no information available. • **Valley International:** will be showing the full range of signal processing equipment including the *800* series, the *Micro FX* series, and the new digital multiband compressor. • **Veetronix Inc/Reach Electronics:** no information available. • **Versadyne International:** high-speed cassette duplication equipment.

W

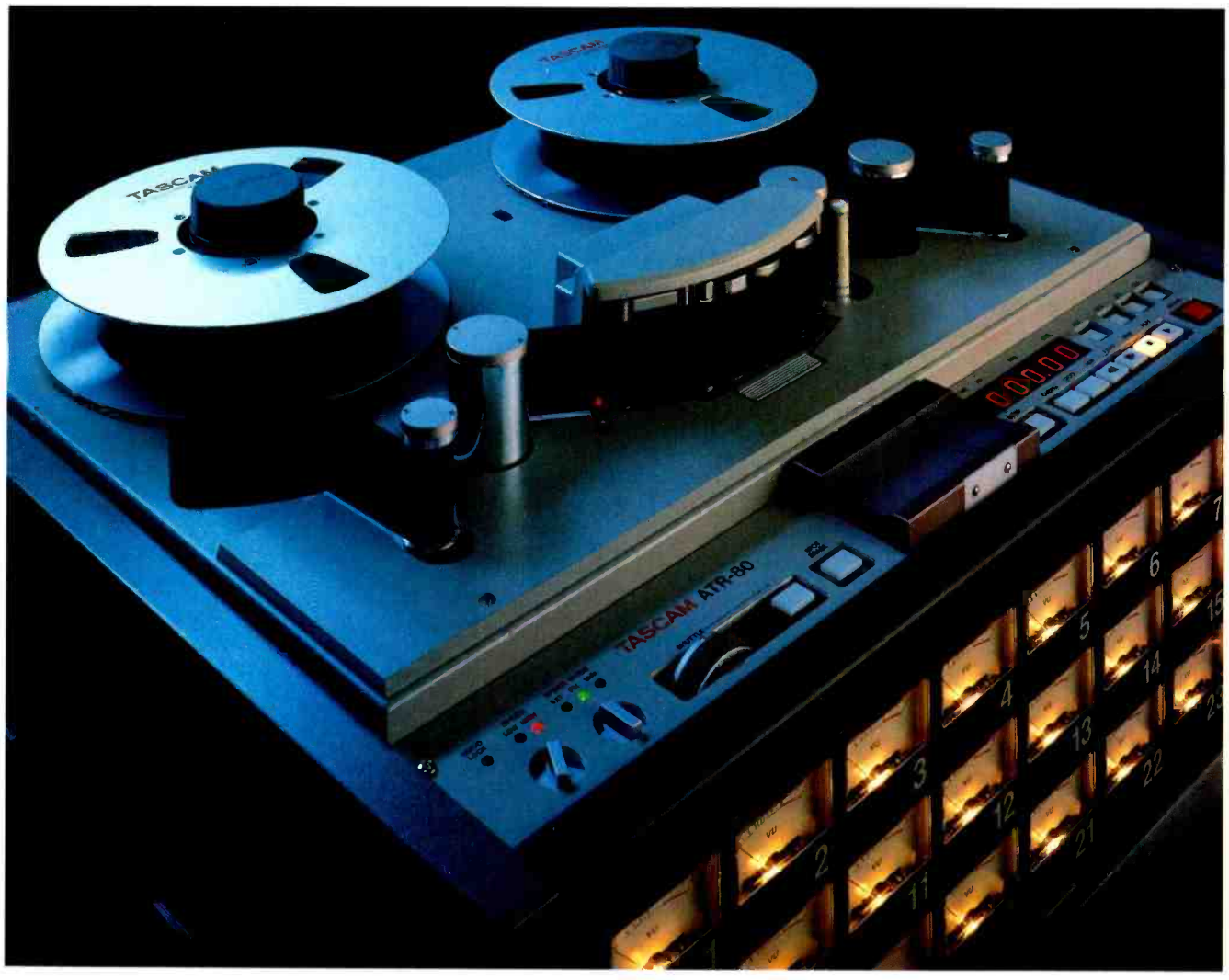
• **WaveFrame:** will be showing the latest hardware and software for the *AudioFrame* Digital Audio Workstation and the Digital Audio Bus digital processing, synthesis and mixing system. • **Westlake Audio:** will be showing the *BBSM* range of studio monitors. • **Whirlwind Inc:** audio and video cables for studio, remote and special applications with wide range of accessories. • **Wireworks:** multicable components for mics, multipin audio interconnect products including splitters, stage boxes and racks, coaxials and colour-coded cables.

Y

• **Yamaha:** will be showing the new *DMP7D* digital mixing processor. It contains interfaces enabling its use with external accessories such as the *Type 2, 3, 4* and optional interface boxes that will allow connection digitally to the DASH format or Mitsubishi *X850*, etc. Also launched is the *DA202* D/A converter designed to convert digital audio signals in AES/EBU or CD format to analogue; the A/D converter that converts eight channels of analogue to digital format for direct feed into the *DMP7D*; and the *FMC1* format converter interface that converts *DMP7* digital signals to DASH, AES/EBU, CD or DAT formats. An all-digital direct to DAT mixdown will be demonstrated. Also on display will be the new range of *PC* power amplifiers, the *NS40M* monitors and the studio version of the *NS10M*. Other products will include the *PLS1* MIDI programmable line selector, the *SPX50D* digital multi-effect processor and the *R100* reverb processor.

●

• **Studio Sound** will be based on stand 506 exhibiting copies of the latest issue together with magazines from our sister publication *One to One*. Editorial and advertising staff will be in attendance at the stand or around the Convention and we look forward to meeting anyone who wishes to drop by.



THE VERY LATEST TECHNOLOGY IN 24 TRACK RECORDING IS GOING TO COST YOU LITTLE MORE THAN A FEW MISCONCEPTIONS

You may think you know which 24 track recorder gives you the most advanced technology and design. However, you're probably in for a surprise.

It's the TASCAM ATR-80.

The ATR-80 is an engineer's dream. It has features that make track-laying and mastering faster and easier than it's ever been in a 2-inch 24 track format.

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A MOMENTARY LAPSE OF REASON - THE TOUR

Terry Nelson, Mike Lethby and Richard Vickers cover the European leg of the 87/88 Pink Floyd tour

The Pink Floyd are alive and well. I spoke to drummer Nick Mason about the concert and the new stereo system which is said to make normal stereo seem like mono: "This concert will be a big, elaborate affair and I think it points the direction in which music is going to move," he said.

"The sound will be coming from all around the hall, using an Azimuth Co-ordinator—a mixer which will really throw the sound round in all directions. You can centre all the speakers, change the direction of the sound and place a sound in any part of the room you want."

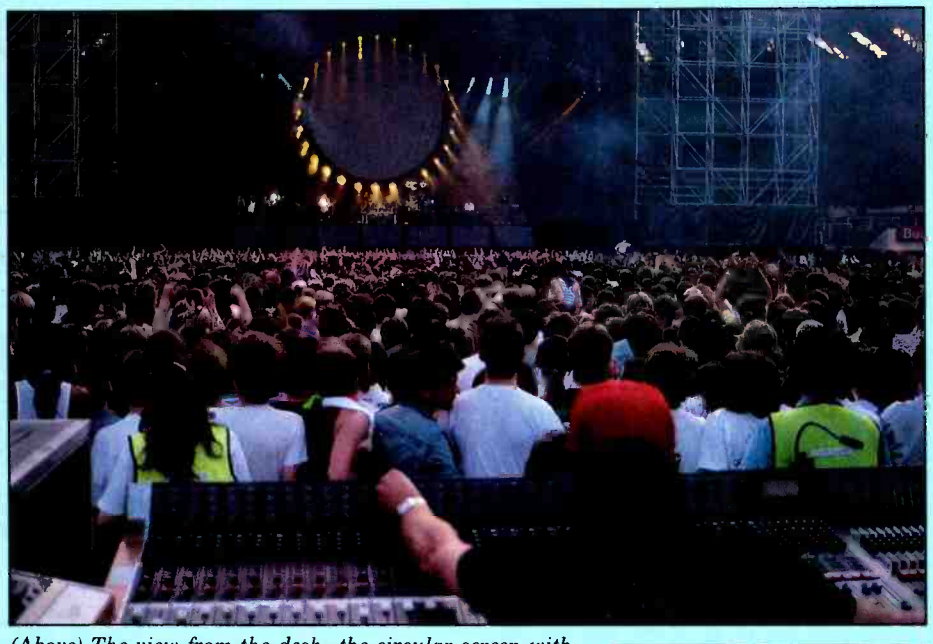
Nick sees this as the start of a new sound system. "In 20 years' time, probably sooner, they'll have home sound-in-the-round with speakers at each corner."

These optimistic words were spoken not of Pink Floyd's latest concerts at Wembley Stadium, the penultimate leg of their mammoth *Momentary Lapse of Reason* world tour, but in April 1969 on the eve of a performance at London's Royal Festival Hall, a concert which in fact was instrumental in introducing the world to the concept of live quadraphonic sound sources.

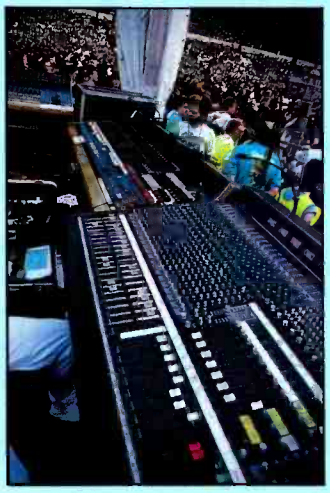
The intervening 19 years, of course, have seen quadraphonic hi-fi's introduction fall flat on its face during the '70s, through a lack of appropriate recording techniques and specific quadraphonic material, and the problems posed by incompatible rival formats.

For Pink Floyd, however—inspired by a desire to make live shows a complete visual and audio experience—this medium was, and still is, perfect. Thus in more ways than one, the 1987/88 *Momentary Lapse of Reason* world tour provided a varied cocktail of vintage dramatics and contemporary production technology.

The Azimuth Co-ordinator has long since been superseded, as have the RCA 'W' bins and sleeveless, specially chromed Vitavox horns. But the concept of a bigger and more expressive sound stage, allied to a vast array of visual effects, remains Pink Floyd's trademark.



(Above) The view from the desk—the circular screen with Varilites provides some of the effects. (Below) PA rigging. (Right) Around 140 on-stage and effects returns are routed through the FOH consoles.



In production: the concept

The production was designed from the outset to suit large US halls and the band's famed reluctance to focus on 'personalities' gave the production team an open brief to create a broad spectacle, which could be appreciated by every member of the audience.

Robbie Williams was tour production director and is a director of Britannia Row Productions in London, who, in conjunction with MSI, provided the worldwide sound production with Samuelson Concert Productions supplying the lighting. This in itself was a departure from previous tradition in that Pink Floyd would be using an 'off-the-shelf' system rather than one that was custom-made.

The crew needed to design and run the show was inevitably fairly extensive—a total of 93 production personnel was required for the European section.

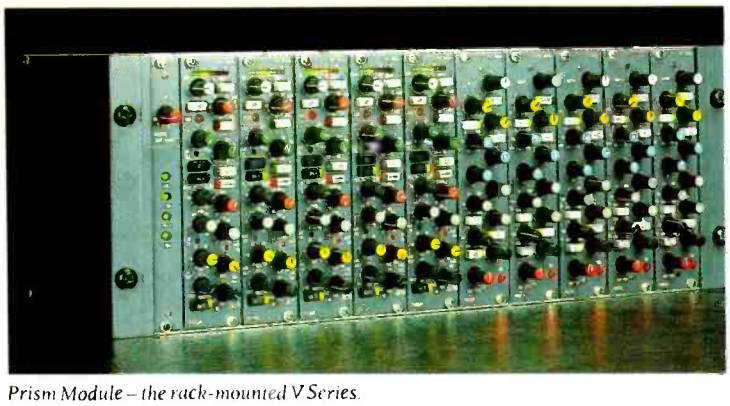
The quadraphonic system, placed in the shape of a diamond, consisted of a 230 kW MSI hi-pack/lo-pack system at the point of the star, supplemented by long-throw horns (with additional long throw horns at the mix position to augment HF coverage) and Turbosound *TMS-3* stacks at the other three points of the diamond.

Some 140 on-stage and effects return channels (with MIDI sequencing and attendant keyboard sources routed via two on-stage submixes) were handled out front by two Yamaha *PM3000* and two Midas *PRO40* consoles.

The quadraphonic PA system provided effects such as chiming clocks, clinking cash registers and gurgling water sounds during the show.

Among the multitude of visual effects were a 32-foot circular screen, used both for back-projected films and as a kaleidoscopic canvas for the Varilites mounted around its rim. Then there were lurching airborne inflatables including a 40-foot pig (in *One Of These Days*) and a giant hospital bed complete with incumbent (*On The*

WHAT'S GOING ON?



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A MOMENTARY LAPSE OF REASON—THE TOUR

Run)—a feature of the latest album cover.

Major stage lighting was provided by four custom-built mobile pods each containing eight Varilites and two Telescans, and four 'FloydDroids', circular rotating lighting clusters housing colour rays of Lasermedia that rose from the stage at set points during the show.

The pods, slung from I-beams on PTS (Pod Transport Systems) and moving vertical winches, provided horizontal and vertical motion in addition to the remote computer control of each Varilite and Telescan. Proving remarkably manoeuvrable, they swooped and dived over the musicians' heads like menacing robot vultures, creating an engineer's nightmare in working out the various load bearings and stress factors that the truss would have to endure.

To complete this complex picture were some suitably alarming side-stage pyrotechnics, a mixture of vintage and new film footage, and lasers front and rear of the stadium.

The stage

The stage was built to accommodate a host of conflicting demands: 16 musicians' monitor positions, understage up-lighting, plus moving lighting risers and pyrotechnics. Additional problems were the need to remove mobile 'props' (pig, bed, etc, which swayed down a steel from the far top end of the arena to a point backstage) from the stage area in seconds, and the sightline requirements imposed by the screen.

The solution was a 120 ft truss (probably the highest ever used) and a complex 2-tier stage construction. An open equipment floor ran under the full width of the performing stage for underfloor monitoring with a lightweight aluminium open-mesh grid some 8 ft above the equipment floor.

Adapting the initial production concept for massive outdoor arenas was a logical step as soon as the tour and accompanying album's success had become apparent—but one which was not without its own problems.

Production director Robbie Williams explains: "The difficult thing was that unlike the earlier Floyd tours, there wasn't a set theme for the show. We expected to mainly do shows indoors with perhaps a couple outside. So with the average US indoor ceiling grid set at 75 ft, the original rig was designed to fly as high as possible within that environment. It also meant we used a smaller screen for those indoor gigs in the States. Then suddenly the album took off and the tour was a huge success so the agents booked 81 stadium shows and, of course, we had to support it.

"That meant the full size screen for outdoor shows and because of the extra height needed above it for all the complex lighting trussing, we had to build an exceptionally tall stage—over 120 feet at the front, which is just below the top of the Wembley canopy.

"Apparently, it's the highest ever stage ceiling. It created some horrendous problems...mind you, it seemed like such a good idea at the time! It had to be that high to fit the projection screen in, plus the lighting pods whizzing around in there and so on. And with the projection screen being so far back, we needed an incredibly wide opening, otherwise the sightline angle is like a funnel."

The final trussing emerged as a covered roof with a proscenium arch, supported on free-standing towers, independent of the two PA wings. Lighting was then rigged from the roof trussing, with additional I-beams clamped underneath to support the mobile pods.

Williams: "Because of the complexity of what goes on underneath the stage, through it, around it and over it, there's no way we could have dealt with it as a standard arena stage. A combination of Paul Staples and myself actually got the thing into construction and it was built by FM Productions in America specifically for this tour.

"The performing area actually folds down to just seven dollies and it takes us 40 minutes to set up or break down. The whole stage fits into one truck—with the extra risers, say one and a half. It's a seriously happening piece of machinery."

Q: With such a large scale production, the trucking logistics must have been quite a headache?

"The basic tour in Europe takes 16 trucks and we've leap-frogged three scaffolding systems of eight trucks each between the shows, so at any one time we're running about 40 trucks. I think we were up to 56 in the States..."

Q: How many gigs and audiences will you have played to on the whole tour?

"We're at the 150 mark now in London and there's another 10 to go. So around 160 shows and—I was trying to work it out in the hotel the other night—three to four million people."

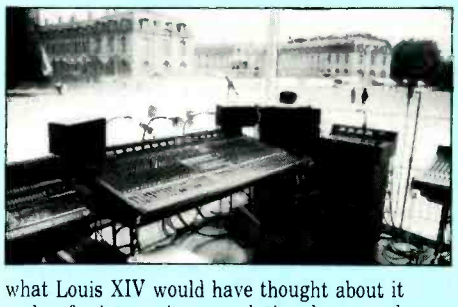
The show

The *Momentary Lapse of Reason* tour was the first Pink Floyd outing in over a decade to go out without a specific, thematic concept. The set, instead, was made up of part new album and part greatest hits.

The second half showcased familiar material, benefiting from the descending darkness which enhanced the light show that over the years has possibly become almost a bigger attraction than Pink Floyd's quadraphonic PA system.

(A mischievous rumour has it that previous bass guitarist Roger Waters owns copyright on the original female inflatable pig; and to side-step this legal hitch the band ordered a suitably attired hog.)

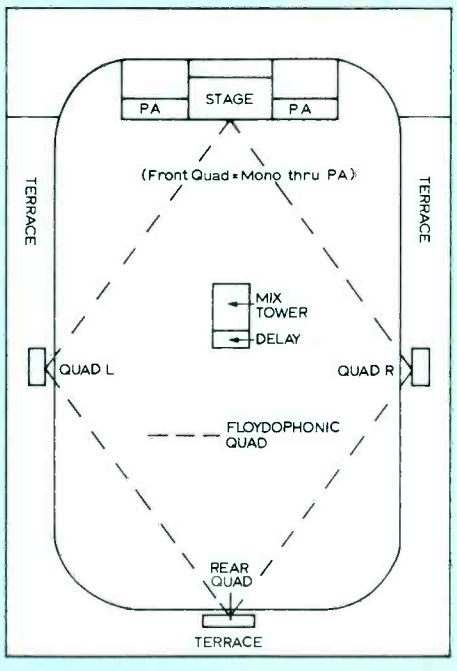
One of the high points of the tour was the Versailles concerts where the group performed on the Place d'Armes in front of the chateau. Quite



what Louis XIV would have thought about it makes for interesting speculation, however, he always did appreciate a good show! The large open space also gave the laser operators more room to work in and the firework display over the Chateau de Versailles made a fitting finale. It's not every gig that has scenery like that.

Fig 1 shows the system configuration. In keeping with Floyd tradition, this consisted of a main stereo system with a quad effects/surround system turned through 90° to give quad left/centre (this being fed through the main system)/right and rear. At the Versailles concerts the rear stack was split into two sections in order to improve coverage and provide a better view of the palace. The only apparent differences in the system at the Basle concert were that less horn packs were used for far and mid field coverage and that the rear quad system was not split into rear left and right.

The quad system was 3-way and built up from



older MSI systems. The main system comprised the newer MSI hi-pack and lo-pack cabinets together with subwoofers.

To better cover the far and mid field areas, the system was augmented by JBL 40° and 60° constant directivity horns inserted into the main stacks together with a curved array (delayed) of 60° horns behind the mix position (eight at Versailles and four at Basle). The placement of the horns varied with the venue; the 60° horns were lower down the stacks at Versailles and high up at Basle.

The front fill cabinets (again dimensioned as the lo/hi packs) containing four JBL 10 inch speakers and an MSI/Northwest horn with JBL *2445* driver.

Power to the main system required 16 amplifier racks per side with Crest *8001*s being used for the sub-bass, SAE *P500*s for the bass, SAE *P250*s for the mids and Ramsa *WP-9220*s for the highs and front fills.

All amplifier racks are wired 3-phase for the mains and connected with 9-way cabling for the audio.

"All racks, satellites, etc, are connected with eight lines of audio plus a communications insert point. This makes set-up and troubleshooting a lot simpler, as a comms unit can be plugged in at any point for talkback to the central mix positions."

The front-of-house, or head end of the system consisted of three consoles—a Yamaha *PM3000* master console under the control of Buford Jones, a second Yamaha *PM3000* for effects returns, tapes, etc, under Dave Lohr (who also ran the quad master unit) and a Midas *PRO40* console

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A MOMENTARY LAPSE OF REASON - THE TOUR

with a stretch section for drums and percussion under Larry Wallace.

Line feed capability from the stage was 104 lines (two 52-channel snakes) with two 9-way returns to amp racks, etc.

The drum/percussion set-up was a powerful mixing system in its own right, with the aforementioned Midas *PRO40* console and dedicated effects racks. The latter housed 10 BSS *DPR-502* gates, three Alesis *Microverbs*, Lexicon *PCM 70*, AMS *rmx 16*, two dbx *160* compressors and a pair of Tubetech *PE1A* valve (tube) equalisers. System engineer Steve Guest: "We use the Tubetechs for the overhead microphones. They smooth out the sound and stop it from being aggressive."

Also among the effects were three Wendel Sample Systems.

Steve Guest: "Each unit takes two cartridges with samples. The response time is very fast and for all practical purposes there is no delay. A great advantage of the system is that you can use it dynamically in order to trigger different tunings, etc. There are two thresholds—A and B—and this means that you can trigger, for example, high tom and low tom with different input levels.

The racks were nearly all grouped into dedicated functions for easy operation and set-up. The 'dynamics' rack featured six BSS *DPR-402* compressor/limiters, a dbx *160X*, two UREI *LA-4*s and a *1176*, and a Drawmer *231* (used for two acoustic guitar feeds).

The vocoder system (used on songs such as *The Dogs Of War*) included a Roland *SVC 330* vocoder, Eventide *949 Harmonizer*, Drawmer gates and a *1176* limiter. Delays were in use quite a lot with Lexicon *PCM-42*s being used for the sub-bass feed and two of the quad feeds.

"We select one tower as the reference point and then sync the other two to it."

Other effects in use included a Lexicon *PCM 70* and Roland *SDE 3000/2000* delays: "We have *SDE-3000*s crosspatched for voice delays, which lets the signal wander around the soundfield a bit, then the moment the two delay times coincide the voice goes dead centre and hits you between the eyes."—an Eventide *Instant Flanger* and two *910* DDLs.

"These have to be the only two *910*s I have come across in a sound reinforcement rig that are unmodified!"

Many of the racks were also fitted with Furman *PL-Plus* lighting/mains control units. Did Guest find them useful?

"MSI have their own transformer-isolated power system so we are mainly using them just for lighting. However, they have proved very handy and it beats crouching down with a torch to set check settings.

"The power itself for the system is designed for *330A/3* phase and we are pulling around 270 A on average. The other point that requires a lot of care is that we are mixing up 110 and 220 V feeds for the American and European equipment and a mistake could prove very costly—not to say embarrassing. I must admit that I am sometimes surprised that things have worked out so well without problems."

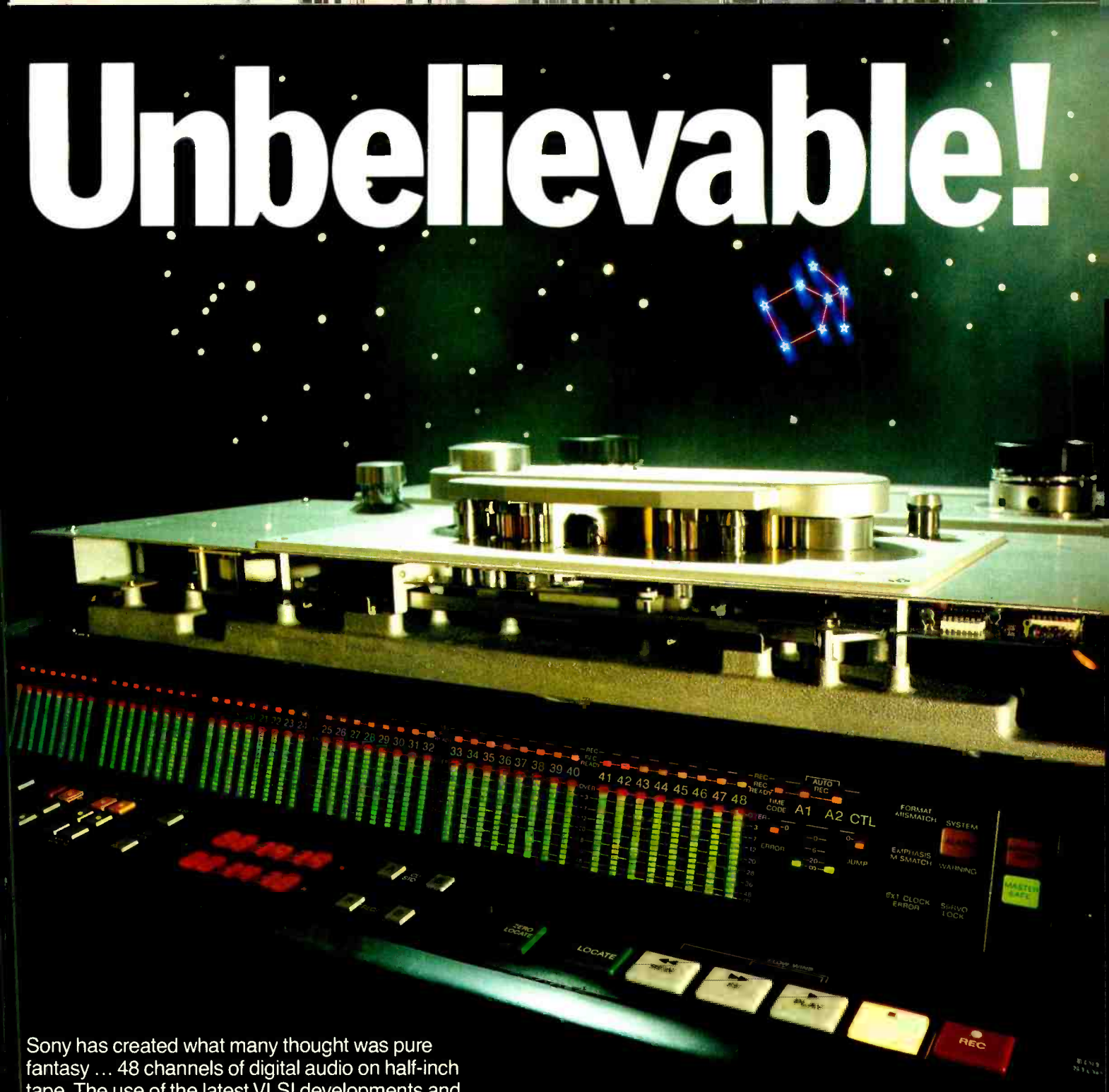
The main, or master, *PM-3000* regrouped the stereo drum mix plus sub-bass send, the effects mix and the rest of the mix sources. The main stereo drive rack housed the custom MSI crossovers and main graphics, the latter being the new White *4650* model.

The main stereo output from the master console was split into various destinations, apart from the amps/speakers, via a Primus distribution amplifier, these being the delay high frequency array, the quad/effects mixing system and the lighting desks (working a long distance away from the stage will mean that 'realtime' lighting cues that have to sync with the audio will be late if you are relying on the PA signal).

Monitoring for the main mix console was a pair of *NS-10*s with a Crest amplifier and a dbx *RTA-1* analyser. One of the advantages of the dbx is that it can use the programme signal as one of its test sources and curves can be compared between the measuring microphone signal and console output. Each concert was also recorded on DAT (Technics *D-1000*) and with an *F1*/Beta hi-fi—the hi-fi tracks being used as ambience tracks with a pair of *U87*s.

"One of the best things to ever happen to live sound is the Shure *FP-12* line bridging headphone amplifier. The loopthrough facility means that you can listen in on lines without disturbing the signal and this is perfect for troubleshooting and monitoring. However, there is a small mod that I

Unbelievable!



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A MOMENTARY LAPSE OF REASON—THE TOUR

have done and recommend, and that is to install a switch plus two LEDs to indicate phantom on both legs. I have had problems in the past where everything checked out but there was obviously a fault: nearly every time this came down to only having phantom on one leg and it can be very time consuming trying to find out where the problem is. With this modification it's very easy.

As far as onstage techniques went there was nothing startling and it had become rather a hoary joke that 'nothing has been invented in the way of vocal microphones since the *SM57*' or 'if you know it works, then use it'.

The backline equipment set-ups were very neat with all the effects and amplifiers in overall racks for each musician and custom pedalboard controllers for switching effects in and out. The speaker cabinets for the guitars were nicely hidden behind grilles.

Floydophonics—1988 style

Quadraphonic sound, as our introductory quote shows, has long been a feature of Floyd shows. And as on past outings the quad system was employed quite sparingly as an adjunct to the main PA, providing appropriate pre-recorded and live effects to enhance key points in the set. These were manually cued-in with visual effects and film footage from a FOH sub-mix.

Inevitably, the full 'surround sound' effect was best appreciated centre-field; yet was clearly audible in all parts of the arena—even vintage multitrack tapes, quality-wise, did not prove unacceptable.

Williams explains Floydophonics: "The original concept of the Floydophonic quad is that you have one source directly behind the mix and two either side, halfway between that and the PA.

"In the longer arenas, in practice, that would put the two side quads way behind the mix. Usually in arenas the mix tower's 150 ft from the stage, so we put ours at 200 ft, which is pushing it, but we make it happen—and we put the side quads level with the mix. Some places it looks a bit weird but it's not as far out as it looks.

"It's actually a 4-point system but the front one goes through the FOH stereo system as a mono signal."

Jones outlines the quadraphonic concept from the engineer's position: "We send the pre-recorded tapes out flat to the quad from a pair of ½ inch Otari 8-track machines. Then there was a really clever idea which Dave (Gilmour) came up with, which is to have two *SPX90*s autopanning in the quad—both set to stereo pan, one left to right, one front to rear—with both their inputs wired from an echo send on my console. When I turn that on it's like an automatic fig-of-8 pan, and it works great. I use that on the synthesisers a lot to make John's keyboard swirl around and a touch on the girl's voices here and there.

"The third source for quad is the small quad console with four joystick controls. That was built by Les Mathews at Britannia Row. That's also driven from my console's echo sends, so by turning on a send I can position a sound manually. We used it a lot at first but I found the *SPX90* quad send was just as precise. Now we use it on Dave's guitar where we want the guitar coming out of everywhere but we don't want it moving.

"Some of those early quad tapes have been around a long time—but they were recorded so well. The new things, the *SPX90*s and so on, add a new dimension, and using this system in different venues, I've found I can almost overcome the acoustics in a way. The bad characteristics of the hall don't somehow seem as dominant."

Q: Do time delays at various positions in the venues affect the quad?

"I appreciate that the quad, from various spots, may be very unusual sounding (laughs) because of the time factors where things meet. Unfortunately there's nothing we can do about it."

View from the desk

Texan Buford Jones is in charge of FOH sound. Had he found the tour's above-average share of poor weather a problem?

Jones: "Something like 10 out of 12 gigs have been played in rain. After the speakers have been saturated, come next day things sound a little weird until they dry out. But otherwise, with precautions like plastic shields for the mics, we manage."

Q: Is there much syncing?

"Not much except for the tapes, which hook through to the back projector at times. There's a lot of MIDI sequencing running on stage—I try not to get too involved in that but sometimes I see people running around the stage with floppy disks, saying, 'it's crashed'!"

Q: So the MIDI systems are under the control of the keyboard players?

"Yeah, there's two Kurzweil set-ups with an array of Rolands and other things. It's really been very reliable—and the sound that comes out of it is awesome..."

Q: Are the keyboards submixed on stage?

"John's keyboards are quite a complex set-up. They go through two Yamaha *DMP7*s, which are cued from the sequencers according to the song. Rick's keyboards come direct, *JX-10*, Kurzweil and *B-3* Hammond organ, and I deal with those separately. The *DMP7* balance is John's problem, and they're generally very reliable. Occasionally at soundchecks John and I trim out a few things here and there but dealing with as many inputs as we have already, 16 more keyboard inputs would just be chaotic."

Q: What about effects? Do you get dry signals from the stage?

"Most of it's dry; David has quite a few pedal effects in a big rack and he sounds so good off his amplifier that all I'm doing is occasionally putting in some (Lexicon) *224XL*, which really broadens the sound."

Q: What effects are you using?

"Several reverbs; we've gone through many but we still rely on the AMS *rmx-16* for drums along with (Lexicon) *PCM-70*s. There are some Alesis units for one-time 'set effects' and (Yamaha) *SPX90II*s for preset delays—it has some good long delays."

Q: Have you had problems tuning the system in on this tour?

"Ha—if you'd asked the same question at the start of the tour, I'd have been chewing my nails and saying it's a nightmare, we've got to have 4-hour soundchecks. But now we soundcheck in 30 minutes.

"Indoors or outdoors, I do not change my mix technique at all to speak of. A lot of the credit's due to the guys setting up the system and Steve Guest who tunes the system before I get here, so it's just a matter of musically laying the balance.

"We tape each night to find a relationship between show tapes and PA sound. I also use a dbx *RTA-1* spectrum analyser to compare system frequency response and in fact the shows don't vary much in frequency characteristics. So, no, it hasn't been a problem tuning all those sources in day-to-day."

Q: The system sounded pretty quiet between numbers. Is there a lot of gating?

"On the drums, yes, but overall I highly compliment the quality of signal coming down the lines to us."

Q: What do you attribute that to?

"To the man sitting in this chair right here (nods towards Dave Gilmour, deeply engrossed in an Apple *Mac* flight simulator) and the way he creates the sounds and knows exactly what they are. They're very clean signals.

"The only reason we gate the drums is not so much the bleedthrough or any noise, it's just that there's simply too many mics to be continually muting and un-muting. Otherwise, it's all manual muting on the consoles. There's compression on the bass, vocals and acoustic guitars but when I can, I'd rather ride the vocals. I've learned to do that instinctively. I worked with Linda Rondstadt who has an incredible dynamic range and I hated to compress her voice. I don't expect the mix to just sit there and happen—I'm motivated the entire night."

Q: You seemed to get a fair level in here last night; or as the guy I was sitting with said, 'I'm impressed by the trouser-flap'...

"Yeah—I think the council felt that way! But I don't think we're in any way too loud—if somebody says the show's 'loud', to me that means midrange; that means uncomfortable listening.

"I mix the show the way I think Pink Floyd should sound—I guess I could take a poll of everyone in the audience but it would be so confusing I don't know what I'd do! Hopefully, when I get a charge, the audience do as well. I feel the energy they're putting out on stage as much as the audience do."

Both engineer Buford Jones and MSI engineer Paul Giansante, though happy with the system's performance found their only real problem was the usual low end resonances that roll around under the deep canopy of Wembley stadium, obscuring HF clarity at the sides.

For the three engineers on the mixing tower, it was certainly far from being a case of 'set it up and leave it'; there was a great deal of 'hands-on' work to be done throughout, as well as the tape effects, which had to be cued by hand, and some nifty manipulation of the Quad Box's four joysticks at appropriate moments.

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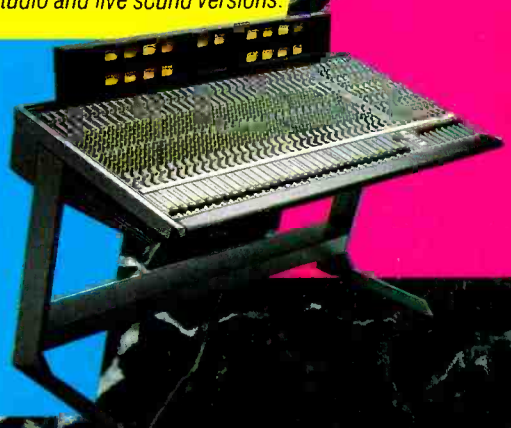

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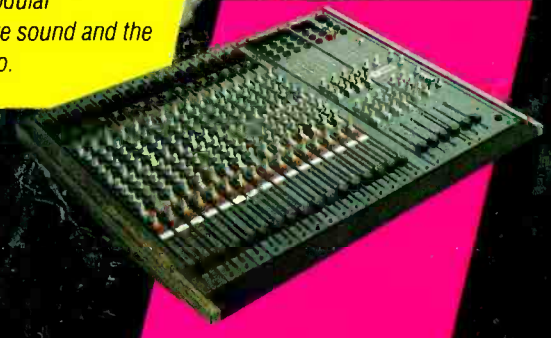

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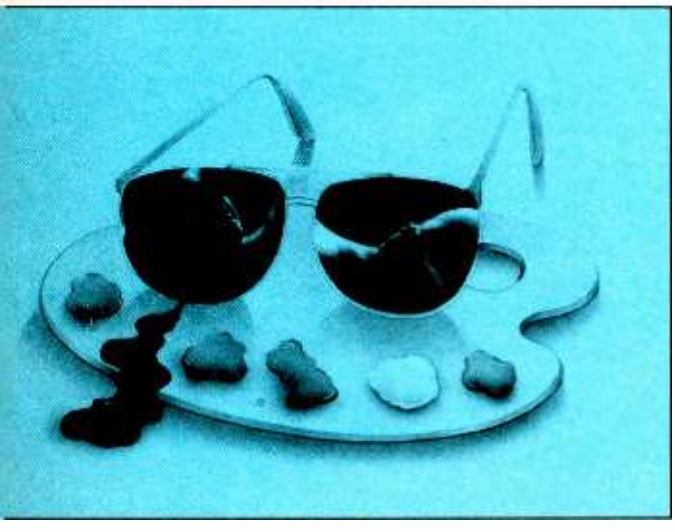

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A MOMENTARY LAPSE OF REASON - THE TOUR

Monitors

Q: There are 11 musicians on stage—do you provide them with one monitor mix apiece?

Monitor engineer Seth Goldman: "No, there's a total of 19 mixes. It's a 16 send desk, so I'm doing some insert sends, going into a graphic right after the channel. Which means I'm not monitoring anything, right, I'm flying by the seat of my pants..."

Q: Why so many mixes?

"Well the sax player has two positions—upstage and downstage, so that's two mixes. Dave has four monitors in front of him on two mixes and under the stage there's two 2×15s a side on another mix. Three vocalists—three mixes. The bass guitarist has a vocal mix and a mix of the instruments; John Carin has two mixes—one for his vocals, the other for the instruments.

"Then there are two headphone mixes: one is for the percussionist—he has a wedge behind him which is his instruments, keyboards, the proverbial clicktracks; the other mix is for the rest of the band, which is just clicktracks. Rick has two different mixes, one for his vocals and instruments. He also has a Leslie."

Q: That's presumably dumped offstage?

"In fact, there's one onstage and one offstage. The one they mic is offstage. I've got a Midas console with 36 inputs, and BSS active splitters. My monitors are *UM-1*s and 2×15s.

"I like to use the wedge that they're listening to, so I get the best idea of what's happening.

"Originally he had wanted to build the monitors into the stage but this caused many problems so he decided to build some on stands.

Q: You couldn't get the angle on them properly?

"Well with the majority of the monitor cabs slung below the stage, you get some really strange comb filtering going on, with the slats in the stage obscuring speakers and horns.

"I tried a hundred different positions but the horn on the monitors is so mean, it's a real bitch of a horn—it's really loud and clean. You have to figure out the angle so that each speaker and each horn comes out through the spaces in the grille of the staging; if you change the angle of the horn you're getting a lot of deflection and comb filtering. You look at it down there on the meters and then you come and listen to it here out on top and—what?...it's all over the place.

"Anyway, the stage monitor has a potential of around 35,000 watts."

What's in your rack?

"Analyser, noise gates and limiters. There's noise gates and limiting on keyboards and the kicks, and on the percussion the two big drums at the back have to be gated because with a 4×15 as a listening wedge it's somewhat prone to feedback...And there's a Roland *DEP-5* on the tenor sax.

"The headphones on stage (for clicktracks) are Beyer *DT-108*s and Fostex."

Q: Very loud, those Fostex cans...

"Yeah, the only thing you can't do is this (shakes his head about)—they fall off! If they want to do that, we use the *DT-108*s."

Walking around in the floor under the stage brought home the degree of advance planning that went into the tour. Monitor man Micky Sturgeon explained that the layout allowed each piece of equipment to be packed away and loaded out when it was finished with: "By the end of the gig this floor will be empty; in fact our average get-out is 4½ hours, though the record stands at 3 hours 40 minutes—with everything loaded into the trucks."

The overall lighting director/designer was Marc Brickman (who worked with Paul Staples, the production designer) and his only stipulation was that the lights should not be "just another rock and roll lightshow. I'd had enough of that, which is why I moved on into film and video production.

"My basic idea was to have a black box in which light sources could move three-dimensionally. The other thing was that the moving lights would be the main light sources—not just the special effects."

Control of the visuals required 10 computerised controllers—including an Avolites console for the colour changes—and necessitated a high degree of teamwork. "If everyone has the same general idea, then it's no problem."

Conclusion

A comment one often hears is that the musicians could really stay at home and the show would go on with the just the effects and tapes but it would not be the same. There is far more live playing than many might realise and the backing/effects tapes are just that, not a source for someone to mime to but to play along with.

To go on tour again with the reputation of exceeding the last production with bigger and better sound and lighting, it must have been some relief to Dave Gilmour and cohorts to finally hit the road knowing that all previous technological extravaganzas had been either equalled or surpassed.

As Buford Jones said, "For all of us, this tour has been the biggest thing we've ever done—we've experienced the lowest lows and highest highs. I'll never forget it."□

BLUE WAVE

Roderick Macdonald goes inside Eddy Grant's studio and discovers the other good reasons for opening a studio in Barbados

Situated on the windward (eastern) side of Barbados on a small estate built on the site of a former sugar cane plantation and some 20 minutes drive from the international airport, the studio was originally built for the private use of Eddy Grant. Since then it has been upgraded and re-equipped with a view to making it additionally available to clients on a commercial basis.

The decision to build in Barbados was the result of several factors, not the least of which was Eddy's desire to live there. Other influential factors were the stability of the local government, the presence of an international airport, the infrastructure on the island (some of the islands have simple dirt tracks for roads), as well as the government's offer not to apply the customarily heavy import duties on the equipment brought in from overseas.

The disadvantages of the location are almost all of a technical nature. The air conditioning has a great deal to cope with, the average all year round temperature is in the upper 80s and the humidity levels are frightening. This is not really the place to store your multitrack tapes if you can avoid it. Tape heads need to be constantly cleaned.

The major problem at the moment is not the inclement weather (as far as equipment goes) but the somewhat erratic behaviour of the local mains supply. In the more far flung parts of the Caribbean the electricity companies provide new supplies by simply hooking in to the nearest house. By the time one gets to the end of this chain the supply can be as much as 20% down compared to its nominal value. In addition to these 'brownouts' there are also 'blackouts' when no power is available at all. The limited number of electricity users also causes the problem of large generator-induced spikes as the whole island cooks its breakfast at the same time: increased demand pulls in extra generators causing instability.

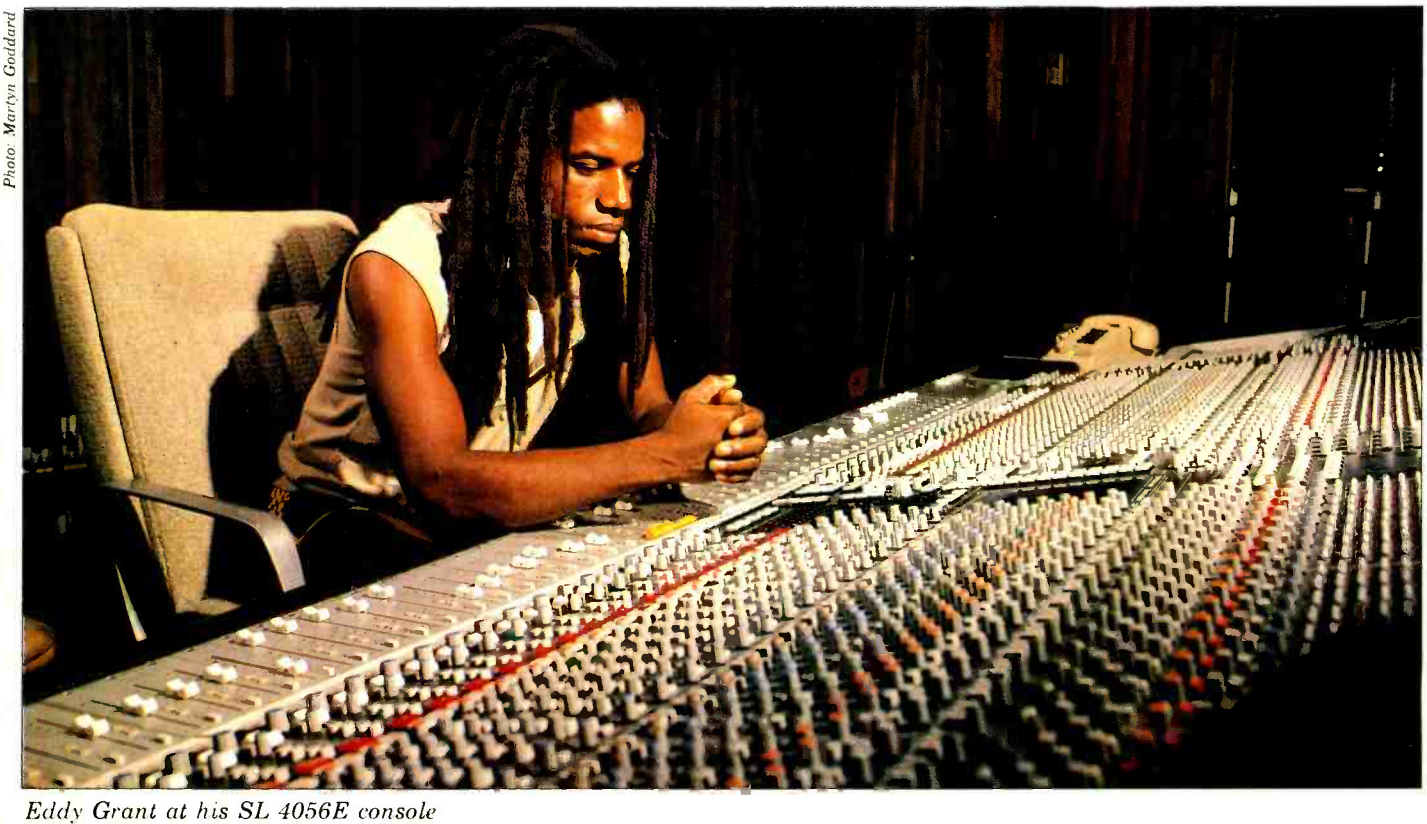
At the moment the studio is using a mains stabiliser to condition the supply to the whole facility. Part of this supply is then sent to a battery backed-up, uninterruptable power supply which feeds a stable, regulated supply to the SSL computer and console. This system works very well for voltage dips and very short duration blackouts but cannot deliver the type of current requirement necessary for more than a couple of minutes. This has prompted the purchase of a generator which will kick in and run up to speed during the time that the UPS can still deliver the requisite supply during a complete blackout.

The studio started life in February 1981 with a Spectrasonics console and a Lyrec 24-track multitrack installed in the same control room and studio that exist today. The decision to move upmarket was made in December 1983. An SSL console was ordered along with Adams-Smith synchroniser, two Otari multitracks and several new pieces of outboard equipment. In 1985 a *Synclavier* was purchased and is available for hire along with a *Mirage*, a *DX7* and an Oberheim *OB8*. The availability of these instruments in-house is of far greater significance than usual when one realises that the nearest hire company is probably at least 1,500 miles away in Florida. This is not a studio in which it is sensible to have sudden brainwaves, like hiring in a couple of Pultecs to put across the output of the SSL as this will necessitate probably the longest tea break in recording history.

The original building has been reconstructed and added to, and now provides a recreation room with pool table, a kitchen/dining room, an office area and five bedrooms. In addition to this there is an annexe with four more bedrooms with ensuite bathrooms and another kitchen. Eddy's house is also within the boundaries of the estate and last but by no means least there is a large terrace with a pool overlooking the surrounding countryside. The whole estate is set within beautifully cared for gardens some considerable distance from any other habitation. The general feel of the place is of rather upmarket seclusion.

The studio is fairly large, 27×27 ft, with a less reverberant booth of 22×11 ft. The control room features an SSL *4056E*

Photo: Martyn Goddard



Eddy Grant at his SL 4056E console

It's Time To Rack Up Another Hit.

It's hard to follow a great act. Expectations run high. The performance must be flawless. When we decided to carry the legacies of our LA-2A, LA-4 and 1176LN into the next generation, we knew exactly what we were getting into.

The 7110 combines the smooth predictable RMS style performance of the LA-4 with the precise automatic peak control of the 1176LN.

Our new 7110 Limiter/Compressor incorporates the characteristics of its predecessors, is the natural addition to a legendary line and has all the potential to become a major hit in its own right. The 7110 combines both peak and average limiting action, producing smooth, predictable RMS style performance like the LA-2A and LA-4 with the precise automatic peak control of the 1176LN.

The 7110, with our exclusive program dependent Smart-Slope,™ gives you adjustable compression curves from 1.5:1 through infinity:1. You set threshold, attack, release time and output level – the 7110 automatically rides the gain with split second response.

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Just another limiter/compressor? We don't believe so. After you've heard it for yourself, we think you'll agree. Stop by your local JBL/UREI dealer and give it a listen. And, get ready to rack up another hit.

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BLUE WAVE

series console with *Total Recall* and plasma bargraph metering. The console is currently fitted with 52 channels and there is an integral patchbay. Multitracks are a pair of Otari *MTR90*s locked together using the Adams-Smith synchroniser. Analogue mastering is on ½ in Ampex *ATR100* and digital is via the Sony *PCM-701ES* with Audio+Design interface going down on to Sony U-matic. (Frank Agaratt, engineer, explains that he can't live with the number of dropouts using Betamax.) Main monitors are JBL *4350*s and minis are Yamaha *NS-10* with the popular 'tissue paper modification'.

Outboard equipment includes Yamaha *REV-1* and a pair of AMS *RMX-16* digital reverbs. Digital delays are a pair of AMS *15.80S* with pitch change (but not as yet the keyboard or MIDI interface). Compressors, limiters and de-essers are by Audio+Design.

Design of the studio and control room is by Frank Agarrat. Frank is maintenance and sometimes balance engineer although a large percentage of clients so far have brought along their own engineers.

The control room is approximately 27 ft across ×25 ft front to back and, to paraphrase current design language, could be described as 'live end, live end'. The monitoring position gives a clear line of sight into the studio over the top of the console. The front monitor wall is reflective along the lines of the original Eastlake designs but using wood as the reflective surface (not a lava rock in sight). This, of course, is the opposite of *LEDE* design where the front of the room is made as anechoic and absorptive as possible to avoid any early reflections (the intention being to produce as coherent an image as possible by the removal of multipath arrivals separated in time at the monitoring position). The room also features a compression ceiling à la Eastlake, thus increasing the SPL at the monitoring position, enabling the monitors to operate at lower levels than would otherwise be required. The back of the room is predominantly wood and is therefore reflective, this makes it similar to the back of an *LEDE* room with the major difference being the lack of RPG-type diffusers normally found in *LEDE* designs. All in all it's a rather unorthodox design.

But does it work? The only sensible answer, at the moment, is probably! The main problem is that the room was built prior to the decision to buy an SSL. When the SSL was installed it was positioned closer to the monitor wall than the original console. Unfortunately, this means that the monitors are now at the wrong angle and focus on a monitoring position some considerable distance behind the ideal position. The combination of this and the horn-loaded drivers of the JBL *4350*s (with their narrower dispersion than soft dome drivers) means that there is a bit of a hole in the middle of the stereo image. Frank seemed to agree with this and pointed out that the obvious remedy of changing the angle of the monitors necessitated fairly serious surgery to the whole of the monitor wall as the monitors were not sitting in some kind of universal-sized monitor pod, but were an integral part of the structure. In addition he is considering the installation of a soft dome monitoring system and feels that all the changes should be carried out at the same time.

All this makes the room sound unusable, but nothing could be further from the truth. Comparison can be made with some of the best sounding rooms in Europe and the USA. A large number of independent engineers use their own nearfield monitors these days and everyone is familiar with the in-house Yamaha *NS-10*s. Frequency-wise the room and monitors sound quite happy, it's just a problem of stereo image. The majority of clients would probably be coming here to put down tracks in relative peace and quiet and would then mix in one of the recording centres of the world.

Until recently the studio has not been actively marketing itself due to the inevitable conflict of it being both a commercial studio and also Eddy's own place of work. This problem has been partially alleviated by the acquisition of another building some distance away, the intention being to build another 24-track studio for Eddy's own production work. Recent projects have included Sting's *The Dream of the Blue Turtles*, Mick Jagger working on a solo project, Musical Youth, The Explorers, Branford Marsalis and a remix of a Prince track.

The going rates are similar to those one has to pay in London for a good 48-track studio, the additional costs being the accommodation and the air fare. All the rooms are air-conditioned and most have ensuite bathrooms, television and telephone.

This is, all in all, a very enjoyable place to work if you get the chance; particularly in the middle of an English winter.□

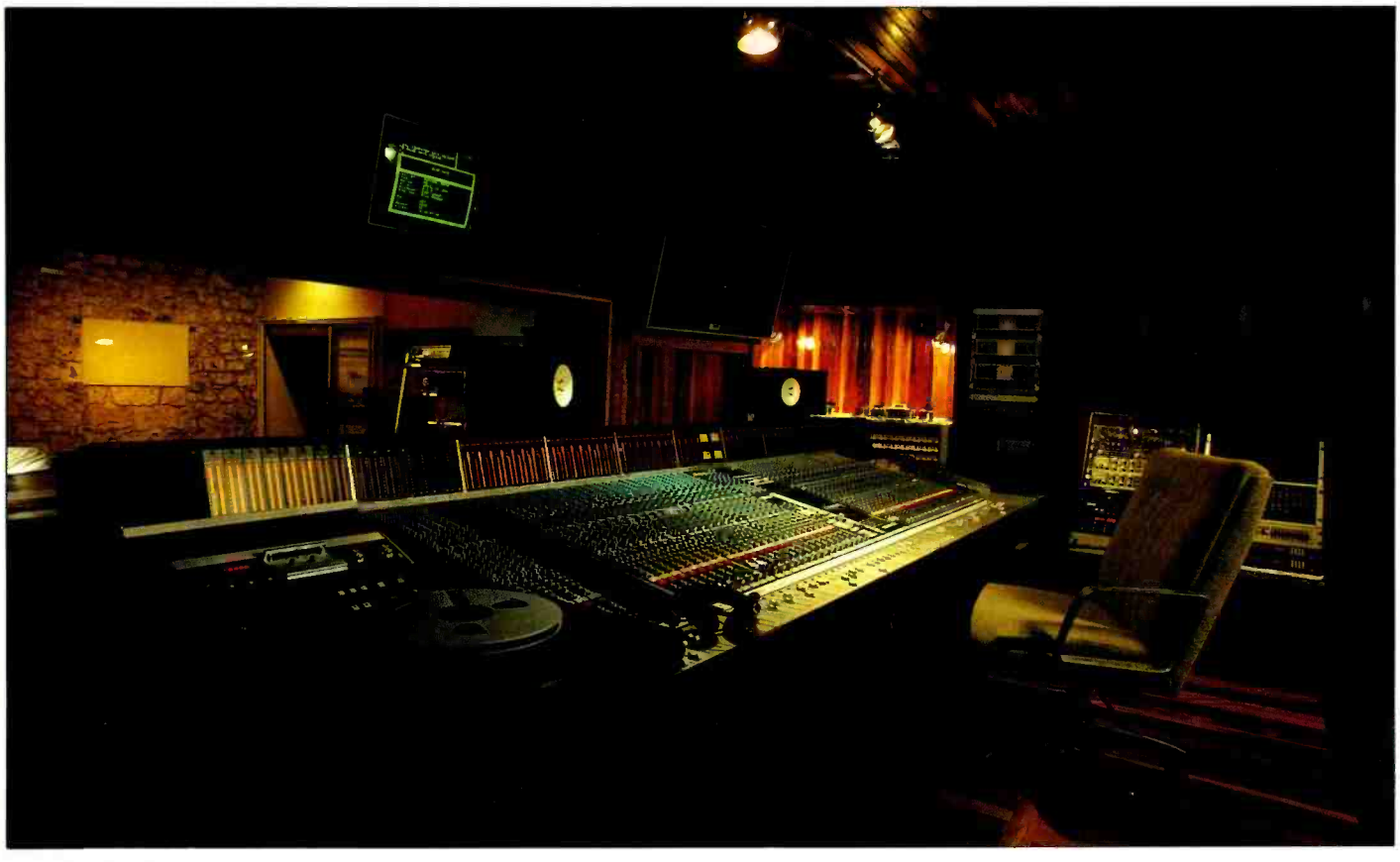


Photo: Martyn Goddard

ECHO TIMES

9 AudioFiles for Streeterville Chicago

In the largest single order ever placed for hard disc based digital audio systems, Jimmy Dolan of Streeterville Studios has unveiled plans to incorporate 9 AMS AudioFiles (TM) as the heart of his new studio complex situated in downtown Chicago.

Jim Dolan, previously owner of 3 NED Synclavier systems, has been no stranger to disc based digital audio. He and the technical staff at Streeterville have been carefully monitoring the developments of all commercially available and proposed hard disc editors/digital workstations.

"At Streeterville, we are committed to being the best we can be. We want our clients to know that they come first, and that we will perform whatever is necessary to fulfill their most creative vision. This has sometimes meant that our engineers have had to actually invent new methods to address these needs.

In the same way, when we decided that the best overall system for Streeterville would be based on a random access, digital audio storage medium in a central core, we were prepared to start building. However, fortunately for us, while our needs at Streeterville were growing, so was the ability of the AMS AudioFile. AudioFile has come a long way since we first took a look at it 3 years ago, both in terms of operational features and the systems approach which AMS has adopted. Because of its open ended architecture, it has continued to grow and develop in ways that put it way ahead of any of its competition. AudioFile is already unique in the things it can do, and with the coming availability of networking and dynamically automated digital consoles like Logic 1, it is clear that AMS with their experience has a very good understanding of what is needed from these systems. Plans revealed to me recently leave me in no doubt that taking this step at this time with AMS/Calrec is clearly the best way to go, for Streeterville and the clients that depend on us."

Jimmy Dolan, Streeterville.

Left to right Doug Ordon, Nigel Branwell (AMS) and Jimmy Dolan (Streeterville)

Douglas Ordon, the Chigaco representative for AMS said "In January of '87, I had the privilege of placing the very first AudioFile in America into the hands of Editel-Chicago. Now, almost 2 years later, the pioneering spirit here in Chicago has once again provided us with another first; the placement of the first "multi-room" AudioFile system, comprised of 9 individual units networked together, at Streeterville Recording Studios.

Jimmy Dolan and Steve Kusisciel of Streeterville, took their time in assessing the different disc based systems currently out there. I mean they **really** took their time. They picked every brain they could find. They discovered, as I did, that AMS is constantly moving the goalpost further downfield, redefining the yardstick by which all such systems are measured.

The audio community in this neck of the woods has been good to me. Once again they've rallied around a leading edge product that I felt was destined to be a long term winner. Streeterville's thorough and careful decision to standardize the use of the AudioFile throughout their facility reinforces what I believe. AMS/Calrec viewed as a total, is the leader in hard disc digital recording technology. I have always believed in the AMS potential, and the continued success we've enjoyed here in America's heartland tells me that I'm not alone."

Doug Ordon, Douglas Ordon and Company.

Four of the nine systems have already been installed at Streeterville such that work started in one room can be completed in any other without physical relocation of hardware. Streeterville will be employing the AudioFile Networking System (See adjoining story) which will also expand to accommodate the remaining 5 systems, to be supplied to Streeterville as the additional, newly planned suites come on-line.

Chicago is yet another city that has come down heavily on the side of AMS AudioFile for its disc based digital audio post production, as can be seen from the increasing number of facilities who now operate one or more AudioFiles. Chicago Recording Company have just added a second AudioFile to their facility and Szabo Tohtz has ordered the first LOGIC 1 for delivery in the U.S.A.

AudioFile owners with one or more systems in Chicago:
Editel
Chicago Recording Company
Szabo Tohtz
Avenue Edit
Universal Studios
Streeterville

LOGIC

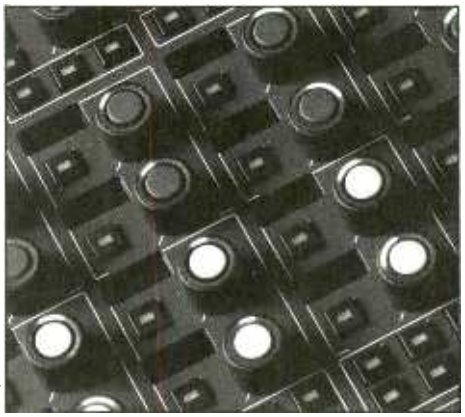
A FULLY AUTOMATED DIGITAL DESK FOR AUDIOFILE

The NAB Exhibition in Las Vegas, U.S.A. during May saw the launch of the first in a series of all-digital consoles from the AMS/Calrec R & D departments.

LOGIC 1, a dynamically automated moving fader console, has been designed to work in conjunction with AudioFile. Together, LOGIC 1 and AudioFile offer a highly comprehensive and flexible production centre for the professional audio engineer, whether working exclusively with sound or with sound to picture.

The console control surface attracted a significant amount of critical acclaim during the exhibition, particularly several unique features for which patents have been applied.

The moving faders incorporated in LOGIC 1 are based on linear motor technology and



Logicator (TM) Controls.

have been so designed as to reduce the uneasy feel that can be introduced by pulleys and springs used in conventional motorised faders.

Every pot control from pan, mic input, aux sends and EQ can be dynamically adjusted and on replay "move" with the automation exactly as adjusted during the automation update mode. This "movement" is courtesy of a further device that is the subject of a patent application - the Logicator (TM) control. Logicator is a touch sensitive control knob featuring fibre optic technology that allows both pinpoint accurate settings and broad bands of display to be available on the head of any knob on the control surface of LOGIC 1.

The console itself employs 32-bit floating point processing and operates with an internal dynamic range exceeding 1500 dB. Existing AudioFile owners will be pleased to learn that any AudioFile so far supplied by AMS is capable of being retrofitted into a LOGIC 1.

The first LOGIC 1 in the U.K. will be going to Tape 1 and the first in the U.S.A. to Szabo Tohtz in Chicago, as mentioned in the earlier article on Streeterville.

EDIT

A DIGITAL AUDIO MINI MIXER

AMS/Calrec launched their second digital audio mixer this year at the IBC (International Broadcast Convention) in Brighton, England at the end of September. EDIT 1 can accept either analogue or digital inputs but has been designed primarily to operate as an automated audio mixer in conjunction with the new generation of digital video tape recorders.

EDIT 1 is an 8 into 2 mixer (any or all channels can be mono or stereo) with a 19 inch rack-mount configuration for direct mounting into existing furniture, or it can be supplied in its own desk top housing.

EDIT 1 and AudioFile can be directly interfaced for those wishing to take advantage of the automatic audio editing software within AudioFile whilst it is under the control of a video edit system.

THE AMS DIGITAL AUDIO NETWORK

AMS AudioFile has now become established in over 20 countries worldwide and can be found working daily on a host of different projects and being applied in a variety of different ways.

The wide scope of AudioFile's operation has resulted in an increasing number of owners purchasing second and even third systems. In such situations, a trend is revealing that each AudioFile, rather than being used on a project from beginning to end, is being used to perform a dedicated function.

An AudioFile in a small room with a sound effects library can be used purely as an editor or for pre-lay. The same system can be available for control from a video edit controller being used in an on-line video edit suite. A second AudioFile may well be used in conjunction with a small mixer for dubbing or ADR work, whilst finally a third may be available in an automated mix room. Once a facility is working in this way, the ability to complete audio work in one area and have it immediately available for continuation of work in another is of paramount importance.

A matrixing system has been available to AudioFile owners for some time, which performs this function by permitting any control surface to be instantaneously switched to operate with any mainframe.

The latest developments have been aimed at providing a circuit card which can be inserted into any AudioFile to allow up to 32 systems to operate on a ring network. This same card is currently being used as a communications card between AudioFile and LOGIC 1.

Significant further advantages of the AMS Digital Audio Network mean that several AudioFiles can be working on the same piece of material at the same time. Also, a single AudioFile on the Network with a large memory capacity (anything up to 16 hours) can hold a company's sound effects library which is then available to any other AudioFile on the Network.

UA 8000 w/ TASC

FURTHER UA 8000 AND DIGITALLY ASSIGNABLE CONSOLES FOR UK STUDIOS

Odyssey studios in central London have replaced one of their SSL consoles with a 48 channel UA 8000 with TASC automation. In a move to offer his clients a greater choice for music recording Mr Wayne Bickerton, Managing Director of Odyssey Studios, feels that the UA 8000 has already become a favourite with his clients.

"The audio quality and flexibility of the UA 8000 are things that a lot of people have been talking about. Taken in conjunction with a powerful yet straight-forward to use automation system, it is not surprising that once used on a project, my customers find it difficult to go back to anything else."

Abbey Road Studios, owner of a 64 channel UA 8000 with TASC automation, have recently completed extensive refurbishment work on their Studio 3. The work has involved the swapping round of the studio and control room with acoustic work by Sam Toyashima. Ken Townsend, General Manager of EMI Abbey Road, said "This new room has been designed to be the best in London and as such reflects what we believe to be the very best that can be made available to the most discerning client."

Music Factory in South Wales have enjoyed a great deal of success since the installation of their UA 8000 and TASC. John Davies, Studio Manager at Music Factory said "When you know music recording studios in London are having a tough time you can bet regional studios like ours should be also. What the UA 8000 has done for us is give us an edge over London Studios and resulted in us being fully booked with advance bookings that typically stretch months ahead."

Scottish T.V. have joined the BBC and Thames Television with their decision to purchase AMS/Calrec digitally assignable consoles. The first will be used in Gateway Studios at Edinburgh.

Steve Jagger (L). AMS/CALREC and Wayne Bickerton of Odyssey Studios

HAVE AUDIOFILE WILL TRAVEL

An increasing number of successful sound engineers have looked hard and long at AMS AudioFile and decided that their freelance services can be greatly extended by working with their own AudioFile. By offering a combination of their talents combined with the capabilities of AudioFile, a new generation of sound engineer is finding itself very much in demand – and location presents no problem at all.

Of particular interest is the broad spectrum of applications that these new specialists are beginning to create – from sound editing for film and video to music editing for albums as diverse as Iron Maiden to the Everley Brothers.

What follows is a selection of comments from a few individuals who have geared themselves up with flight cases and an AudioFile and who seem quite happy to travel anywhere with their systems.

Anthony Faust (London)
Tel: 01 437 0516

"I have equipped myself with a completely portable AudioFile facility for tackling anything involving sound to picture. All my equipment is flightcased and fits into an estate car. Besides AudioFile I also carry triple standard U-matic recorders and monitors as well as a centre track timecode Nagra, a tape streamer, timecode equipment, an R-DAT recorder and CD sound effects libraries."

"I've got a package and a formula that allows me to demonstrate greater speed and flexibility of working to anyone currently involved in the post production of sound for film or video."

"Having been a sound editor in film for more years than I wish to remember, I take great delight in witnessing the sparkle in individuals' eyes as they tumble to what AudioFile can mean to them for all their future projects."

Andy Hilton (London)
Tel: 01 708 0483

"With my rental company, Hilton Sound, having offices in Paris and London, naturally any equipment I do business with has to be portable. Transporting AudioFile around the continent is child's play, and getting to grips with AudioFile represents few problems for our clients.

Apart from hiring it out on more traditional projects such as sound to picture work, we are at the same time watching AudioFile evolve as the heart of the latest music post production craze – 'Acid House'. Armed solely with one of our AudioFiles, 'Acid House' Producer 'Zeo' was recently featured live on Channel 4's 'Network 7', transforming a Glen Madeiros single into the Acid House genre. Few demonstrations of the system's real time editing and recording capabilities could have been more pressured, but impressive results were performed live in front of millions!"

Andy Macpherson (Manchester)
Tel: 061 485 8942

"I've got a title of "Mr Drums" and for me my ideal combination of equipment that does just what I want is a Mitsubishi digital multitrack working in conjunction with an AudioFile."

"I've already had my AudioFile on aeroplanes where a "fix-it" job has been necessary on a project and going back to an analogue way of working without AudioFile is just unthinkable."

Tom Allom/Ted Stein/ Eric Shilling (USA)
Tel: (305) 947 5611

"Between us we own a single AudioFile that has already been used on the creation of the most recent Judas Priest album at PUK Studios in Denmark, the current Everley brothers album project in both Nashville and Los Angeles and also on numerous Miami Sound Machine projects in Miami".

Tom Allom has this to say of AudioFile, "AudioFile is a brilliant aid to record making – it's hard to imagine going back to the old methods having got used to its precision and both time and energy saving features.

Dave Aston (West Yorkshire)
Tel: 0274 566747

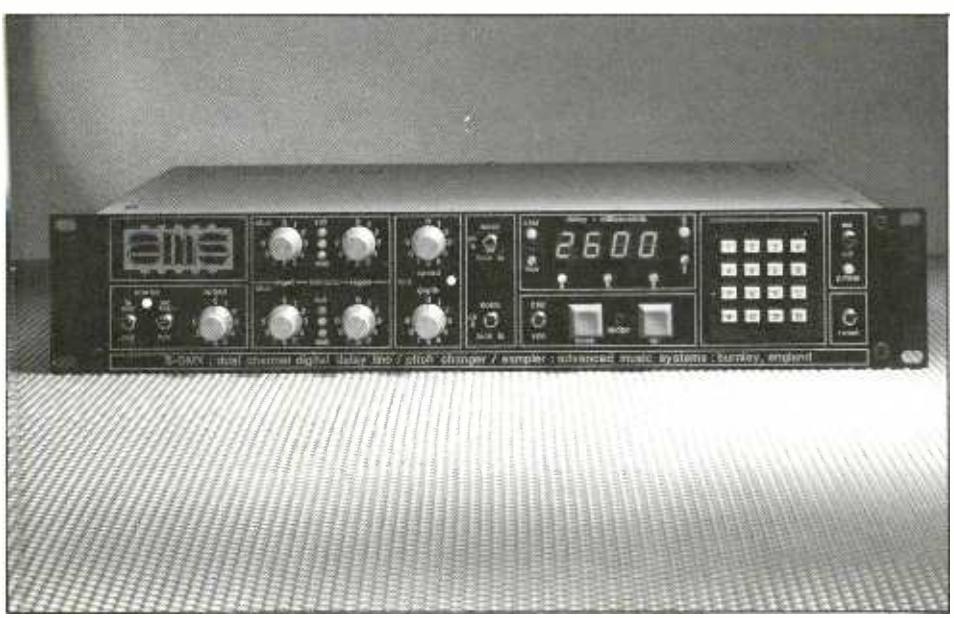
"A year after purchasing AudioFile I feel I've learnt an awful lot and I still feel as enthusiastic as ever about this system. A certain amount of my work involves music editing and undoubtedly AudioFile is definitely the best thing since spliced tape! For me and my business, the portability of AudioFile has definite advantages and the inevitable phone calls requesting – can you come now? – doesn't present any problem."

"I am just as at home working with sound for pictures as I am editing a broad cross section of music. The best thing about AudioFile for me is that the system is a creative tool where I am an artist and not just an operator"

STOP PRESS

At time of printing, Young Guns, a 1980's western and the first major feature film to have the sound post production done on AudioFile, appears at number 6 in the American movie charts.

Wylie Stateman of Soundelux in Hollywood reports "The entire post production editing of the film was accomplished using the facility's two AudioFiles. First reaction to pre-release viewing of the film and its soundtrack are wildly enthusiastic. The precision and high quality first generation sound could not have been achieved without AudioFile."



S-DMX. A NEW STANDARD OF EXCELLENCE IN DIGITAL AUDIO PROCESSING.

A further series of enhancements to the AMS DMX 15-80S dual channel delay/pitch changer/sampler has been accompanied by a name change for this every popular piece of studio equipment.

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Finally, all S-DMX's are also equipped as standard with a MIDI interface, which was previously an optional extra.

JEFF WAYNE interview

Jeff Wayne is probably best known worldwide for his double album creation "War of the Worlds". What is less well known is that he owns multiple AMS digital audio processors and has just purchased an AMS AudioFile to help him complete his new project "Spartacus".

A.M.S. I am correct in thinking that you came from a musical background?

Jeff Wayne: Yes my father was a singer and writer. He was a popular singer in my home country of America from the early forties up until the early fifties when we moved to England. The move to England was for him to play the role of Sky Masterson, one of the leads in the original "Guys and Dolls".

We stayed in England for four years and he got involved more in writing and production.

AMS: So how old were you when you came To England?

JW: Nine. I was brought up in New York before coming to England, and returned to New York for about three years before graduating at high school and college in California. I came back to England in 1966 and decided to stay. The reason I stayed was I wrote a West End musical that ran at the Palace Theatre, which I am sure you know is now owned by Andrew Lloyd Webber. I intended just to come and see the opening of the show and then go home – but as you can see, I'm still here!

AMS: So what made you stay?

JW: Well, I found my first consistent income when I started writing music for commercials. Involvement in this work meant I met a lot of singers, musicians and entertainers and I started producing records – as usual one thing lead to another. By then it was the early '70s and I got lucky because the first artist that my own company ever signed was David Essex and the first record we did got to number 1 in America. That was "Rock On" and we got a Grammy nomination for it.

AMS: Did that herald a long relationship with David Essex?

JW: Yes it did. However I also took on 11 or 12 movie scores and T.V. work in between working with him and thinking about starting War of the Worlds.

AMS: When did you actually start War of the Worlds?

JW: It was started in 1975 and handed over to CBS in mid 1977. We prepared it for release by making singles from it and doing videos – not quite like the videos of today but, then again, not bad for the time. Sadly, CBS in America didn't want to know about it saying that projects like this never happen! Then, of course, it did!

AMS: So how many copies has it sold so far?

JW: War of the Worlds is still selling and still moving very nicely. It stayed in the U.K. charts for almost 7 years and over a year ago passed 4 million double albums and a couple of million singles.

AMS: So what happened in the States?

JW: It's sold nearly half a million albums in America which is less than it sold in Australia, but we had lots of distribution problems. One of the major problems we had was that it was never listed accurately in Billboard. Somehow it got into the section marked "film soundtracks" whilst it should have been on its way up the charts – and of course there was no film. I can show you some wonderful press reviews of a soundtrack to a movie that doesn't exist! We also had a single that did very well – "Forever Autumn" but even that was listed as a single off a Moody Blues Album!

AMS: Does that mean the U.S.A. has now missed its chance for exposure to the War of the Worlds project?

JW: Fortunately not. My most recent contract with CBS involves a remixing of War of the Worlds once Spartacus is finished, for re-release wherever they choose. I'm delighted. Don't forget, when War of the Worlds was first made in the mid '70s, not only did we not have an AudioFile, we didn't even have RMS 16s and DMX 15-80Ss. It'll be fun – It won't be a chore!

AMS: Do you remember your first contact with an RMX 16 or the DMX 15-80S?

JW: I started as a musician, not an engineer, so I always have noticed effects that machines can produce. I would think of effects and write for them. My first meeting with AMS equipment was in my original studio in London, being part of JWM (Jeff Wayne Music). It was wonderful and without being overly flattering it was undoubtedly the best of its kind for me.

AMS: Is there any favourite way you like to use the RMX or DMX?

JW: I just don't think I can give you one answer to that, quite honestly. They really are classic "instruments" and as such have a range of facilities that are still viewed and used every day in that respect.

AMS: You've looked hard and long at hard disc recorders before purchasing AudioFile, what do you see the immediate advantages of this particular system are to you?

JW: Spartacus that I'm working on now is my second project. When I look back at War of the Worlds I know that if I had had an AudioFile, and ONLY an AudioFile, my life would have been much different. This is simply because these projects combine both dialogue and music, using both film scoring and contemporary music scoring techniques. The way editing is done on AudioFile, the quality of the sound because you aren't continually laying-off and back – the whole range of facilities couldn't have failed to change my whole professional life. Jumping ahead to where we are now with that experience, I'm sure with what I already know about AudioFile and also what I'll discover – creative expression on the system will definitely make for a very exciting project.

AMS: Whilst the Spartacus album will be receiving your major efforts over the next 18 months or so, will you still continue with other pieces of work for TV where you can take further advantage of AudioFile?

JW: Oh yes, I'll continue to do TV themes such as the TV-AM and Good Morning Britain ones. That's what appeals to me about AudioFile specifically – it has such a width of application.

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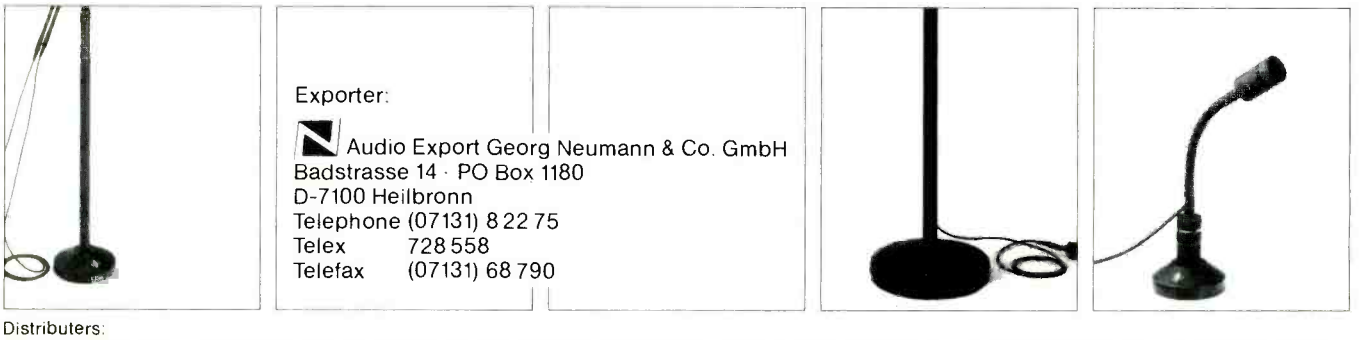

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THE BRIDGE

Janet Angus visits this audio facilities house in Central London

The Bridge is one of a new breed of audio facilities houses for video and television post-production. Situated in Great Marlborough Street in Central London it was born out of the highly successful Silk Sound studios round the corner in Berwick Street. Had partners Robbie Weston, actor David Tate and DJ Tommy Vance not been fortunate enough to find premises so nearby they would not have been able to implement such diverse facilities but the result is two very different facilities, which are nevertheless wholly compatible.

Silk Sound comprises four very busy studios where the atmosphere is extremely frantic and hectic, according to Robbie Weston. By mid 1985 they had reached a point where they all wanted something a bit more relaxed and spacious as well as a total upgrade to embrace the latest in automated mixing and hard disk/digital recording. Yet at the same time they were loath to disrupt a facility that was working flat out just for the sake of it. The obvious answer was to expand.

"Silk does everything from 24-track dubbing to cassette duplication and voiceovers—a very real mix of things," explained Weston. "The length of sessions tends to be short—it is quite usual to have eight 1-hour sessions going on in every studio in a day. That means that every hour there are four lots of clients in reception and copies need to be made, etc; it tends to be a bit mad."

The new facilities and equipment were to open up a broader market. Here television programmes for Channel 4 and longer commercials are worked in an altogether more comfortable and ergonomic environment. The design including all interior design, acoustic work and technical equipping was carried out in-house by Weston himself, Rick Dzandzera, Bill Gautier and, towards the end, Steve Kennedy. Weston's background includes periods with Radio Luxembourg, Capital and Molinare; Dzandzera's Air Studios, Molinare and LBC. Gautier had been with Silk as an engineer for the past three years and Kennedy arrived fresh from building radio stations in New Zealand.

They felt that between them they had the experience to do the design themselves without having to explain what they wanted to a middleman who would then have to interpret those ideas and explain them in turn to the builders.

"We just thought it would save a lot of time and expense," says Dzandzera.

"We didn't want to do what everybody else does, ie pay someone else to do it," added Weston. "It's not like a rock and roll studio; I don't think there is anyone with the necessary expertise to do it for us. It was finished on time, within budget without having to sue anybody! And our ideas haven't been used for someone else down the road, which is what tends to happen."

After seven months of searching for suitable premises Great Marlborough Street came on the market. Weston: "We found some appalling places, and there were others that seemed fine until the underground trains suddenly went rumbling by."

Although they started with an empty shell and initially considered installing three studios, the team very soon decided to restrict it to two very large facilities. "We wanted control rooms with a lot more space so that we could fit lots of clients in more comfortably. These projects seem to involve an awful lot of clients sometimes!"

The first thing Rick did was draw lines joining up all the pillars as they wanted to hide every one of them. "There was quite a lot invilved in isolating these rooms from the Marks and Spencer lorries delivering to the store opposite us. We worked around soundproof boxes manufactured by alpha dBk, and therefore getting the acoustics right was relatively simple."

They did initially try to work with an architect as they felt there was a need for technical drawings. However, when he baulked at the positioning of the monitors, preferring to have them flush-mounted at floor level, Weston decided it was time the man took his leave.

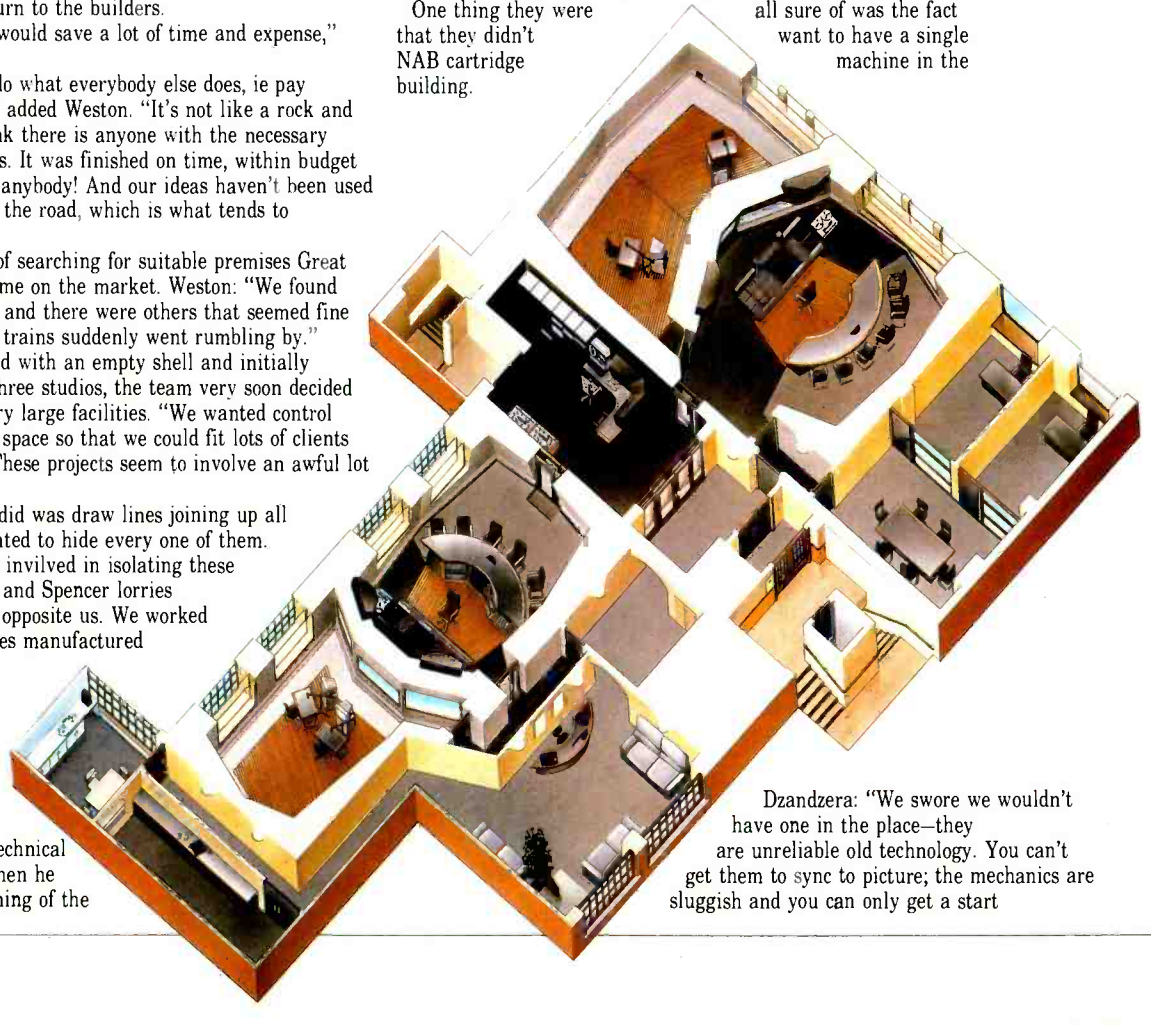
Each of the two control rooms has its associated voiceover room and both are connected to a central all-purpose machine room called the Engine Room. Much juggling of doors and windows took place so that clients in either studio would not be aware of the other. "We wanted customers to feel that they get individual service and are not just part of a big complex," said Weston.

Amazingly the whole complex, for complex it is, was designed, built, wired, interconnected not only internally but also to Silk Sound, and commissioned in one go. Dzandzera is not ashamed to admit that this put quite a stretch on resources. "But it had to be done that way. Given the layout it would have been totally impractical to still have the builders working at one end with customers stepping over them in the central reception area to get to the studio. Also we couldn't work with just one studio and cover our overheads. For some reason we never considered that it might—that was never even mentioned. Doing it all in one also concentrated the period of agony and sleepless nights which was quite good."

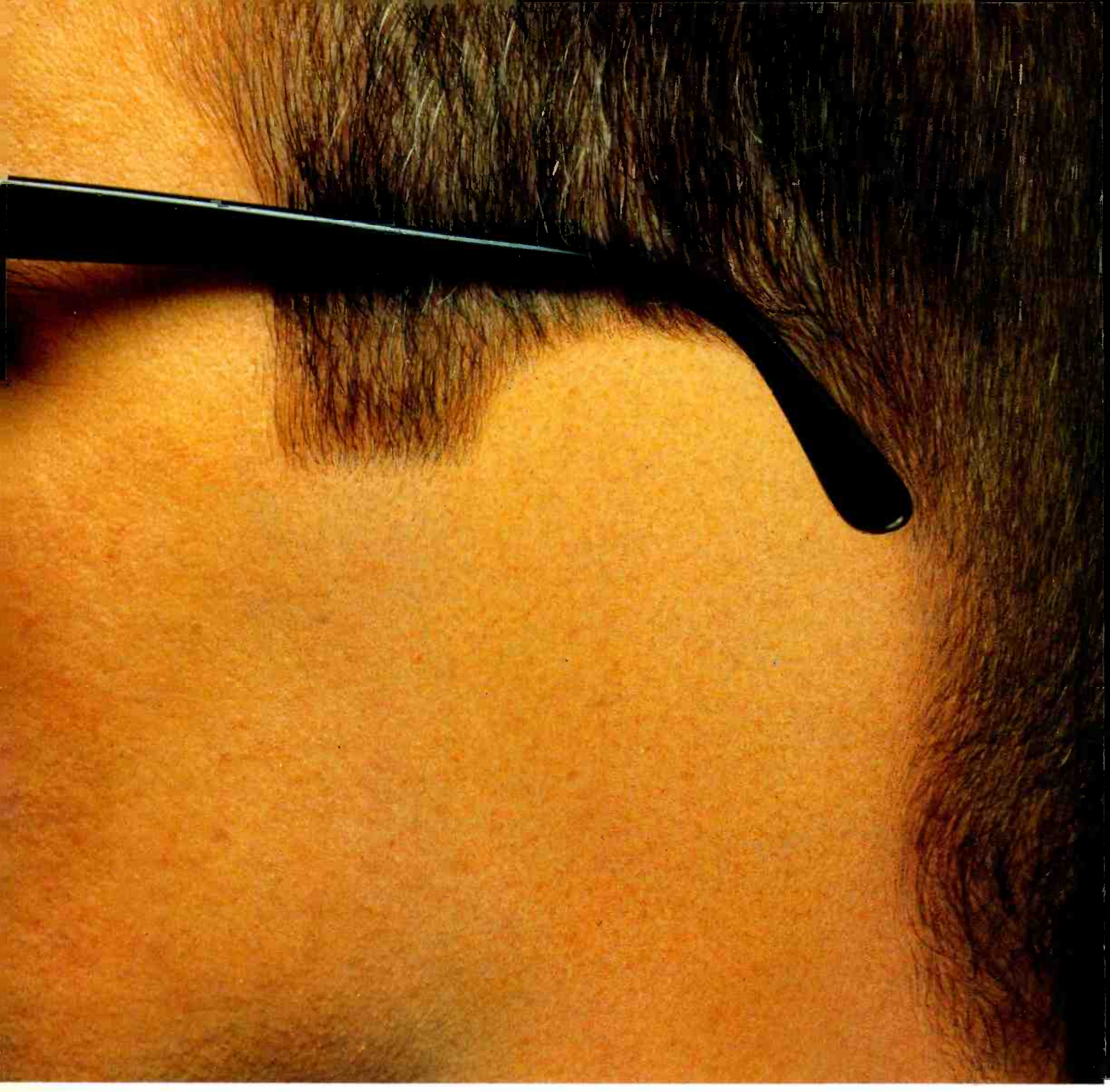
The whole project took seven months to complete from start of building; Weston clearly remembers the Christmas tree on a pile of plasterboard, he assures us. Having taken care of the building, equipment was next on the list.

"We wanted to exploit the new products—things like AMS *AudioFile*, which was the only system of its kind on the market that actually worked 2½ years ago—the others were all just figments of people's imaginations. We had one at Silk Sound already and this encouraged us to go in that direction."

One thing they were all sure of was the fact that they didn't want to have a single NAB cartridge machine in the building.



Dzandzera: "We swore we wouldn't have one in the place—they are unreliable old technology. You can't get them to sync to picture; the mechanics are sluggish and you can only get a start



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point so you always have to go to that and everything else is down to guesswork. With *AudioFile* you can guarantee to get within 100th of a frame instantly. The fact that it was digital was not the major concern but rather its flexibility. We wanted an efficient system."

An advantage audio post-production has over music studios is that the lifetime of the equipment is not dictated by fashion. "Clients are much more specific when it comes to ordering lunch, you know—the type of bread and make of butter. We had a client last week who wanted chilled *draught* cider; it couldn't be out of a bottle."

So the fact that The Bridge sports two SSL *6000* series consoles is down to sheer suitability for the job. Weston: "Even today, SSL offers the only integrated system including synchroniser and automation. What we wanted was our engineer to be able to sit in one position, and not have to keep getting up and wasting time accessing equipment. Other manufacturers have said that there are so many systems available they can't design software to suit them all. The SSL software is built around the Adams-Smith synchroniser, which means you don't have a choice but it is integrated. The system takes care of everything. The multitrack reel is striped with timecode and all you have to do is put the disk in and the computer sets everything up. To us that's the only way to work. The equipment isn't getting in the way. We didn't buy SSL because it is a known mixer. Our clients wouldn't even know what one was."

Because sessions tend to be short and to the point clients are not expected to buy a whole reel of multitrack for each job but simply pay for however many minutes' worth they have used. Each reel could therefore have as many as 10 or even 15 different jobs on it. The SSL system makes accessing these a relatively simple operation. Masters and working tapes are stored for years and customers expect The Bridge to be able to locate any job, however old, with whatever little information is available. This industry is all about service. If a client phones up at 7pm and says they forgot to ask for a batch of copies, you do it for them at once. Weston says they also act as a source of technical information, giving suggestions for voiceovers music, etc. Essentially nothing can be too much trouble.

"We have been doing quite a bit lately with American producers who want to use English actors but are too busy to come over. So we get them on the phone and inject the signal into the talkback so that they can conduct the session from the USA."

The engine room deals with everything. Here work coming in on 1 inch masters is transferred to U-matic and the sound is laid off on to Studer *A820* multitrack or AMS *AudioFile*. At the end of the session an automated mix is laid back on to the 1 inch thus avoiding degradation of the 1 inch tape. The bulk of equipment is housed in here, including the two 24-track tape machines, Studer *A810*s with timecode and synchroniser, *A812* stereo machines with Dolby A, Ampex 1 inch C-format video machine, as well as five Nakamichi *MR1* cassette machines for short run copies (bulk copying is carried out at Silk Sound on Revox machines).

THE BRIDGE

This room is occupied much of the time preparing for sessions, getting appropriate sound effects ready. "This is a good one," says Weston picking up a job sheet. "Oldish French clock ticking. You can imagine it can't you—no, that sounds Italian. Or this one—fountain pen writing; yes, but in which language? Of course we take our work seriously!"

Although the design team wanted to keep as much equipment out of the control room as possible, some things could not be overcome. "We use JVC U-matics in the control room—they are quicker than Sony and seem to make less noise." These are housed under the producer's (bridge-shaped) table behind the engineering position. "We weighed up the convenience of having the machines in there. We wanted the advantages of a machine room with noise and air conditioning but didn't want it to become an inconvenience. It would start to annoy clients if you can't even play a tape without getting up and walking out of the room."

Monitoring is on KEF *KM1*s. "We have always liked KEF's and used them everywhere," says Weston. "They have a flatness and clarity for voice work and yet give the volume for music work. They are good at all listening levels; you don't get subjective changes at different levels, and they are also non-fatiguing."

THE BRIDGE

Alongside the U-matic there is a record deck on a sliding shelf ("we thought if we have to have one at least have it so that it slides out of sight"), a cassette machine, outboard foldback amps and Lexicon reverb. Mounted into the console are the AMS *AudioFile, RMX 16* reverb and *DMX 15-80S* delay/sampler. The Bridge *AudioFiles* were resprayed Raven Sparkle grey to match the SSL console ("Do you know how many different shades of Raven Sparkle there are?").

The rooms themselves are large and bright with natural daylight in both control and voiceover rooms. The latter is large not only for comfort but also because once in a blue moon a job will come in which involves a cast of 15 actors and it is nice if that work isn't turned away. The room is optimised for voice recording, ie deader than a typical music studio, although one side is liver than the other. It is easy to add to a relatively dead sound. All rooms are tielined to each other and to the Silk Sound facilities.

A comprehensive computer-listed storage area looks after all masters and working masters for one year, after which they are archived at Silk Sound. They were recently asked to find a recording made nine years ago. The only connection was a cassette the American client had with the Silk Sound phone number on it. They found it and the job was carried out without a hitch.

Strangely enough most of the personnel at The Bridge have come from a music studio background. Weston: "Nearly all the people here have come from music and wouldn't go back to the long hours and insecurity. What I like about facilities and production houses is that they are much more business-like. The rates are not excessive but sensible for reinvestment. And if you're stuck with a client you don't like you've only got to put up with him for the rest of the afternoon whereas in music you're stuck with him for the next three months!"

Dzandzera is equally unrepentant: "You just get so much more variety of work. There is also the fact that people don't book in here with their own engineers. Apart from anything else our reputation rests on our engineers, not the equipment. Anyone can buy the same equipment; it's the people that count."□

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Typically	0dBu Input	1KHz 0.002%
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	+20dBu Input	" 0.01%
Noise	better than 80dBu below +4dBu output	
Frequency response	−3dB at 120 kHz	

Power + and − 15 volts, 200ma (average, depending on L.E.D.s in use)

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MARTIN POLON'S PERSPECTIVE

The two men moved silently through the night. Hampstead Heath was one of London's better neighbourhoods and the spectre of crime simply did not worry the shopkeepers in the vicinity. The Metropolitan Police were in evidence with some frequency and the sort of 'smash and grab' that was the curse of other less-affluent neighbourhoods simply did not happen here. It was three o'clock in the morning and a slight mist was in the air. It had been very hot the previous day, so hot that the announcers on the TV had joked about it being the one day of Britain's summer. The taller and thinner of the two men cupped his hands together to make a foothold for the shorter and squatter of the pair. 'Abbot and Costello' was the handle the London police had given the burglar team and the lanky veteran of the capital city's crime world rather enjoyed the notoriety.

Using the boost up, the short man grabbed at an electrical entry pipe and pulled himself up, but not without distress. The pipe began to pull out of the elderly brick facing of the side wall of the row of shops that the two were assaulting. Once up, a knotted rope was thrown down to 'Mr Tall' and the two huddled on the roof. A skylight was quickly jemmied and access was made to an upmarket health food shop.

Once in, the short man decried his current condition: "But, I tell you Keith, I'm hungry. Look at all of this good eats."

The tall man cut him off short: "You'll survive. We only have another two and a half hours 'til there's light. Let's blow the wall."

The short man produced a small lump of what appeared to be clay, out of a backpack he was carrying. He placed it against the side wall into the next shop and inserted an igniter. A battery box was produced and the two huddled down behind a refrigerated display case of swede and aubergine quiche. A muffled rumble and a cloud of dust revealed entry into the next shop, the premises of a jeweller. The two quickly made for the next connecting wall and repeated the technique that had gained them access.

The short man questioned, "Why can't we blow this safe and pull the gems?"

His companion answered, "You know as well as I do that we would have to take in a fence and a lousy fence would give us 17 quid in the hundred. Seventeen pennies in the pound is not my idea of a night's work. I also do not like the idea of the pieces being hot against the jeweller's description. Between the coppers who work 'hot ice' and the insurance hounds we would not have a nice time."

The short man completed his preparations and again a wall crumbled against the power of 'La Plastique'.

The evening's activities had finally gained them access to a recording studio. The tall man pulled a paper out of his shirt. He pointed. "This is Studio C and there it is."

He gestured to a large looming in the darkness and played his flashlight over the form of several relay racks. "The direct-to-disk system. We want all of the memory frames. Remember to put each frame into an anti-static bag as soon as you have it out. We don't want to damage the quality of our merchandise."

The short man turned to him. "Are you sure we're going to get our blinking dough from all of this electronic junk?"

The tall man was astonished: "After all the time I spent teaching you about Dynamite RAMS and State Rams and EPROS..."

"It sounds to me like some kind of explosive, chips for the Prime Minister and something you would get from that scruffy Greek take-away near our local."

"You and your sense of humour. I know you understand. We can make 20 quid a chip and there are 32 on each board. There are four boards in each frame. This beasty has 20 frames. That means we will split fifty thousand pounds."

The short man pondered this for a few seconds: "How can the 'finger' get his money back if he pays us so much?"

The tall man smiled. "Martin, me lad, these days these black chips are dearer than gold. And in this electronic business, everybody is jealous of everybody else. Everybody wants the product and nobody can deliver—for a year or more. Who, when offered the unattainable, would suppose that the unthinkable had taken place? Who would question a miracle!"

And what have we here? Another smashing imaginative piece of fiction from the febrile er... fertile brain of our favourite columnist? What's the matter lad? Did you drink too much of that 'Scrumpy'? Why, that West Country cider will do it to you every time. No, the price of RAM memory chips has risen right up there with Beluga caviar, a trip to London for impoverished audio columnists and/or Maine lobsters.

Unfortunately, what is described above could happen any day now in the world of audio and has already happened in the wide world of electronics. Worse still, not all of the blackguards in the world are operating illegally in terms of the very real world shortage of dynamic RAM (Random Access Memory) chips. What has happened in 1988 is that a combination of US Government trade policies on dynamic RAM 'dumping' and quotas, and Japan's MITI (Ministry of International Trade and Industry) policies on dynamic RAM production, have run afoul of the runaway demand for RAM memories on all variations of microprocessor-based products.

Government policies have resulted, somewhat unintentionally, in reduced supply at the same time when demand and chip pricing have reached new peaks. The facts speak for themselves. Dynamic RAM (DRAM) production capacity in 1988 will be for 902 million units, a 12% drop in unit production capacity from four years ago. Demand for 256K DRAM chips has soared by nearly 75% since last year. The consumption of 1 Mbit chips has increased threefold. Curiously, in Japan where the majority of all DRAM chips are made today, there are virtually no reported DRAM shortages.

The spread of large memory-resident computer application software and overall demand for large-scale memory on current generation DOS *PC*s and on the new IBM *PC* system *PS2*, has really fuelled the worldwide memory demand cycle. Attempt to consider the world before the arrival of the personal computer. Ten years ago the *PC* was just a 'gleam' in the eyes of IBM and a few other visionaries. Today, the entire world has adopted the *PC* by tens of millions and it is those numbers that have defined the size of the chip memory marketplace.

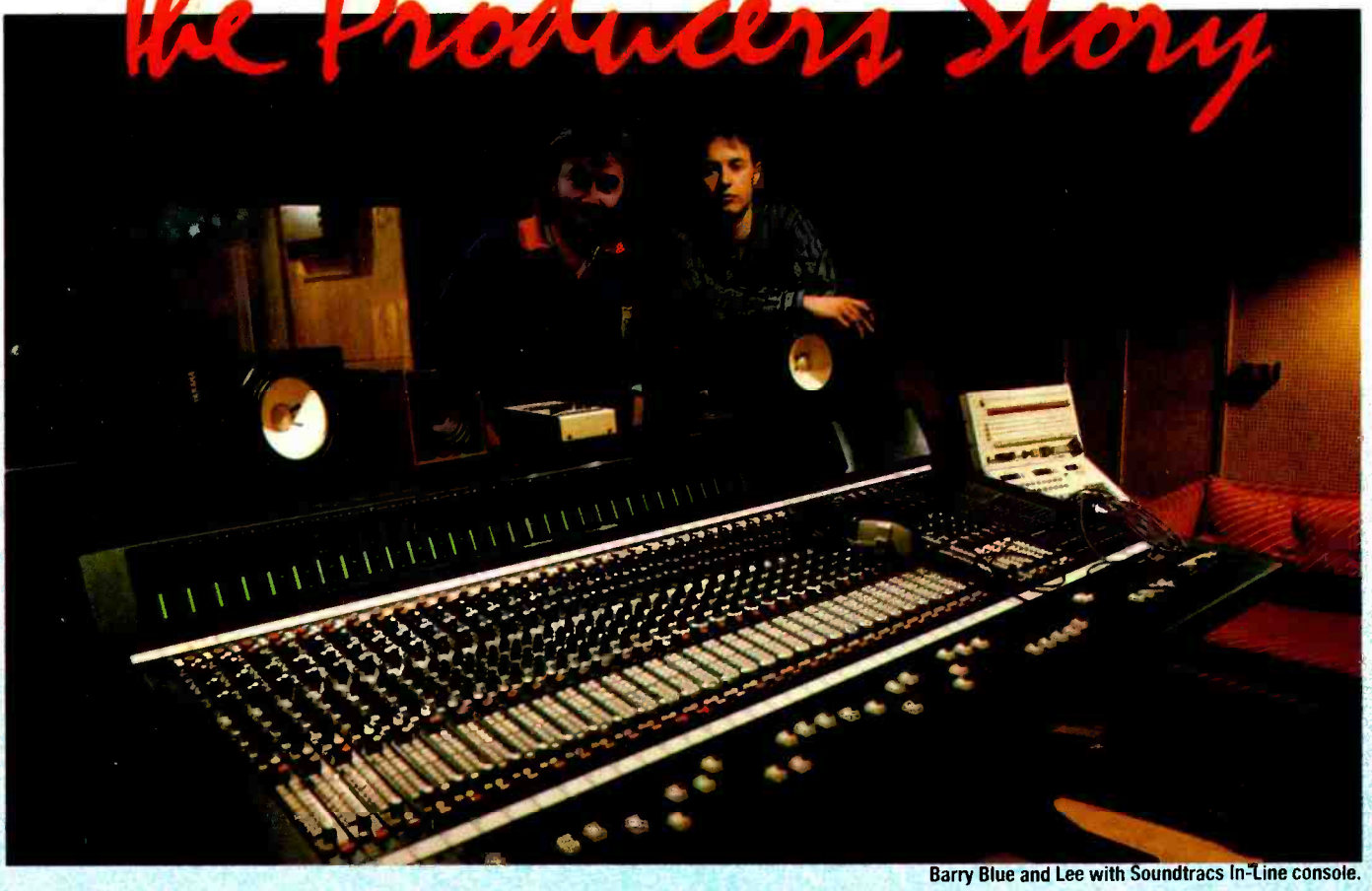
When the *PC* was introduced in the early 1980s, legitimising the whole concept of personal computing, 64 Kbytes of RAM was considered sufficient for most applications. By the mid to late 1980s, most *PC*s were armed with the theoretical limit of memory accessible to the 16 bit microprocessors used, in the 500 to 600 Kbyte RAM range. The *PS2/OS2* family uses 32 bit 'engines' (microprocessors) that allow instant and easy access of RAM bytes in the 10 Mbyte range. It is not unusual to find large-scale members of this second generation *PC* family 'loaded' with 16 Mbytes of RAM. Many pieces of software written for the new system use anywhere from half to one full Mbyte of RAM just for that particular program.

The real demand problem takes on greater significance when you realise that in this and in all other RAM-based applications, the RAM chips themselves are rated in 'bits' of storage. The achievement of 'bytes' is accomplished by having as many chips of the desired 'bit' rating as the pathway of the microprocessor requires. Therefore, a 1-Mbyte dynamic RAM memory cache requires 16 1-Mbit chips for the early *PC* system and 32 1-Mbit chips for the current system to achieve the desired one 'megabyte' of memory. It now appears that any theoretical limit on RAM accessibility in the 20 to 30 Mbyte range for *PS/2-OS/2* has been breached, allowing virtual unlimited RAM capacity for the new system. All this fuels worldwide RAM demand.

In the same vein, MIDI-based audio systems, audio editing workstations, digital audio products and a whole range of professional (and consumer) audio product that did not exist five years ago (and in some cases five months ago) have expanded the demand for the same pool of available memory chips. Further, the rapid acceptance of computer systems in both analogue and digitised audio has bound the audio industry to the computer chip as surely as the dynamic microphone bound the industry to the transformer 50 years before. Aside from the most obvious use of computers (such as the Apple *Macintosh*) to control audio systems (such as the Yamaha range of digital mixers, equalisers and reverberators) there is the consideration of all the memory chips used in such products themselves. In fact, the memory chip has become the 'point man' in the design, application of features and capacity of new audio electronic systems of any kind.

Despite the fact that part of the dynamics of this shortfall is a reaction to the combination of badly thought out trade legislation in the United States and a marked reluctance by Western World chips manufacturers to compete head-on with the Japanese in 256K and 1 Mbyte RAM chips, the expanding marketplace is the real culprit. Some will argue that this has allowed the Japanese to recognise that their fiscal success can come from selling fewer numbers of higher priced chips rather than large numbers of chips at lower

The Producer's Story



Barry Blue and Lee with Soundtracs In-Line console.

AOSIS UPDATES WITH SOUNDTRACS IN-LINE

Barry Blue – there's a name to conjure with. Why is a top producer and recording artist like Barry Blue one of the first to buy a Soundtracs In-Line mixing console for his highly succesful Aosis Studios? The answer is simple: sound. Or more specifically, absence of noise.

The Soundtracs In-Line console recently installed at Aosis Studio One was immediately put through its paces by top freelance engineer Andy Kelly, who booked the studio after hearing a demonstration of the desk.

Barry was in no doubt of the extremely quiet signal paths, low crosstalk and high audio quality offered by this most recent professional recording console from the Soundtracs factory. These factors, combined with its wide ranging comprehensive facilities and exceptional value for money, made the In-Line the obvious choice.

Barry Blue's successes stretch from the late sixties with acts such as Uriah Heep, the Message, and the Ram Jam Band, to production credits with The Honeycombes, Dana, Heatwave, Bananarama, Howard Johnson, Five Star and most recently Amazulu, as well as major writing hits such as, perhaps his most well-known single 'Dancing On A Saturday Night'. He is certainly in a position to judge what is required of today's mixing console.

The Soundtracs In-Line is a 36-buss high performance mixing console. It is available in two frame sizes, with 36 or 48 inputs.

"We were looking for an in-line console anyway – the width of the control room dictates it really – but this console, in terms of noise, is very, very quiet. Secondly, it is very flexible and has a pleasing sound. Thirdly, it is easy to use and well designed. And fourthly, it looks the part.

"It is everything you could ask for; simply a very well designed desk which is straightforward to use. Everything seems to be there. Every other desk we looked at seemed to have something missing. The In-Line has been very well put together and thought out. We are in no doubt that it is going to be apopular desk, so we have no qualms about being one of the first. Everyone who has used it so far will be coming back.

"We were simply looking for a flexible, quiet, well designed in-line mixer and the Soundtracs In-Line is just the job. We have been selling studio time on it from the day it was installed."

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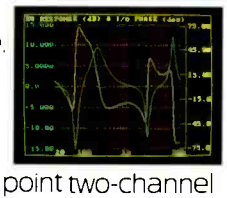

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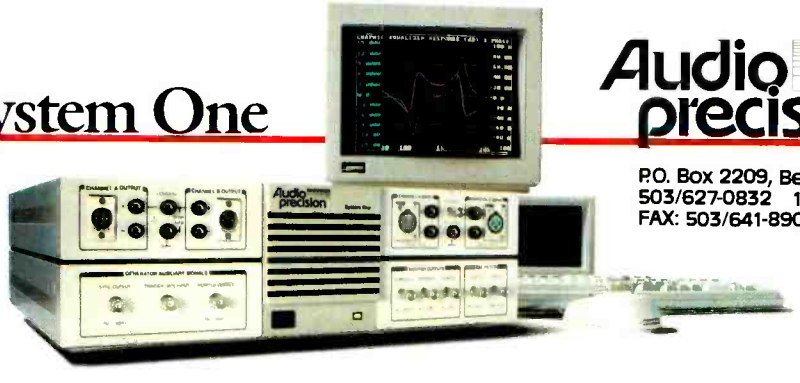

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prices. The argument continues that the lowered price was designed to devitalise the competition and the current shortfall is one result of that policy. Whether that is the reality is less the point than the fact that the relative glut of RAM chips until the beginning of this year, freed designers from the architecture limitations of insufficient memory. It made 'the sky's the limit' theory of equipment memory design a fact of life. It can also be argued that the next jump in RAM size to 4 Mbit capacity will come six months to a year later than predicted, hopefully in mid-to-late 1989. That is also a component of the problem since an ample supply of larger memory chips of that size would ease demand for the smaller chips. That 'knee of the curve' technology jump has occurred every time this memory problem has appeared in the past, before the crisis point was reached.

An easing of the current 'crunch' is unclear. Each month the predicted relief is placed farther into the background. Many analysts hedge their bets, while quoting December 1988 or January 1989 as a peak. Some think it will be well into 1989 before the current crisis eases and there are those who doubt that a return to the 'good old days' of low priced memory chips will ever be possible in the face of burgeoning demand.

Those companies that possess significant in-house 'captive' memory chip manufacturing capacity have done very well through the current crisis. That list is rather short and includes only the names of IBM and ATT in the domestic United States. A few European vendors have had some 'captive' capacity. Of course the Japanese electronic giants have traditionally played both a 'captive' chip supply role to their own subsidiaries as well as taking a 'merchant' chip vendor position in supplying memory (and other) chips to outside buyers. The presence of a careful and well thought-out long term purchasing contract relationship for memory chips has saved many companies from RAM chip disaster as well. Unfortunately, the concept of 'JIT' has been eagerly adopted by the Western World's electronic makers. JIT is a Japanese manufacturing system that stands for Just In Time. It means that an equipment maker will receive needed parts on the day of manufacture of specific products from vendors and jobbers. No expensive warehousing is needed or desired by the manufacturer but no backup parts stock exists either. Thus, many companies have been caught without a supply of RAM chips to help them weather this crisis.

Unfortunately, many segments of the world audio industry have not achieved the level of 'clout' needed to ensure an uninterrupted and fairly priced supply of memory RAM chips. A production manager at one of the larger electronic music product makers thought the situation rather ironic.

"The use of JIT concepts from Japan has left many audio equipment makers swimming in waters far over their heads as another concept from Japan, in this case memory chip production cycles, has devastated the world electronic industry. The dimensions of the problem facing an audio manufacturer goes something like this... Whether or not you use JIT is not so much the issue. The reliability of your memory chip source *is* the issue. If you have locked up your supply by contract, then you have no problem as long as the current contract runs. You will pay the low pre-crisis price for the chips you need.

"If you have been buying chips for JIT on the spot market each week to match your manufacturing schedule, you clearly have bought it in the shorts. Chips prices have risen as much as tenfold. If you use JIT but warehouse your own inventory you are all right as long as your supply lasts. If you build product conventionally and warehouse, again you are fine as long as you have supply. What do you do when your supply or contract runs out? Good question. You don't dare tie up a large supply or long term contract at the current inflated price levels. So you use the spot market and wait for this thing to peak.

"You also don't develop new product using memory and you control your production runs on product that is heavily dependent on memory. The purchasing agent has become more important than the president of your company and will probably keep his key to the executive washroom after this is all over—if it ever will be all over. All I hear is about more chips from Korea and how all the Japanese chip workers are giving up their August vacations to keep output moving.

"Equipment prices to your customers are another good question. The memory chips are only a component of the total price. Do you hold price to compete with your off-shore competitors who make their own chips and have little or no problems? Do you take it in the socks or do you selectively raise prices so you have at least some profit on the products hardest hit?"

Having to deal on the chip 'grey' or 'black' market has not been a desirable option for many manufacturers but it is an option nevertheless. The so-called legitimate 'spot' market has been priced so high during the current shortfall that effectively, some audio manufacturers have been priced right out of the ballpark. The problem with what one purchasing agent calls 'Midnight Electronic Supply', is that the exact status of irregularly purchased chips remains a mystery. Are the chips stolen, or have they been legitimately cut out from a product that is 'memory rich' but 'price poor'? Are they even real or are they counterfeit? Are the chips rejects that would not normally have seen the light of day and if so what percentage of the cells are dead? New product introduction has probably suffered the most from the chip crisis. Of course, specific memory add-ons have increased in price in most chip-dependent systems in all sectors of the electronics industry as much as 30% to 50%. But it is the inability to obtain new reasonably priced supplies of RAM chips that has crippled many new product introductions.

A solution to all these problems would seem to be in the ultimate achievement of greater RAM chip yields. This could relieve the current pressure on RAM pricing and chip manufacturing output. The technological potential for 2, 4 or even 8 Mbit chips increases every day. These chips would be very desirable to the audio industry as well as to everyone else. But the problems of making and pricing these 'super RAMS' are not minor ones.

A Wall Street forecaster who watches the semiconductor industry opted, "There are some significant manufacturing problems to be solved as we drop further down into the micron range to achieve the desired density. It has become painfully expensive to achieve the standards of submicron size and cleanliness necessary for these larger yields. It will happen but much more slowly than it has in the past. And fewer and fewer of the domestic players will be willing to make the investment for fear of being blown out of the water by off-shore sources later on. Even the smooth efficiency of the process in Japan can be questioned. Since the Japanese equities market (real estate, stocks), is 'boom-push' overvalued, an 'adjustment' could remove much of the financial where with all to finance expansion of chip capacity or yield."

Where all this leaves the world audio industry is an interesting point. It seems clear that along with the ever-present threat of changes in currency exchange rates, the impact of potential or real RAM chip shortages and price premiums will reduce the options for multiplicity of design of professional (and perhaps even consumer) audio products. For some equipment makers used to having a large number of different models in their product line with significant 'bells and whistles', the safer course may be to standardise around a specific design architecture and specific components. The cost of stocking chip parts for a large number of design options could prove prohibitive in today's chip marketplace. That is one of the major reasons that the component market is subject to such swings of demand.

The bottom line in manufacturing may well be for professional audio equipment makers to stock needed components in substantial quantities to assure availability and affordability of their products or obtain long term contracts that will assure the same thing. Unfortunately, most professional audio makers outside of Japan have neither the unit demand nor the overall clout to command a competitive position.

The long time-frame most professional audio equipment makers use between product changes increases their vulnerability to the vagaries of the computer memory chip process. Since the exact sales potential of a studio audio product over a three or five year life cycle is virtually impossible to predict, the number of chips needed is equally difficult to assess. Nonetheless, that studio equipment maker will have to carry an expensive and potentially worthless inventory (at the end of the three or five year cycle), to be sure of having enough chips on hand to meet demand. Not having enough chips leaves only the alternatives currently in effect, ie no supply at all or at prices so exorbitant as to cause product price to nearly double. And of course, without long term contracts, so much for 'Just In Time'.

If an audio manufacturer is willing to subscribe to the kind of contractual guarantee that chip makers will provide with a legally verified order, they can protect their manufacturing process from some of the risk but that will also require funding a large inventory over a much longer period of time than has been the practice to date. At current high prices, some equipment makers have been forced to visit their bankers to try to fund a million dollar buy of chips that would have cost $150,000 in the good old days.

Worse still, if the semiconductor and computer industry analysts are correct about the long term nature of the chip crisis, especially as it impacts the further development of large megaRAM mass memory chips—the development of audio recorders without moving parts will suffer as well. It may be that the audio industry's position vis-à-vis the computer industry and the chip crisis, akin to being the small bird riding on the elephant's hide, leaves something to be desired.

At the very least, wherever the elephants feel compelled to charge about to, the audio industry will be there, for the bad times as well as good.□

BARRY FOX'S BUSINESS

Here we go again: if you believe what you read, tape and disc are dead. Late in July, a UK-based juke box supplier, Sound Leisure, held a seminar for all the firms in Britain which deal in juke boxes. Those present were shown new high-tech CD systems along with nostalgia models echoing the '50s and '60s.

Then they heard from an inventor in Florida who claims to have developed a juke box that doesn't use CD, tape or vinyl. Instead it uses solid state storage. I'll be following this through but in the meantime suggest that the juke box industry buys a calculator and does a few sums.

Compact disc audio, with 44.1 kHz sampling frequency and 16 bit coding, needs 1.4 Mbit/s for stereo, which is equivalent to 6 seconds per Mbyte of solid state storage, or 10 Mbytes of storage per minute of stereo recording. (There are 8 bits in a byte.)

Reduce the sampling frequency to 32 kHz, for 15 kHz bandwidth, reduce the word length to 14 bit and compress to 10 bit (using a system like the BBC's Nicam) and you end up with 0.64 Mbit/s for stereo, which doubles recording time to around 12.5 s/Mbyte and 5 Mbytes for one minute's recording.

As a yardstick, most personal computers now have one Mbyte of memory. To upgrade with a further Mbyte will cost you several hundred pounds. So far the most advanced chips hold at most one Mbit, so you need eight of them for a Mbyte. Usually computer makers find it cheaper to use a bank of 64 k or 256 k chips ganged together.

IBM recently developed a new x-ray lithography process, which, to quote IBM, "opens the door to future memory chips holding more than 64 Mbits", ie 8 Mbytes on a single chip.

But that is still only a minute of stereo. And IBM stresses that this technology is only an experimental manufacturing process. Moreover, as any computer buff will know, the price of memory is currently going up, rather than down, because of a worldwide shortage.

What all this adds up to is a clear message. Beware of entrepreneurs bearing news of solid state storage recorders. There is nothing magic in storing music in a chip, but it will be many years, probably into the next century, before solid state storage is cheap enough to compete with moving disc or tape.

The personal computer industry has spent the last 10 years cutting its own throat by creating a mish-mash of incompatible standards. IBM walked into the vacuum and created its own standard, or more accurately group of standards, bringing some kind of order out of the chaos.

But as anyone who works with PCs will well know, it is still more a matter of luck than judgement if any two pieces of equipment work together as smoothly as their makers promise. Ask anyone who has tried sending data from one computer to another by hard wire or modem and telephone line, or anyone who has tried connecting a CD-ROM drive and running different software, or anyone who has tried running a business on software that is copy-protected so that everything stops if one disk is damaged.

And it's clear that President Reagan has never used a PC. If he had, he would never believe in the fantasy that a computer-controlled Star Wars programme will be bug-free when the time comes to use it.

As if all that isn't enough, the computer industry now has another self-made problem, touched on by Martin Polon in *Studio Sound* July. No-one knows quite how seriously to take the threat of computer viruses. But already they are providing a healthy income for journalists who write about them, and specialists who offer search and destroy surgery for a healthy fee.

Computer programmers have for many years used their own software bombs. The idea was born to ensure that people who borrow, lease or steal software lose out if they do not pay for what they are using by a given time and date. All business computers have an internal clock, which keeps track of time and date. This lets the PC date text automatically as it is written, keep track of invoices and run diary programs. It is easy for a programmer to put a line of code in the software that springs to life at an appointed date, to remind the user to pay for the program—or be prepared for something nasty. If the user pays, he gets a new copy of the same program, without the time bomb. If he doesn't pay, the program shuts down, probably losing all accumulated data.

Time bombing is a perfectly legitimate exercise. Studios would jump at the chance of recording on master tape that auto destructs on a given date if the client has not paid in full. But computer vandals picked up on the idea of time bombing, and wrote destructive programs that bury themselves inside ordinary programs.

These nasties work like a Trojan horse. An apparently innocent program runs perfectly well for a week, a month or a year. Then, suddenly, at a pre-appointed date and time, it misbehaves, either putting odd messages on the screen or erasing vital data.

And while the rogue program has been waiting to strike, it has not been idle. It copies itself on to any floppy disk temporarily used in the computer, for instance to load a program. Then when the disk is used in another computer, it copies itself into that computer, and so on, *ad infinitum*. Sometimes the original virus only starts causing damage to its host computer after it has been copied half a dozen times. Then the half dozen copies lie dormant in their hosts until they have copied a similar number of times. This is an extension of the coding used by programers to limit the number of times a program can be copied.

So just like AIDS spreading between humans, the rogue program spreads between computers. Hence the term virus. Much like AIDS, there is only one way to avoid catching a computer virus—don't use disks from unknown sources. As with AIDS, ignorance is dangerous. It pays to know a little bit about the way computers store data.

Random Access Memory, or RAM, is volatile. When a PC is switched off, everything in its RAM is lost. A small battery backs up the time and date circuits. A virus can only survive in a PC, and from there spread to other computers by shared programs, telephone line or network cable, if it stores itself semi-permanently on a magnetic disk. The best hiding place for a virus is on a Winchester 'hard' or 'fixed' disk. This remains permanently inside the computer and is used to load the working software or 'operating system' automatically every time the computer is switched on. It also stores many megabytes of the user's data. So it is the ideal target for a virus programmed to erase data after a predetermined period time. A Winchester is both home and victim for a virus.

Systems and Software, of Amersham, Bucks, UK, is offering a program that will counter some virus programs, for just £10. 'Antivirus' is cheap because it works very simply. The program temporarily write-protects the hard disk and is used whenever the computer user tries out a new program on a floppy disk. If the new program attempts an unexpected write to the hard disk, it fails. At the same time the user is alerted to the risk of a virus infection.

The snag is that the more clever viruses may be able to get round this protection with a program that defeats the write-protect software.

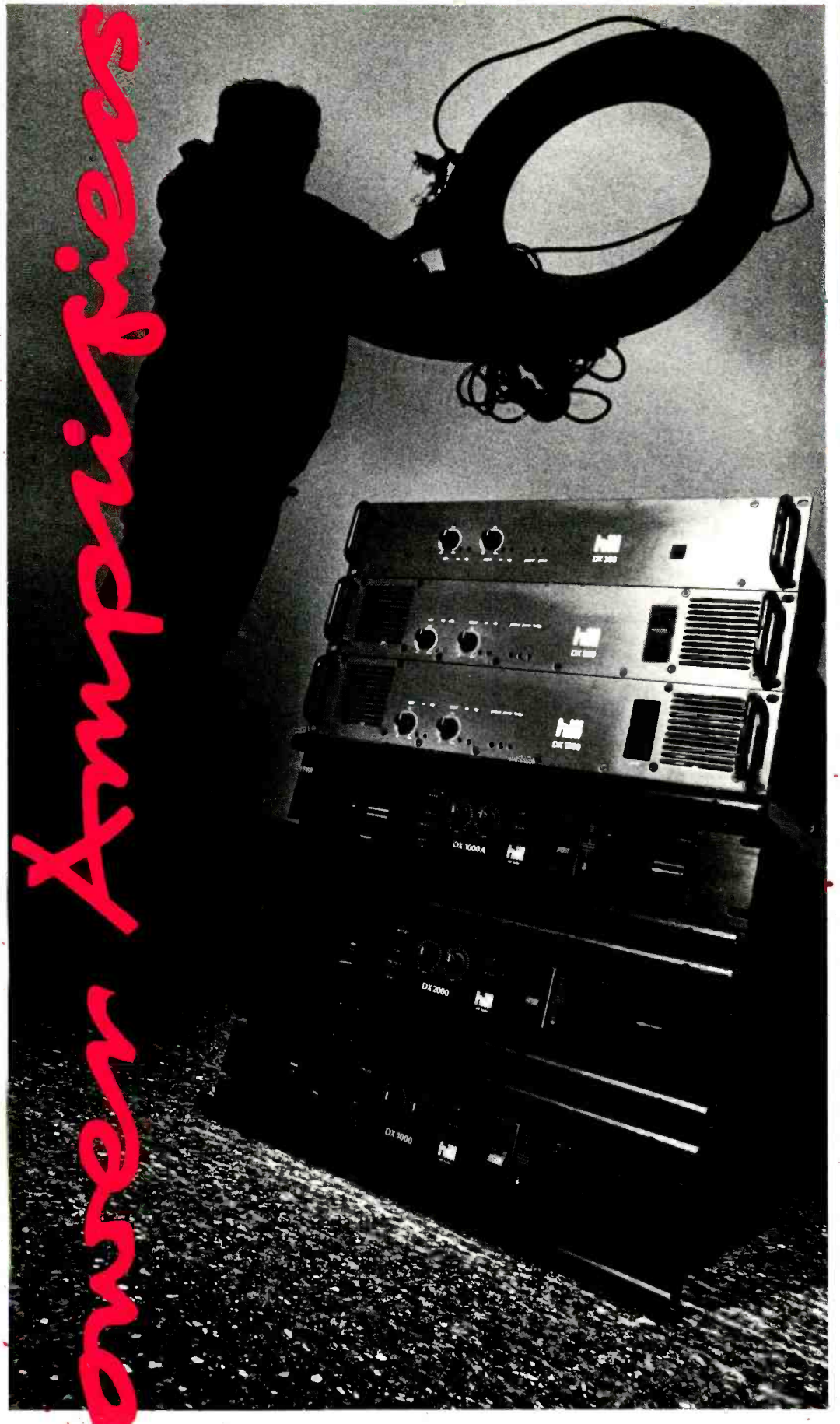
Some computer experts believe that the only safe, long term solution is a return to simple first principles. If an on-off switch is fitted in the circuit feeding data signals to the magnetic recording head in the hard disk drive, then no software, however clever, will be able to write to the disk when the switch is turned off.

Such a switch on a PC could not be left permanently off because it would prevent the user storing any data on the hard disk. Also most programs routinely shuffle data between RAM and the disk as a normal working practice, without the user realising what is going on. But the safety switch could be used whenever the PC was loading a new program from a floppy disk of dubious origin or downloading software from a public access electronic mail bulletin board.

I saw a reader's letter in *Practical Electronics* magazine from a self-confessed fan of George Martin who had borrowed his biography *All You Need Is Ears*. A friend saw him reading the book about how all you need is ears, and reacted instantly.

"He's the bloke who couldn't hear the notch in Copycode, isn't he?"

George Martin's comments on Copycode, in support of the deaf but noisy IFPI and RIAA, could well go down in history alongside 'You never had it so good', 'The pound in your pocket', and 'Perfect sound for ever'.



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HIGH POWER/2U

Stan Gould, technical director of BSS Audio describes a different design approach used for a high powered lightweight and compact amplifier

When we decided to look at the possibility of entering the power amplifier market place, we were already aware of the diversity of products currently on the international market. We knew it would be a difficult task to make a product that we, our dealers and our customers would all be happy with. The amplifier would have to sell itself.

A look at the market place reveals three main sectors accounting for most of the demand, each with its own priority list concerning performance and facilities. While the hire companies and tour specialists are looking for sheer power combined with low weight, small size and increased reliability, the studios' main demand is for fidelity at high SPLs. The main market sector comprising fixed installations, ie theatres, clubs and discos, has a growing desire for the convenience of remote condition monitoring and control. In all areas, however, there is a developing awareness that the loudness and sound quality of equally-rated amplifiers into real loudspeakers can bear little resemblance to specification sheet figures, and all users are now looking for improved fidelity at high power levels, increased reliability and more compact packaging. It was apparent that, subject to economics, an 'ideal' amplifier specification could be devised that would satisfy the needs of all sectors.

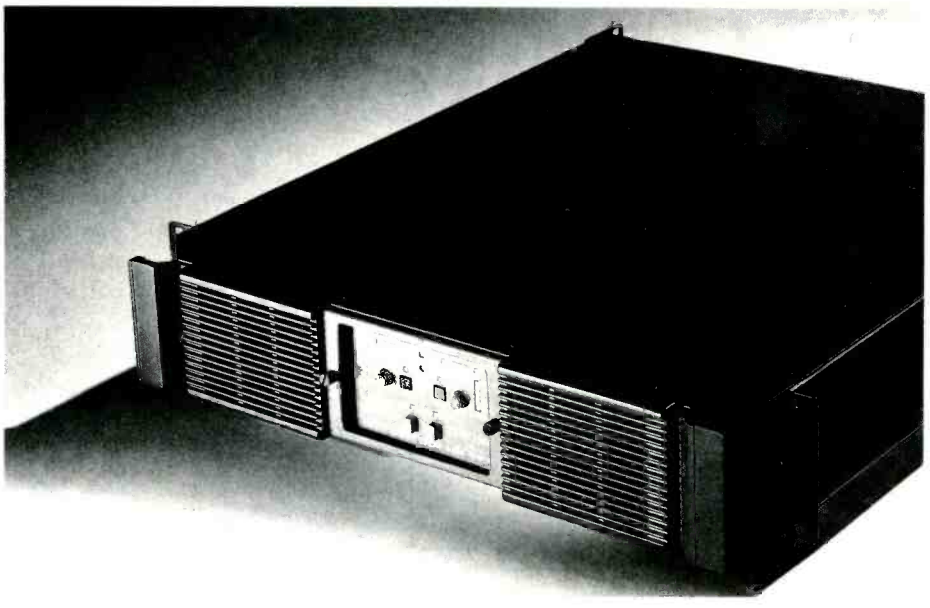
The feasibility study was a balanced two-pronged attack. Sales and marketing defined the requirements for the 'ideal' amplifier while research and development explored all technical avenues to see how closely these requirements could affordably be met. When they smiled and shook hands we knew the project was on. The target specifications were now cast in stone, and we were confident that we were going to reach or improve upon each one without compromising the others. These criteria were not given any order of priority as it was considered that all of them were necessary minimum requirements.

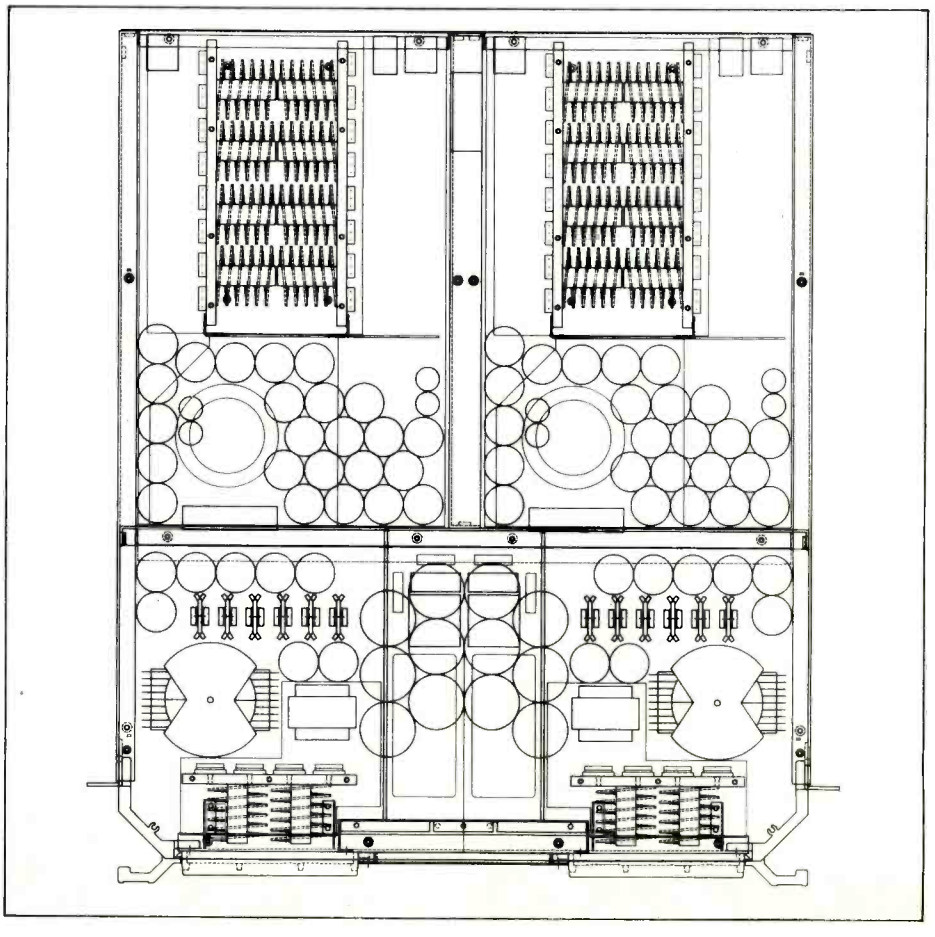
The design goals were:

- Sound: High quality, interference-free performance at all power levels even into highly reactive loads.
- Power: High power, at least 1 kW RMS per channel.
- Size: Small size, 2U height for two channels.
- Weight: Light weight, 30 kg maximum for two channels.
- Reliability: Strong construction and catch-all electronic protection with constant line, thermal and load monitoring.
- Utility: Full facilities and operator-opitimised interface, including optional remote monitoring and control.
- Information: Display of all internal parameters relevant to optimum performance and reliability.
- Value: Cost-effective implementation of all the above goals.

Problems

It was clear from the start that each of our design goals was in conflict with most of the others. High power generates heat which is incompatible with small size, light weight and reliability. High quality sound begs for class A linear amplifier techniques which require massive heat exchangers and a monster power supply. High reliability suggests extensive and potentially intrusive protection circuits, or else a sledgehammer approach, again adding to the size and weight. The web of conflicting aims goes on and on.





Solutions

By definition, high thermal efficiency was required since the main problem was going to be to get a lot of heat out of a small box. A digital approach for the amplifier was dismissed at an early stage since we not only wanted a dynamic range of over 120 dB but we also desired absolute linearity at milliwatt levels. In fact, we were aiming for class A performance up to a power level of about 20 W RMS into 4 Ω. The final circuit arrangement that we decided upon gave us this, and also a two and a half times improvement in efficiency over a conventional class AB amplifier (**Fig 1**).

Each channel still had to get rid of up to 300 W of heat from a space of only 4800 cubic cm, and since we wanted better than average thermal margins for reliability, a radical design of heat exchanger was required. We devised a solid copper exchanger which has an extended surface area and controlled high turbulence air-flow (**Fig 2**). Although this resulted in a 60% increase in weight compared to a conventional aluminium heatsink, it reduced the volume by about three times. Because of the shorter thermal paths involved, and due also to the better thermal conductivity and greater calorific capacity of copper (per unit weight), it gave a much reduced transient thermal impedance.

A low profile case and the increased back pressure of the heat exchanger made us abandon the axial fans conventionally used in power amplifiers and adopt a rotary blower. A 'mid-engined' layout with the fan positioned in the centre of a deep package effectively decoupled its mechanical noise from the outside world. This left us with the advantage of a blower's superior air-flow.

The other area of conflict between light compact packaging and high wattage is the power supply, especially since the amplifier must satisfy the heavy duty requirements of rock and roll and bass–heavy disco music. A conventional mains transformer with sufficient capacity and a low enough impedance would, by itself, weigh more than the budget allowed for the entire amplifier. The series resonant circuit we chose to develop overcomes these difficulties without the shortcomings of a normal switch mode PSU. The transformer at the heart of the circuit is operated with an 80 kHz sine wave instead of the normal 50 or 60 Hz line frequency. It weighs only 1.2 kg and yet passes more power with fewer losses than a line frequency transformer weighing 25 kg. The support and driving circuitry is much less complicated and more rugged than that of a Switched Mode design and the method of synchronisation used generates significantly less interference and puts little stress on the active components, so enhancing reliability.

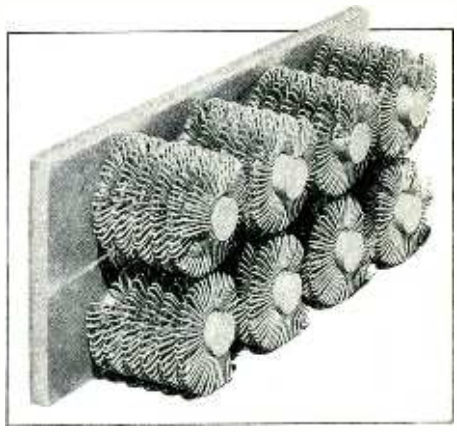


Fig 2: Solid copper extended surface area heat exchanger. Although only 9×18×8 cm in size; the heat exchanger has a surface area of over 352,500 mm². Turbulent air-flow increases heat transfer by three times compared to a conventional finned arrangement.

Among the numerous other advantages is the ease with which voltages and currents can be monitored and fault conditions detected. For example, in the event of an output short circuit, the power supply is shut down within microseconds. We have also been able to implement AC mains line voltage monitoring and automatic tap changing. This is not only a convenience feature but also maintains maximum potential output power and eliminates the dangers of erroneous manual voltage selection.

The other main factor which is responsible for some amplifiers sounding louder than others is the size and impedance of the reservoir capacitors

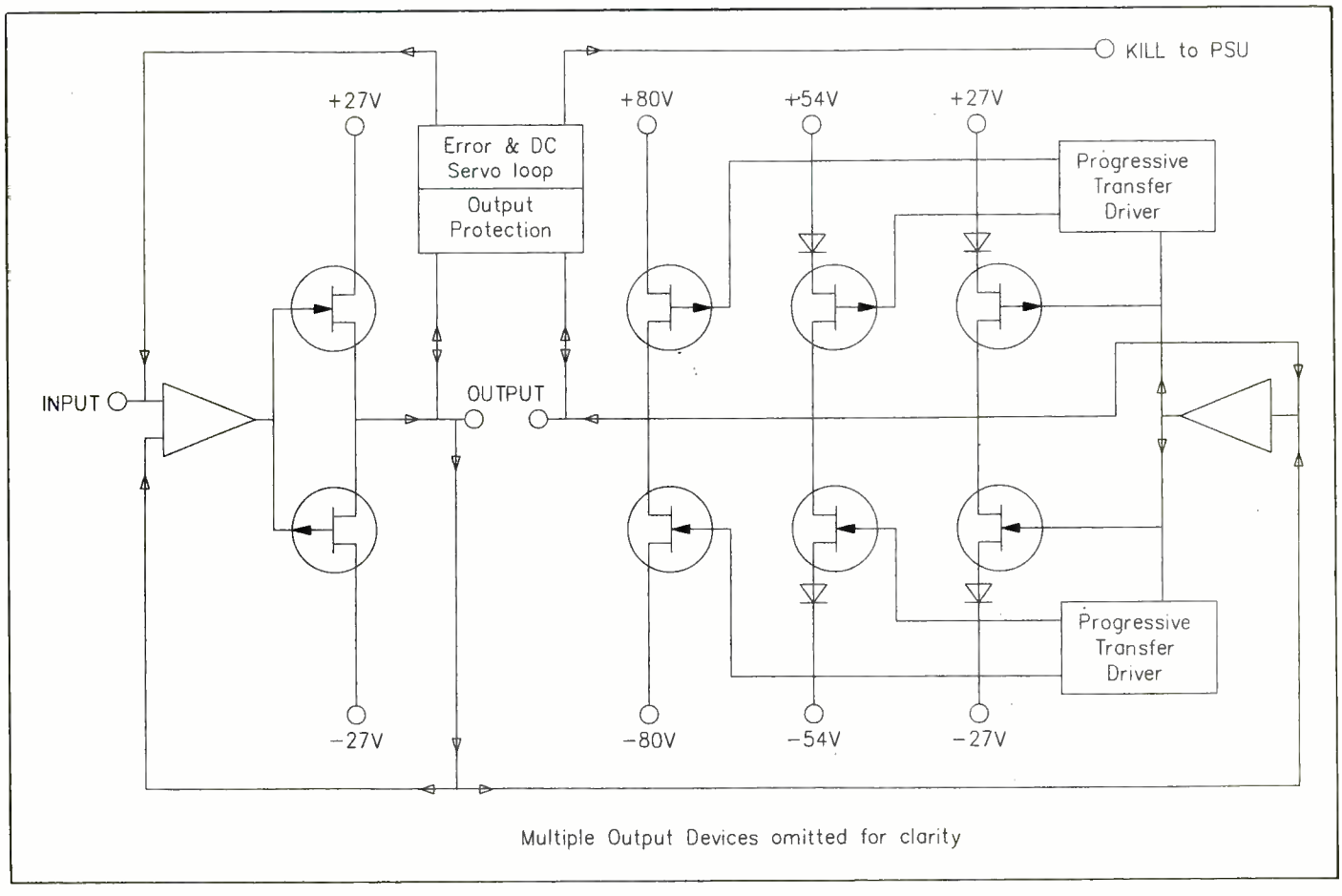


Fig 1: Simplified power stage block diagram. An asymmetric modified bridge with two quadrant commutating power rails allows 2 A quiescent current yet 70% efficiency at full power. Class A distortion characteristics are achieved at normal average program levels while hard-drive dissipation is under 300 W. Each of the 30 output MOSFET power devices dissipates under 25 W. A non-switching 'progressive transfer' commutation driver maintains good linearity in the output stage. This reduces demands on the feedback loop and thereby maintains low output impedance and low output interface distortion with all combinations of program, level and load.

HIGH POWER/2U

and how effectively they are coupled to the output devices. We have managed to incorporate over 108,000 μF per channel, most of which is placed on the amplifier module in close proximity to the output stage. To put this in some sort of context, most current amplifiers have capacitors in the region of 20,000 to 30,000 μF. The effectiveness of this massive capacity is further enhanced by the use of multiple parallel components to keep equivalent series resistance and inductance low and by the fact that less of this stored energy is converted to heat in the output MOSFETs. The main benefit accruing from this is that our 'Peak Music Power' rating spans musical transients lasting over 2 seconds.

This should be compared with the recommendations of P W Mitchell (AES paper 2504, 1987, 'A Musically Appropriate Dynamic Headroom Test for Power Amplifiers') which suggest that a 'Dynamic Power envelope' of 200 to 300 ms is a more realistic test than the 20 ms IHF tone burst quoted by most amplifier manufacturers.

Having illustrated just some of the techniques employed in meeting the performance goals for the power amplifier and its supporting power supply, it remains to summarise how we ensured that performance was not undermined by shortcomings elsewhere.

A key area where many amplifiers with fine text-book specifications can give disappointing results in the field is the input stage. Sonic degradation frequently occurs at the interfaces between pieces of equipment, especially if long lines are involved and proper line loading is not achieved.

Further, although electronically balanced input stages may appear to have excellent CMRR figures, many live installations have unpredictably high, and noisy differential voltages between adjacent points in the earthing system. This may greatly exceed an amplifier's optimum CMRR range causing subtle distortion effects if not audible noise and interference. In order to obtain full isolation between earths, maximum interference rejection and optimum loading even in situations where up to 30 amplifiers are wired to the same source, we have used a 20 kΩ input transformer correctly loaded by a differential input stage.

Bandwidth and RFI are controlled at the input in order to prevent RF demodulation and all transient induced distortion.

In order to give total flexibility in use, the input sensitivity can be accurately set in 2 dB steps anywhere between −10 dBv and +10 dBv by a rear panel switch. An independent front panel control gives a further 20 dB of continuous level adjustment. Each channel's mute switch allows the signal to be killed instantaneously, but 'unmutes' in two stages. A 1 s intermediate 'dim' period gives sufficient time to catch unexpectedly hot input signals before they have caused any damage.

Other areas of operator convenience which we thought important to tackle included monitoring for potential failures before they actually occurred. The most obvious failure mode which an operator may be able to do something about, given warning, is overheating. Although the amplifier runs cooler than is strictly necessary under normal conditions, there are combinations of circumstances which will defeat any amplifier. These include, for example, restricted airflow and high ambient temperatures with an unfortunate combination of programme and reactive loudspeaker. Since we were already monitoring internal temperatures in any case, it was an inexpensive matter to include a temperature gauge on the front panel.

Another danger area that the engineer may not always be aware of is change or fluctuation in the AC mains voltage. Despite the wide 95-260 V 'capture range' of our auto line voltage selecting circuit, line potentials do occasionally deviate beyond safe limits. Voltage variations which endanger the reliability of the amplifier will cause it to switch off immediately, while voltages which are approaching these limits cause the power LED to flash a warning.

We believe these solutions and the numerous other points which have been given equal thought, achieve genuinely high standards in both performance and convenience.

Summary

The development of this new amplifier has resulted in a unique electronic and packaging design which we believe offers considerable advantages. We managed to meet and exceed the original design goals with the finished *EPC-780* amplifier offering power in excess of 1400 W RMS into 2 Ω per channel in a 2 U package weighing just over 20 kg. Reliability has been achieved by maintaining heatsink temperatures below 80°C while offering a 50 amp peak output current capability. Of course we recognise not everybody needs such awesome power in one box, so the *EPC-780* will become the first of a series which will include smaller and less powerful versions of 'big brother'.□

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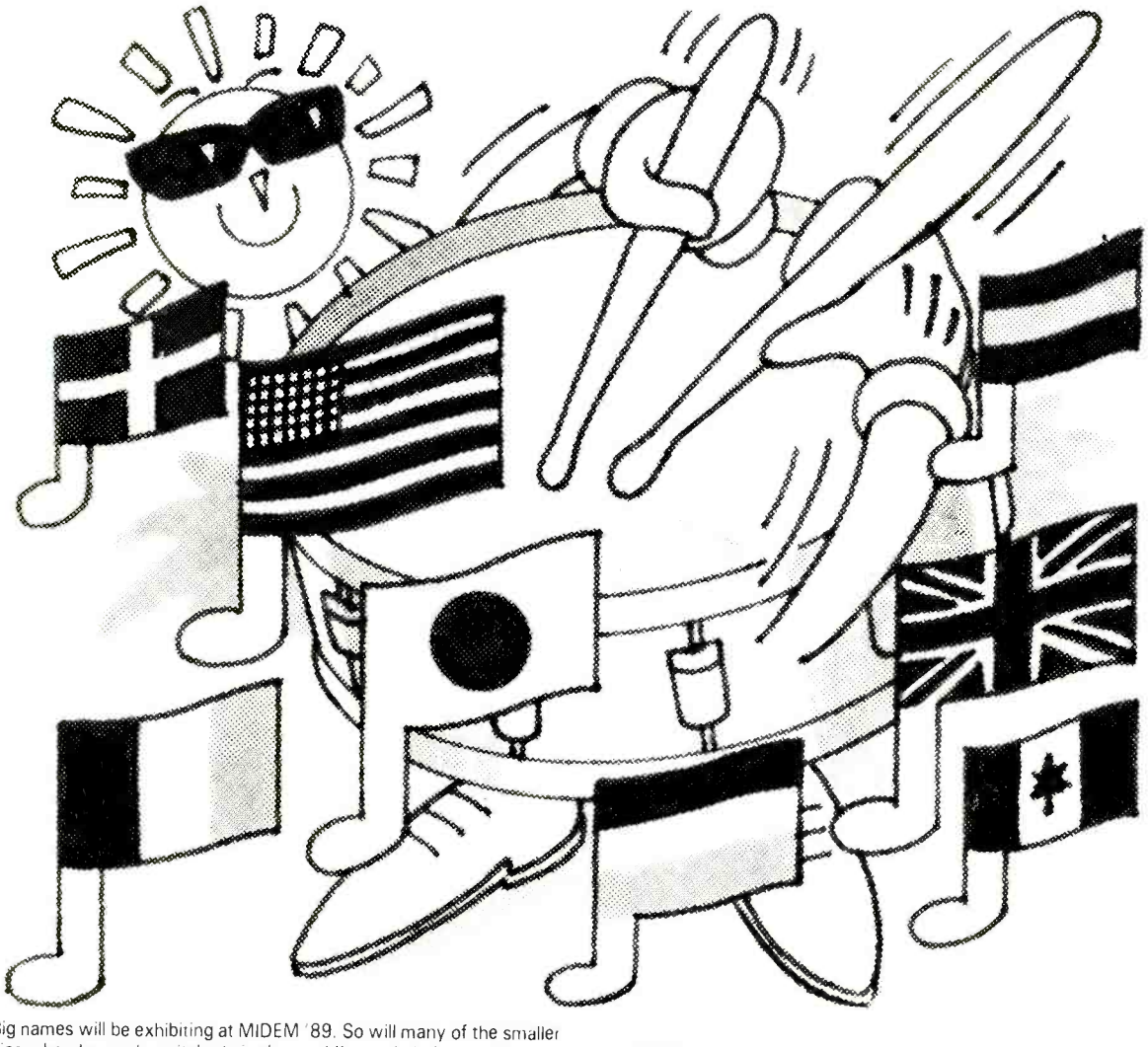

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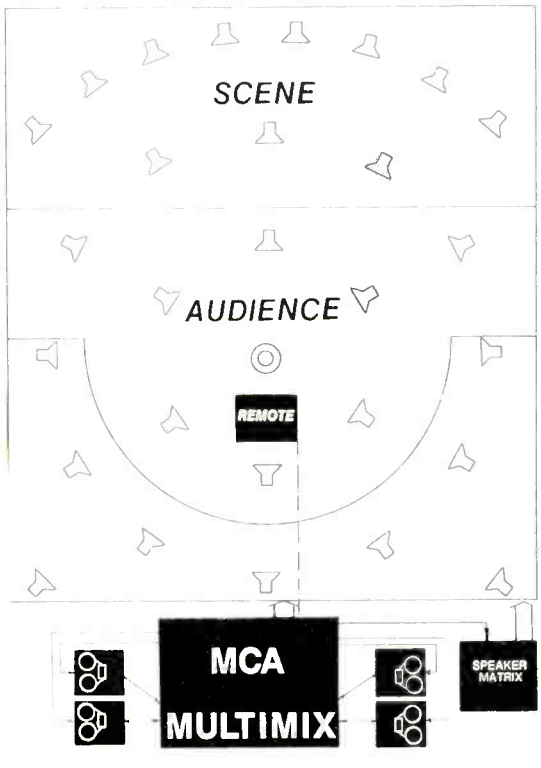

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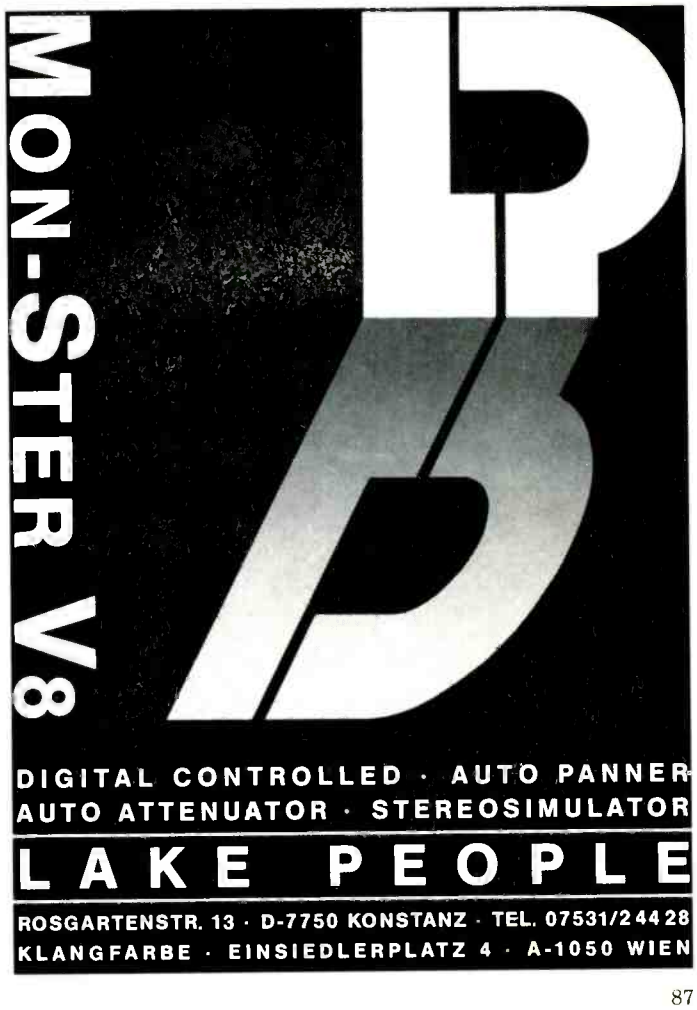

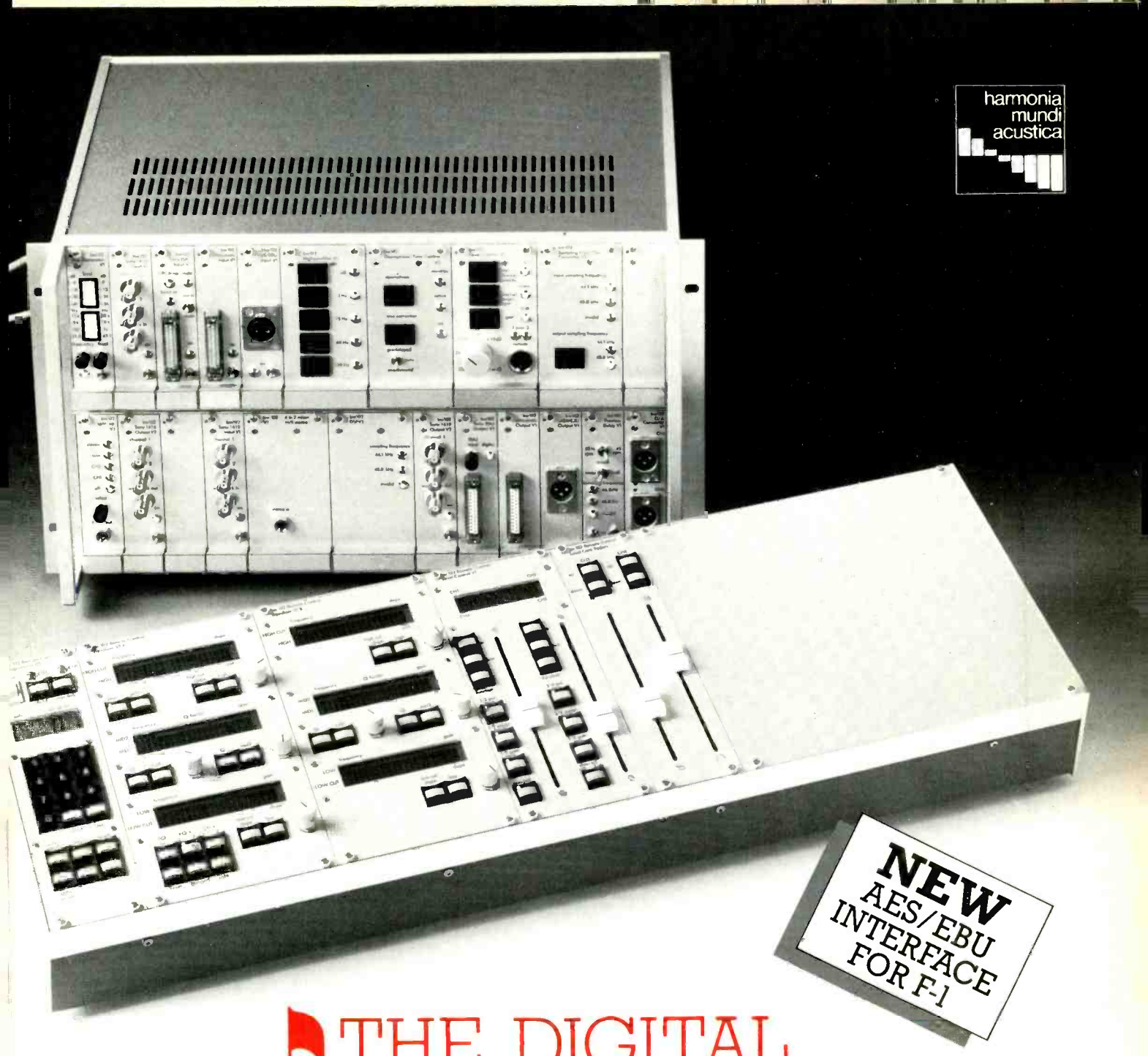

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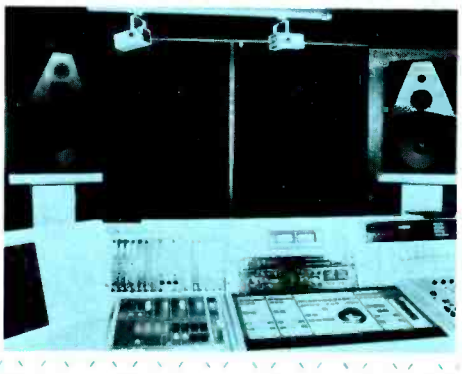

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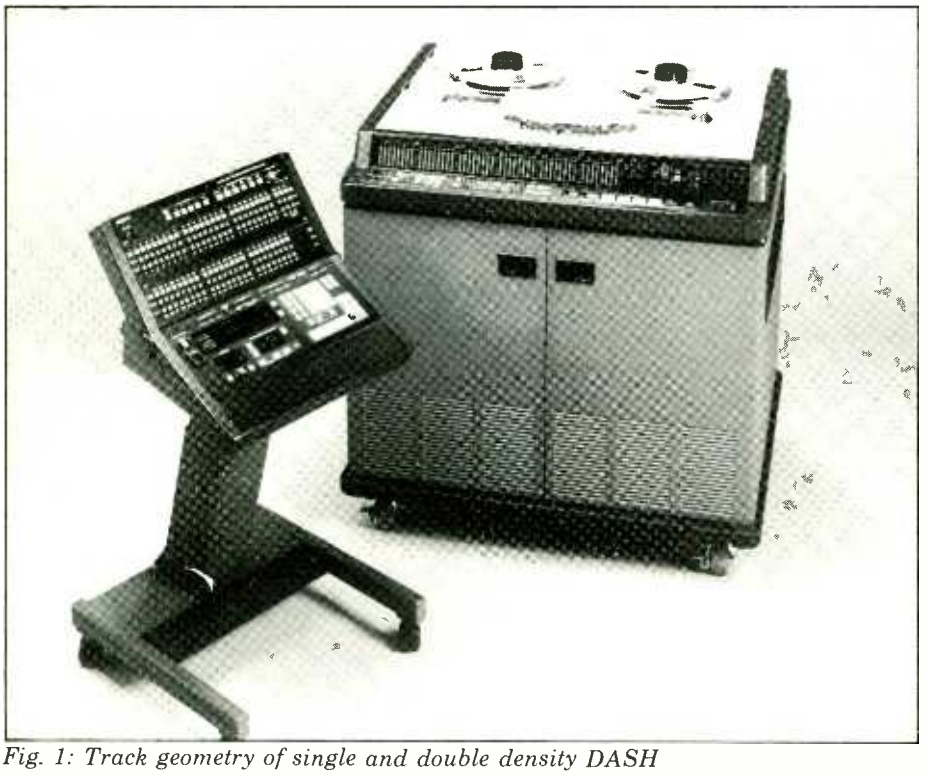
DOUBLE DENSITY DASH

Long talked about, the Double Density extension of the DASH format is a reality in the form of the Sony PCM-3348 48-track. Phil Wilton of Sony Broadcast outlines the format and major features



Pigs might fly! Just one of the many comments made about Sony's intention to manufacture and market a 48-channel digital multitrack recorder using ½ inch tape. Well, prepare yourself for the impossible! By the winter of 1988 Sony *will* have such a machine commercially available. Known as the *PCM-3348*, it comes six years after Sony first entered the digital multitrack arena with the *PCM-3324*.

Even during the development of the *PCM-3324*, it was Sony's intention to have a 48-track as part of the family as and when technology allowed.

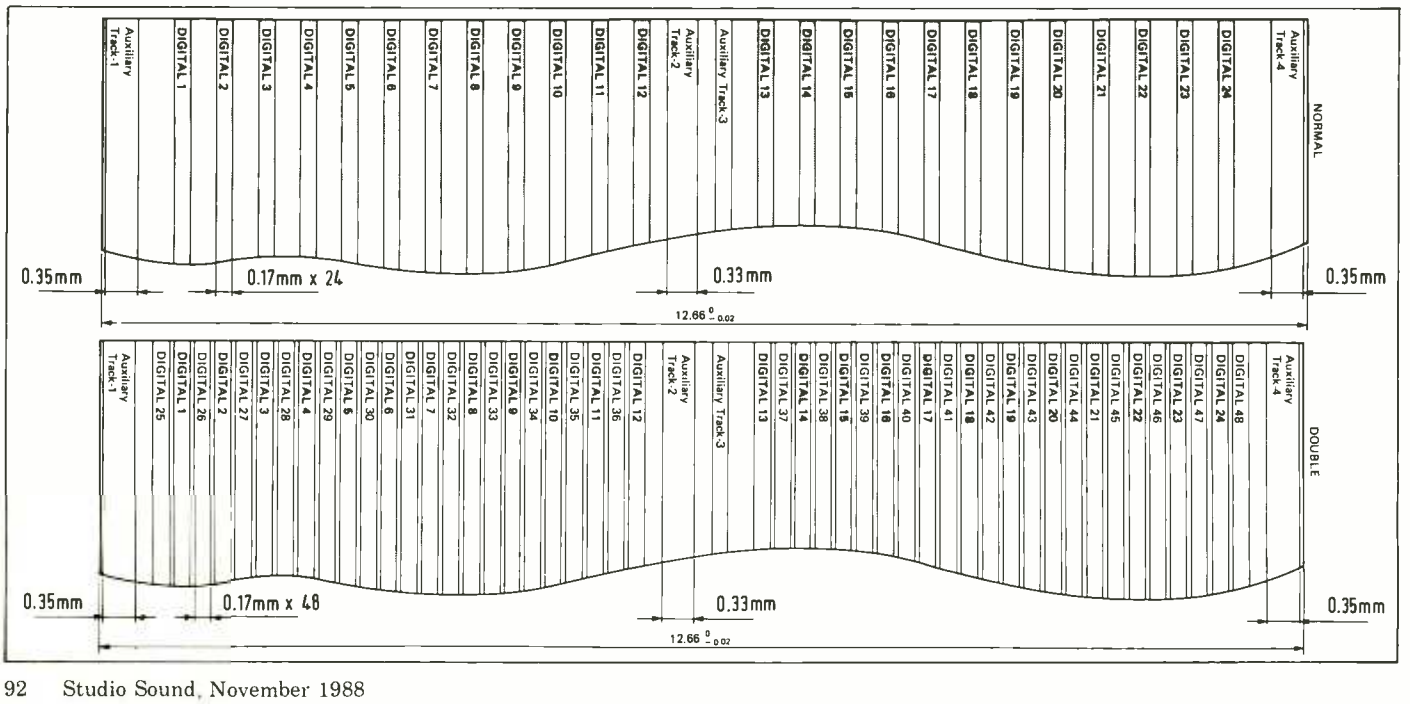
Fig 1 shows the track geometry of the *PCM-3324/PCM-3324A* (known as single density DASH) and the track geometry of the *PCM-3348* (known as double density DASH). Examination of the single density track geometry will reveal a track pitch that allows additional tracks to be placed in between, thereby doubling the number of channels to 48.

Compatibility

The obvious reason for using the 2-track geometries, single density and double density, is one of compatibility. It is essential that existing users of the *PCM-3324* and the large number of tapes produced so far (there are over 400 *PCM-3324*s installed and working commercially worldwide) will play back on the *PCM-3348*. Not only are the two machines compatible, they are also 'upwardly' and 'downwardly' compatible. That is, tapes recorded on a *PCM-3324* will play back on a *PCM-3348*. Because of the non-sequential way in which the tracks have been numbered, you would actually get audio out of channels 1 to 24 on the 48-channel machine. (A nice touch so you don't have to re-patch the whole desk.) One could even dig out an old master tape from the tape store, place it on the *PCM-3348*, and then begin more overdubbing on the newly acquired channels, 25 to 48.

In today's cost cutting environment (ie record companies) this is not such a bad idea as it would enable a project to commence 24-track and then progress to 48-track (physically using the same piece of tape) as and when necessary. Likewise, tapes recorded on the *PCM-3348* will play back on the *PCM-3324* but the *PCM-3324* is only capable

Fig. 1: Track geometry of single and double density DASH



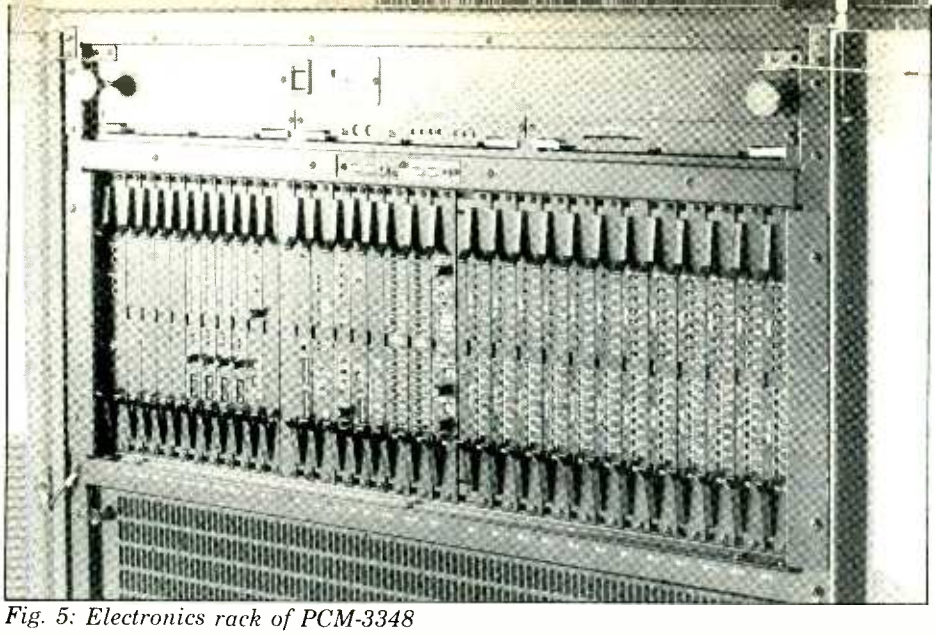


Fig. 5: Electronics rack of PCM-3348

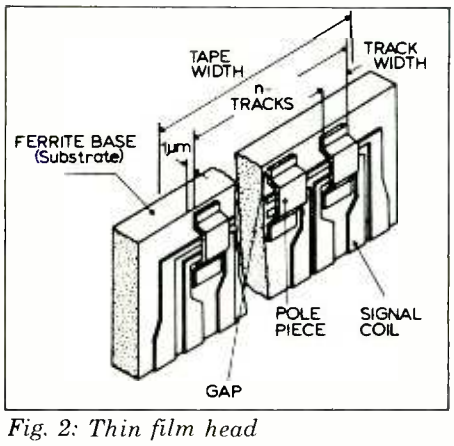


Fig. 2: Thin film head

of reproducing channels 1 to 24.

The two main reasons why it has taken until today to bring about the *PCM-3348* are the problems of physically making the head stacks and shrinking the electronics of two *PCM-3324*s into one machine.

Heads

Originally, the only perceived route to manufacturing heads for double density DASH was by means of 'thin film' technology because of the small dimensions involved. Techniques from the semiconductor industry are used whereby the head structure is photographically etched, layer by layer to produce the finished product in the same way that VLSI (Very Large Scale Integration) chips are made. **Fig 2** shows the arrangement of such a head in cutaway form. This process has proved suitable for record heads and examples can already be seen on other products such as the *PCM-3402* 2-channel DASH machine (the thin film heads are the half brown, half silver ones).

One of the problems with thin film technology and the dimensions involved is that it is only possible to have a coil of a few turns. Under the laws of electro-magnetism, the level of the induced signal from a magnetic flux is proportional to the number of turns in the coil. In the case of thin film playback heads, this signal is at present not large enough to be reliable, when one takes into account spacing losses and mistracking, etc. However, Sony have not been idle in conventional bulkhead technology and have produced bulkheads which are also suitable for use in double density DASH. That is, it has 48 (52 if you include timecode, CTL and two analogue cue tracks) pole pieces, gaps and coils placed one on top of the other in the space of ½ inch. Each track is 0.17 mm wide with a gap of 0.05 mm between adjacent tracks.

Even with modern technology it's still 'horses for courses' such that the *PCM-3348* is equipped with thin film record heads and a bulk playback head.

Signal processing

For those who have never ventured behind the front panels of a *PCM-3324* the top electronics rack contains over 5,000 discrete TTL chips; these not only take up a lot of space, they also require copious amounts of power. At a combined power consumption of 3.6 kW, it is obviously not possible to power two *PCM-3324*s from one 13 A socket, and anyway those 10,000+ TTL chips fill up the

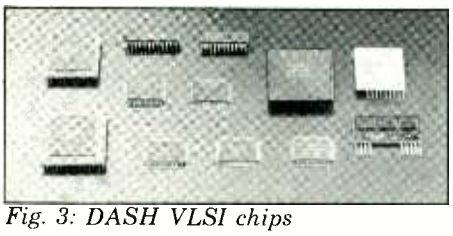


Fig. 3: DASH VLSI chips

Fig. 4: DASH VLSI list

LSI NAME	PRODUCTION PROCESS	NUMBER OF GATE	FUNCTION
DASH 001G	CMOS G.A.	8000 Gate	DASH Encoder
DASH 002G	CMOS G.A.	8000 Gate	DASH Decoder
DASH 003AQ	CMOS G.A.	3900 Gate	DASH SYNC SEP./T.B.C.
DASH 004P	CMOS S.C.	400 Gate	Timing Gen.
DASH 005Q	CMOS G.A.	2000 Gate +RAM	EDIT Coefficient Gen.
DASH 006Q	CMOS S.C.	3500 Gate	SONY DIO Format (SDIF-2) D.IN
DASH 007Q	CMOS S.C.	2800 Gate	SONY DIO Format (SDIF-2) D.OUT
DASH 009G	CMOS S.C.	6000 Gate +ROM+RAM	2TIMES Over Sample Digital Filter
DASH 010	H.I.C.	—	P.B. Pre. Amp. Module
DASH 011	H.I.C.	—	REC. Pulse Train Driver
DASH 012Q	CMOS G.A.	2000 Gate	REC. Pulse Train Controller
DASH 013P	CMOS G.A.	830 Gate	P.B. Digital P.L.

G.A. Gate Array S.C. Standard Cell H.I.C. Hybrid IC

studio.

Using Sony's in-house Semiconductor Division, 12 different DASH VLSI chips have been developed specifically for the *PCM-3348* shown in **Fig 3** and described in **Fig 4**. These chips have enabled a reduction in the number of signal processing boards from 34 (two *PCM-3324*s) to just six for the *PCM-3348*. Implementation of these VLSI chips has also enabled other innovative techniques to be used such as pulse train recording. This, in turn, leads to a simple record alignment as there is no longer a DC offset adjustment. Improved decoding algorithms have led to an increase in the basic error correction from three to five correction lines without changing the format.

Weighing in at a modest 246 kg with no difference in the overall physical size, the *PCM-3348* consumes just 1.2 kW. Some 0.2 kW less than the newer successor to the *PCM-3324*, the *PCM-3324A*.

Fig 5 shows the single electronics rack of the *PCM-3348*. On the far left are the signal processing boards, in the middle clock, CPU, CTL and digital I/O cards and on the right-hand side A/D and D/A cards (eight channels per card).

Obviously, all this high technology in an audio tape recorder is of no use unless it returns a credible sonic performance. The A/D and D/A converters all use 2× oversampling along with digital filtering. The analogue filters have a linear phase across the audio band and a high cut-off frequency with a ⅞ order cut-off slope. The digital filters have their aperture correction characteristics and cut-off responses directly controlled by software, thereby reducing aliasing noise and raising the cut-off point in the high frequency region. These benefits are particularly noticeable when large amounts of varispeed are used. (The high frequency cut-off point is now 21.7 kHz.)

Transport

The *PCM-3348* can handle tape in a fast and precise manner.

An extremely rigid diecast chassis with an integrated construction is supported on three large rubber bushes, thereby isolating the transport and head assembly from external vibration. The transport mechanism itself is an innovative design that features three DC servomotors and no pinchrollers.

The capstan, which is rotating in all modes at play speed, is fitted with a fast acting clutch that is only engaged during play. This leads to a swift transition time between transport modes. The acceleration speed from stop to fast forward or rewind is now eight times quicker than the *PCM-3324* and ultimate wind speed is 15% higher.

A casual inspection of the headstack would at first reveal that the *PCM-3348* is equipped with seven different heads. Four of these are actually synthetic ruby (garnet) tape guides, which provide smooth tape handling and excellent tape to head contact.

Features and facilities

All the innovative features of the *PCM-3324* have been retained in the *PCM-3348*, such as wide varispeed range, CTL accuracy for synchronisation and variable crossfades for punch-in/punch-out also with CTL accuracy. In addition, a whole host of new features have been added, many of them at current end users' requests:

- Digital track bouncing from the remote, selectable for two channels at a time with perfect time alignment.
- 23 seconds of 16 bit 48 kHz sampling memory, which can be trimmed in millisecond, second or timecode frame steps and then spun in automatically to any desired channel on the *PCM-3348* totally in the digital domain. Programme source for the memory can be selected from tape or line input. An external trigger socket allows for the capture of the sample into memory or for manual triggering when spinning in.
- Two channels of AES/EBU and Sony

DOUBLE DENSITY DASH

PCM 1610/1630 digital I/O, which can be selected to or from any individual channel on the multitrack.

- 9 pin RS422 serial remote control with player and recorder ports.
- Built-in multistandard timecode generator and reader with chase synchroniser (SMPTE drop frame, non-drop frame, PAL and film), timecode regeneration and dropout compensation.
- Selectable tape end stop so that the machine will not spool off at the end of a reel.
- The main digital output can be selected to give a signal in advance of the normal position. This 'advanced' signal can be selected in sample steps from 0 up to 256 samples (5.2 ms). This feature is designed for use with digital consoles to take into account any processing delays inherent in any digital signal processing so that the overdub signal is in perfect phase with the playback channels.
- All stores registers and memories in the supplied remote control, *RM-3348* (**Fig 6**), have battery back up.
- The *RM-3348* is equipped with the APIB bus, which allows multiple machine configuration for more tracks or electronic editing. It is also possible to have multiple synchronisation with *PCM-3348* and *PCM-3324/3324A*, all with CTL accuracy (1 ms).
- Built-in multistandard video clock board (24, 25, 29.97 and 30 Hz frame rates).

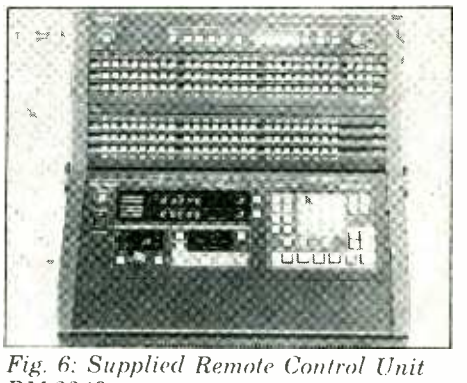


Fig. 6: Supplied Remote Control Unit RM-3348

- Optional remote metering (*DMU-3048*) with individual record/ready and record status plus remote readout of error activity.
- All sync offsets, drop-in and drop-out points can be trimmed in second, millisecond or timecode frame units.
- Optional console interface for remote control of channel status from mixing consoles (*DABK-3340*), which plugs into the rear panel of the *PCM-3348*.
- Large carrying handles and castors for easy manoeuvrability (hire companies take note!).
- Comprehensive self-diagnostics for ease of serviceability plus easy access to major components by means of a hinged deck plate up to an angle of 70°.

Performance

Just in case there are a few doubting Thomases, I can assure you that this machine does exist, unlike some pieces of equipment offered in the BMW adverts found in national newspapers on April 1st each year.

TEST STEP	MACHINE	MODE 13CH	37CH	14CH	38CH	15CH	ERROR RATE [%] 13CH	37CH	14CH	38CH	15CH
1		REC/PB	REC/PB	REC/PB	REC/PB	REC/PB	88	91	85	91	91
2	PCM 3348	PB	PB	PB	PB	PB	90	96	83	86	87
3		PB/REC	PB/REC	PB/REC	PB/REC	PB/REC	91	96	83	86	87
4		PB	PB	PB	PB	PB	88	95	89	94	87
5	PCM 3324	PB/REC	–	PB/REC	–	PB/REC	87		84		89
6	PCM 3348	PB	PB	PB	PB	PB	84	94	92	95	96
7	PCM 3324	PB REC		PB/REC		PB/REC	83		87		91
8		PB	PB	PB	PB	PB	89	94	93	92	93
9	PCM 3348	PB/REC	PB/REC	PB/REC	PB/REC	PB/REC	89	96	92	91	96
10		PB	PB	PB	PB	PB	89	95	90	93	93

Fig. 7: Compatibility by Error Rate

Fig 7 shows a breakdown of the error rate when a tape with five neighbouring channels recorded on a *PCM-3348* is transferred to a *PCM-3324* machine. The same channels are overwritten (overdub mode) and played back on the same machine (step 5). The tape is then transferred to the *PCM-3348*, played back (step 6) and the same channels are again overwritten by the *PCM-3324* (step 7).

The error rate values are relative, with 100% referring to the average error rate of the same tape in an average *PCM-3324* machine. It is clear from this that complete compatibility is achieved.

It is clear the pig has flown!□

TOTAL CONTROL

JBL Control 5

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The 130 mm low frequency driver is matched to a 19 mm high frequency device by a sophisticated dividing network incorporating a power protection unit. As a bonus, both drivers are magnetically shielded, making the Control 1 ideal for audio/video applications.

Where space permits, the Control 5 offers even more control. Using the same construction techniques as the Control 1, the Control 5's larger enclosure permits the use of a 165 mm low frequency driver for better sensitivity and extended bass response. JBL's remarkable 25 mm pure titanium high frequency unit extends your control beyond the limits of human hearing. A dividing network featuring the highest quality components, bypass capacitors and a power protection device complete the system. As in the Control 1, both drivers in the Control 5 are magnetically shielded, permitting use near video monitors without sending the picture out of control.

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PINEWOOD SOUNDTRACKS

Situated away from the bustle Pinewood Soundtracks is a post-audio studio in Vancouver, Canada. Barry McKinnon reports

Situated in the quiet south east corner of downtown Vancouver, amidst office supply and graphics arts houses, is Pinewood Soundtracks Studios. Pinewood may not be as well known as Vancouver's Little Mountain Sound Studio but its product probably reaches a much larger audience than even the hottest musical act. Pinewood has been doing post-audio work for major films and American TV networks. The two studios do share a common thread, however, in the persona of Pinewood's owner Geoff Turner.

Geoff Turner has been in the recording business for 32 years, beginning in England and continuing for 10 years in New York. He came to Vancouver 16 years ago, seeking a change from the high pressure environment of New York studios, where he freelanced in virtually all the major rooms.

Mixing theatre B

"After all those endless hours in the studio, when you come out what do you find? I can remember distinctly, in New York, coming out of the studio at 3 o'clock in the morning, and I'm just walking up 7th Avenue and a guy comes flying out through a window in front of me. You look at yourself and you go: 'Well this is the place to be but it's not the place to be', there's got to be a better way."

He set his sights on Vancouver, and when he arrived there, found there was nowhere to practise his craft, so he built one: Little Mountain Sound Studio.

Twelve years ago he left Little Mountain and bought an existing video studio, which consisted of a big empty room and a small control room. He built Pinewood's Studio A in 1976 and began a diversified recording business. Music was the mainstay but he worked at opening up other markets. Pinewood developed a reputation for recording traditional jazz for the European market. As early as 1977, they had done audio work on seven TV variety shows for the Canadian Broadcasting Corporation. Turner saw the trend for home studios developing and knew that dependence on music alone in the then small market of Vancouver would create financial problems in years to come. He saw a need for a post-audio facility and made calculated steps towards that market, a gamble that has been paying off with phenomenal growth.

Turner expanded on his philosophy: "The reason it grew the way that it did, at the speed that it did, is that my attitude towards audio is not one of just music, or anything specific, it's just that once I realised I was in business, then what I had to do was cater to the audio industry. Most other people looked at audio as music only, somehow they seem to think that TV sound just goes with the pictures. We're an audio establishment. Most people go for the high profile, visible stuff like rock videos and music and shy away from the mundane work. Audio is audio: the difference between speech and music is one has instruments, the other doesn't."

Growth has been steady since the beginning, the only glitch being the onset of the recession in the early part of the '80s, otherwise every year has shown good gains. The facility now encompasses 20,000ft² including the video theatre, two studios, six audio edit suites and offices. When the decision to commit to post-audio for film and TV was made, it marked the beginning of an even higher growth rate.

Vancouver was becoming known as the Hollywood of the North by 1985, the Canadian dollar was worth about 75c (US) and the film and TV production companies were jamming highways to get to the land of low production costs. When they got there they found a film and TV production industry already in place. They were even more surprised to find it capable of doing the jobs they gave it. It wasn't long before many realised they could do the bulk of their production work in Vancouver. The addition of Pinewood's post-audio facility had been the missing link in the chain. They could now come to Vancouver with a cheque book and a script and leave with a finished production.

Late in 1986, construction of a video mix theatre was begun in Studio B. The room was gutted and rebuilt from the ground up. The Sony video projection system uses a special curved screen that allows a wide angle view from the 3-engineer mixing position. The custom console is a marriage of Studer and Neve desks, and is located on the lower tier of a 2-tier construction. The upper tier, for the production people and editors, can also accommodate half a dozen electronic keyboards for film scoring work, with inputs to the console located close at hand. The two tier arrangement also allows for easy movement of the TV production people without disturbing the technical people.

Curtis Staples, director of operations for Pinewood, added: "One of the things about Pinewood, as a company that moved from music to post-production, is the long term commitment we have made. We didn't just stick a TV monitor in a control room and call ourselves a post house. If you're going to compete in a big way, you have to commit yourself to the necessary elements and requirements in a big way. We spent over half a million dollars doing the theatre renovation; it's not temporary, we had to live without the room for a long time. It's a sound version of a video editing suite; it's not unique to the industry but it is unique to Vancouver. In the case of our Foley stage, we didn't do something temporary or portable. It's not a matter of: 'Today we're doing Foley, let's pull it out of the closet.' It's ramset to the floor, the floor is 18 inches of concrete, isolated from the outside world. The surfaces are all real solid surfaces. Our Foley isn't large but the room is right acoustically, it's about 35×50 feet, it's a live-end/dead-end room with the Foley in the dead end. In Hollywood they'd use a soundstage but we don't have that kind of real estate."

Turner's down to earth business philosophy is apparent in the unpretentious surroundings. The studio decor is homey, decorated in natural pine, and includes a working fireplace in the reception area, used to take the chill off on damp winter mornings.

Staples said: "Our place is modest in a lot of respects and it's that way for a reason: we want to be here in the future."

There is more to it than that. Turner identified elements in studios he worked in over the years that he didn't like, didn't feel comfortable with and set out to ensure they wouldn't be in his own studio: "I wanted to take away all those things that make stress. In 12 years here I can't remember any bad scenes between clients and staff. There are disagreements but never to the point of, 'I never want to see him in here again', and I can remember that sort of thing happening in other studios I've worked in."

Turner is unpretentious about his equipment as well: "We have stuff that works and will do for everything around here. That's possibly why we haven't attracted the visually high level of album work. We have had Bryan Adams in here, even Gene

PINEWOOD SOUNDTRACKS

Simmons from Kiss many years ago, but we don't cater to the SSLs and that kind of thing. With a market this size, when someone gets famous they usually go to New York or LA anyway; those are the kind of guys [studios] who should be buying that kind of gear. With our gear it is more important that it is there every day when you switch it on, as opposed to how many lights and indicators or inputs it's got. Living and working out here, especially having an establishment, is a bit like living in a desert—you can't pick up the phone like you can in New York, and get spare parts instantly. Things here are typically from a couple of weeks to 12 weeks delivery; you either make plans around that or you make yourself self-sufficient, which is what we have done."

Pinewood uses *MM1200* Ampex machines for all multitrack work for just that reason. Robust and reliable construction and ease of maintenance are reasons for the choice. They began with Ampex *MM1100*s and found that the *1200* was very similar. they now use five *MM1200*s and a sixth is on the way to them.

Turner said: "They're a simple machine, the more of them you have the more they support each other; you only need one set of spares no matter how many you have. They also happen to work exceptionally well under sync control."

They have upgraded specifications, using computer-designed modifications by Peter Butt. These include electronics and transport tweaks that provide PERC capabilities, reduced distortion and transport performance optimisation.

Neve consoles figure prominently at Pinewood, the relationship Turner developed with Neve dating back to his New York days. Turner explained: "I was first in contact with Neve in New York. The studio I was at got the first Neve in North America, and I was fortunate in being involved in the installation of it and having a little bit of input into what it was. In those days Neve would actually listen to you and put things on the board especially for you. I was so blown away by the service and the quality of the equipment that when I built Little Mountain that I put three Neves in there. Obviously they were my choice when I built my own studio as well. The main reason I use them is every day when you come in and switch them on, they work, and you can't swap that for anything in the world, especially living in this part of the country."

Turner also operates Pacific Western Audio, a studio service and supply company that grew out of the need to maintain

Pre-mixes in Suite A

Pinewood. The company services Nagra for Western Canada as well as Studer in the Vancouver area. With the depth of experience in Neve consoles, it is no surprise that they have become the local Neve experts, offering service work and custom modifications to Neve desks. The company is unique in that it does not seek business, dealing strictly by word of mouth referrals.

As well as the unique Studer/Neve console in the theatre, Pinewood has a second Neve in Studio A, the Foley studio, with

Post-production

The post process, for those not familiar with it, can be described as follows. The show is shot, edited and assembled. Pinewood receives the final cut of the show, possibly missing a few scenes, but it is, to a great extent, locked in stone. In the spotting process, the post-audio supervisor, the associate producer and the editors view it and decide what is to be done. It is then sent to the appropriate departments; dialogue editing, sound effects editing and musical scoring. All these are then assembled on to 72 tracks, and a submix to six submasters is done. The final North American mix is done to stereo, with mixes for the international market pulled off without dialogue. Dolby *SR* is used on the master recordings.

Dialogue editing often includes ADR or looping. The ADR (Automated Dialogue Replacement) is where the original pickup is not of adequate quality, or has suffered some damage after being recorded and new spoken lines must be matched into the rest of the scene, simulating the ambience of the character's lines.

Turner says: "It's not automatic at all, of course. It takes a couple of engineers and a lot of button pushing."

Looping is the film terminology for the same process, often applied to dubbing a different language or cleaning up the language for TV movies and the like.

Sound effects editing will often use pre-recorded effects, sampled effects and the one most interesting to watch: Foley stage effects. This stage consists of a variety of floor surfaces, outdoor surfaces such as gravel and leaves and an odd conglomeration of gadgets to simulate various mechanical noises. These effects are performed in realtime while watching a screening of the scene, very much like the original radio drama sound effects artists.

Pinewood has facilities to handle all areas of this process but the involvement depends upon the show. For the TV series *21 Jumpstreet*, they do the Foley, ADR and final mixes, with the music shipped in from LA, some of it on 24-track, some on 2-track, with timecode on the centre track. A music editor is involved in the final mix of the score.

Staples added: "We have all of the facilities to accommodate all of the possibilities, within reason. Our Foley stage is the only one in Vancouver and we have a pool of Foley freelancers available that have been trained through projects we have done."

ADR and looping work is an example of the black magic side of audio, that grey area between science and art. Staples explained: "Ambience

Foley stage

matching is very time consuming. Obviously it's a technical thing: if you can break down all the qualities of the dialogue, equalisation, presence and reverb quality, you could mathematically work it out and match it. The artistic part is to have someone listen to it and say, 'That sounds like this' and have them take a dry piece of ADR and put it in a person's mouth in a gymnasium or public washroom or subway and make it sound like everything else in that scene. Those may actually be easier than a more everyday environment like the hallway in a hospital. That may be the most difficult to match with the right EQ, reverb and delay. We use a Lexicon *200* and several *PCM70* digital reverbs and a *PCM41* delay as well as UREI equalisers and notch filters. The EQ is as important, as critical to the quality of ADR.

"The other trick to proper ADR is when you record it without the colourisation: if it already sounds like the scene you're half way there. It's more a matter of microphone placement than anything else. The other thing that comes into it, you always have good luck with ADR if you have someone doing a good job on the set, keeping things straight, clean and isolated, with the least amount of ambience, it makes the job easier later. If you record a scene in a gymnasium without reverb, you could cut the whole scene and the actor's lines wouldn't be getting chopped off by having the reverb chopped off. Let the reverb be added in post."

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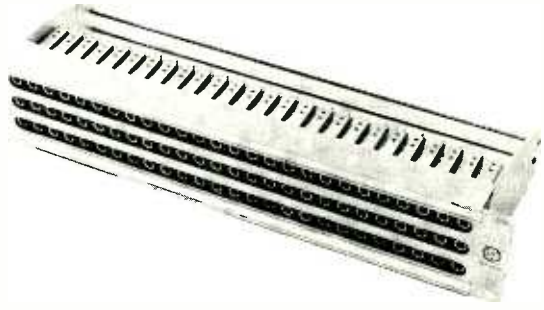

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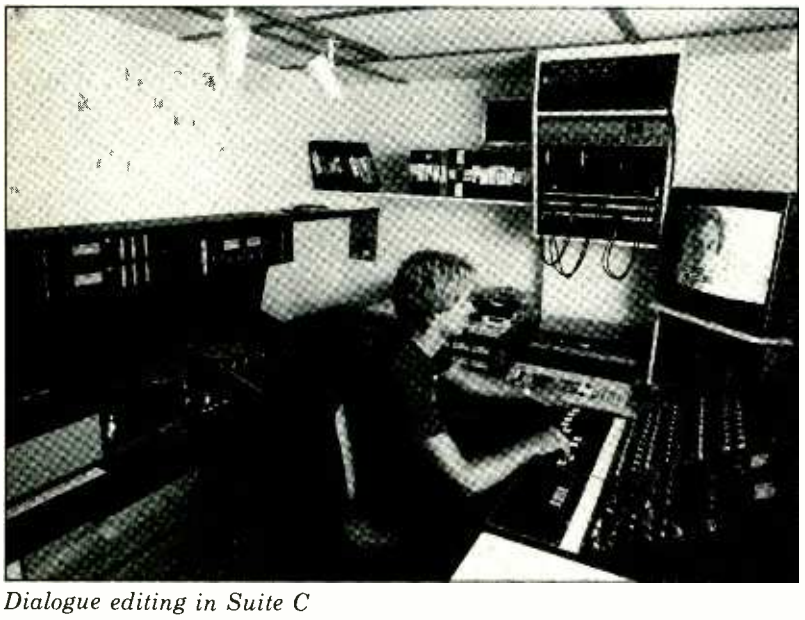
PINEWOOD SOUNDTRACKS

NECAM automation. Studer *A810* 2-track machines with centre timecode, MCI/Sony 1 inch layback machines and the ever-present *MM1200* Ampex machines are found throughout the facility, tied together through Audio Kinetics *Q.Lock*, BTX and Soundmaster synchronisers.

Last season Pinewood did most of the ADR for several TV series, including: *MacGyver, Wiseguys, 21 Jumpstreet and JJ Starbuck*. With *MacGyver*, their ADR work has been shipped to LA for post-assembly.

Most of the TV series have a balance of predictable requirements and surprises. Most will have about half the scenes shot in standard locations every week, such as sound stage sets, cars, offices, etc, and sometimes that will change. Some weeks the shows are action heavy and sometimes dialogue heavy; there is a tradeoff as to which department gets the most work but the overall time required is about the same. Dialogue heavy shows are often difficult to edit. Difficult picture edits make much more work for audio editors. Action heavy shows produce more work for the sound effects editors.



Dialogue editing in Suite C

Staples: "One area that needs a lot of attention paid to it is stereo production for TV. With a TV screen you don't move people around, that's an accepted fact in the business. If you change angles to show the same converstion, you don't want the audio image to jump around, it doesn't work, it would drive people crazy. After a while you wouldn't know who was talking.

"It's the same problem with sound effects. If you have an office scene with an off-camera typewriter on the left, do you move it every time there is an angle change, or is it better to leave it where it is? Usually environmental sound effects are in stereo and specific effects are mono, unless the specific effect is directly attached to primary motion in the picture, like *Top Gun*."

Pinewood offers a unique combination of tape and film styles of editing for clients who need the choice. From in-house production or from the client, edited rolls of mag stock can be laid across to the 24-track *MM1200*s and locked to picture, or the edit can be completed entirely electronically using timecode and samplers to build the tracks up; or any combination of the two can be had.

Staples said: "It's a handy addition for clients, either because of the required speed in doing the show or because of available personnel: the people they want to use are film-style editors as opposed to electronic editors. We hand them a ¾ inch tape or a work print, they work their way and hand you their tracks and you make them become part of the project."

The transfer suite is located adjacent to the equipment room of the mixing theatre, allowing multiple *MM1200*s to be interconnected easily. 35 mm MTM dubbers with timecode are interlocked with a synchroniser to the Ampex and Studer machines.

Staples is understandably pleased with the reputation that Pinewood has developed. They have become part of a worldwide group of post-production facilities that gives and gets support from others. When other facilities in Toronto or LA have needed looping and ADR done by actors working in Vancouver, the job has gone to Pinewood. Recently they did ADR for John Candy's latest film, *The Great Outdoors*, just two and a half weeks before it was released in theatres.

Staples said: "We have a hard earned reputation for ADR—you can't buy that, you get it by doing the work."

Turner's philosophy surfaces in other areas as well, in the realm of new business: "One of the premises of doing business is that we don't advertise. I want people to come here because of our reputation, which means you start off your relationship on a totally different basis than having them sold before they come in through the door."

Turner's hiring practices reflect his philosophy: "Because this business is like it is, you only see people once a year or every couple of years, I want them to see the same faces here all the time. We make sure all of our staff are long term. We can't hire off the street in this business, so instead we wait for waifs and strays like myself. Others here have had really good experience but didn't want the Big City life and all that goes with it. Anyone coming from LA or New York is pleasantly surprised by what they find, that is engineers with the same capabilities as they are used to but with a totally different headspace. We're all happy here, not under the gun, looking like we need a year off. Most of us are hiding out here; we've found a little haven where we can deal with people at a reasonably high level in the business. So we haven't swapped our professionalism for local hokeyness."

Pinewood has some very experienced people in the engineering contingent; Alan Perkins is the chief engineer, originally from England where he worked at The Manor and The Townhouse. He has been at Pinewood nine years. Dave Slagter was originally brought to Little Mountain from Toronto by Turner in 1975 and he has just recently joined Turner at Pinewood. Ron Cote was originally from Vancouver, worked in both New York and Dallas before coming back to Vancouver and joining the staff about a year ago. Gary Morgan is another recent addition, coming from the CBC where he worked in post-production; he too has been on the staff about a year.

The writers' strike has meant a quiet few months, allowing time to finish six additional audio edit suites and other maintenance work without pressure. Staples said: "Frankly I'd rather have had to do it under pressure." The Fall is likely to be very busy as soon as the strike ends and production on the new season begins.

Turner said: "When the strike is over we have to be ready to shove through three and a half hours of TV programmes a week. That'll take all the people I've got and them some."

Already, there has been over $60,000 in studio time taken up in trial mixes getting the new 72-track format for post-mixing working smoothly.

One major project that won't be dependent upon the writer's strike is the audio work for the CBC series *The Beachcombers*. In an ususual move, the CBC has taken what was an in-house production for them and gone outside for all the dialogue, transfer work and final mixes.

Last season, the only thing standing in the way of even more production in the Vancouver area was a lack of experienced production people for movie and TV work, the union in the area being fully employed on an average of seven to ten simultaneous productions. Even with some minor fluctuations in the value of the Canadian dollar it looks like it should be a promising year for the post-production industry in Vancouver. Pinewood is ready to grow along with the market and is eagerly looking forward to the time when the Canadian production scene may become as big as the imported work.□

Pinewood Soundtracks Studio, 1119 Homer St, Vancouver, BC V6B 2Y1, Canada. Tel: (604) 669-6900.

REVIEW

A technical report by Neil Grant on the SCM 100A monitor from Loudspeaker Technology

The monitoring system arrives in two large—and heavy card crates, with each cabinet nested in sealed foam linings. No documentation, manuals, unpacking, maintenance or setup information, other than the promotional fly-sheet, is provided with the system.

Each cabinet consists of a vertically-orientated, 3-driver speaker set, with an integral power supply, low level active 3-way crossover and three associated amplifiers, all mounted on a common board and heatsink, recessed into the rear of the carcass of the cabinet.

The standard finish is a functional and pleasant light English oak, though your own individual cabinets could—at cost no doubt—be finished to match your own facility.

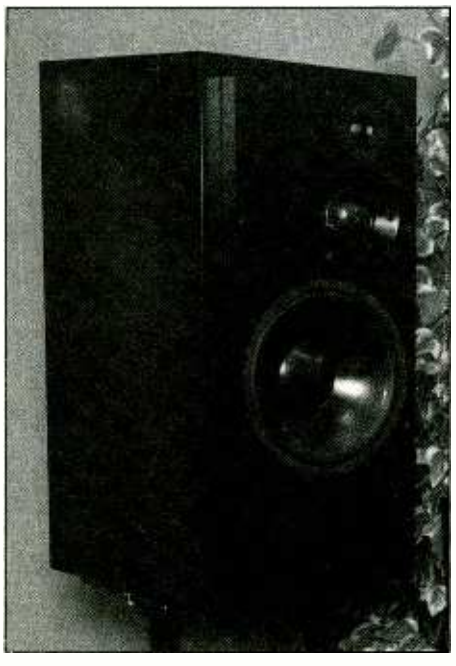
The speakers were not supplied for review with stands, though it is understood that stands are available. It is important that a safe and secure stand is used, since the centre of gravity of each cabinet is high, and there would be considerable damage if either cabinet were to topple over a console.

This does raise some interesting points as to the market niche for this type of speaker. Here we are dealing with a speaker that is substantially larger than the genuine nearfield speaker, yet a fraction of the size and capability of a full, half space mounted, main monitoring system. Possibly this size of speaker would find most use in pre-production studios, and smaller facilities, possibly where the space lost in front of the console is not a problem, or where space and finance preclude a larger, wall-mounted speaker.

Protecting the speaker diaphragms, and neatly checked into the front baffle face, is a fabric grille. This is tightly stretched over a light softwood quadrant section frame, which, it is claimed, minimises diffraction effects by reducing the impedance change around the lip of the cabinet in free space.

The baffle itself is proud of the main cabinet and is potentially removable—it would be necessary to remove a considerable number of countersunk socket-head screws in order to replace drivers. This somewhat agricultural bit of engineering can be said to allow ease of servicing but is principally necessitated by the rear mounting of the mid range dome. The only alternative would be to extract the mid driver through the vacant space left by removing the bass driver first, although it is hoped that driver replacement is rare. The diaphragm is not user-replaceable, and the unit will therefore have to be returned to Loudspeaker Technology for examination and repair.

All three drivers are neatly recessed flush with the front baffle and secured with socket-head bolts. Where these pass through timber, rather than the speaker frames or bezels, the countersunk heads bear on brass recessed washers to minimise wear to the timber face as these bolts are tightened.



Each cabinet accepts a low level balanced input on an *XLR* connector, though I feel that the user would appreciate knowing substantially more of what was happening to his signal once the console has been terminated with the speakers. I feel that considerably more by way of technical details, circuit and performance criteria should be made available to the user, other than the brief, bland and unreferenced information in the brochure.

Both cabinets require mains voltage and care will need to be taken to secure the incoming feed; in common with many 'Euro'-type connectors, it was all too easy to jar and disconnect the mains input to each cabinet with careless handling.

Mid and high frequency level trims are provided on the amplifier panel to the rear of the cabinet; these are the only user-accessible controls or consumables for the electronics, other than the mains fuses.

The cabinet carcass is solidly fabricated from MDF, of around 800 density, internally braced, and with the addition of bitumastic pads glued and stapled to the interior faces for further damping. Whereas there have been great advances in lightweight cabinet structures with remarkable stiffness over the last few years, the use of mass and constraint damping in low volume cabinet manufacture is still the most economical means to the end, and the *SCM 100A* cabinets have a solid, well-fabricated feel, and a substantial veneer to the external faces.

The result is a cabinet partly aimed at the developing upper high-fidelity market but will not look out of place in a control room where large, black, lightweight plywood cabinets are increasingly unfashionable.

System electronics

While it was felt to be outside the scope of this review to examine the performance of the cabinet electronics in isolation, the modules were removed for examination. Each module is secured by a number of socket-headed bolts and consists of a mild steel plate, with two bars to provide protection for cables and some method of handling, along with a heatsink. The amplifier set runs noticeably hot, though it was noted that the mains transformer itself runs substantially hotter than the heatsink, which could give rise to concern. Both speaker modules were difficult to remove, the PC boards fouling the lip of the cabinet. The fit was such that the two top corners of the PCB had, in fact, been cropped following manufacture, in order to persuade the amplifiers into the cabinet.

Internally, local regulators for crossover, and the three amplifier sections, are mounted on a single board, along with all the low and high level components. The MOSFET output devices are sandwiched between the board, and the heatsink, and any device failure would require dismantling of the entire assembly.

It was noted with some concern that the low level input leads from the *XLR* connector were neatly tie-wrapped to the mains transformer output cables, which though apparently not introducing noticeable hum, cannot be good wiring practice.

Speaker outputs are crimped to a neat 6-way connector mounted on the centre of the board, thus making the juxtaposition of speakers and amplifiers difficult, if not impossible, on re-assembly.

The crossover circuitry also provides for limiting, which is pre-set by the factory. This effectively stops the amplifier sections clipping, though the trade off is dramatically increased distortion once limiting sets in. Since this is above the nominal 100 W reference level at the dome, this has effectively been discounted for this test.

All pass delays are provided to trim the on-axis time response within a ±180° window.

System performance; time domain response

It was decided that, even though the system was supplied complete with integral electronics, each

Manufacturer's specification

Input sensitivity: 1 V.
Input impedance: Balanced, >10 k Ω.
Input connector: 3-pin *XLR*, male.
Mid and high level controls: ±3 dB.
Overload protection: Active FET momentary gain reduction, plus extra thermal protection by LDR limiter on tweeter.
Crossover frequencies: 380 Hz and 3.8 kHz.
Amplifier power output: 200 W (bass), 100 W (mid), 50 W (high).
Cabinet dimensions (including amp): (whd) 398×832×488 mm.
Loudspeaker Technology Ltd, Gypsy Lane, Aston Down, Stroud, Glos GL6 8HR, UK.
UK: Syco Systems Ltd, 20 Conduit Place, London W2.

1 SM48 Dynamic

Perfect for vocalists on the way up. Many of the outstanding performance features, similar appearance, and ruggedness of the world-standard SM58, at a most affordable price. Delivers the famous Shure sound, and features the uniform cardioid polar pattern and distinctively enhanced upper mid-range of the SM58. Rugged, reliable and dependable.

So you thought Shure only made one vocal mic

2 SM85 Condenser

The SM85 is ideal for the most demanding live applications as well as broadcasting and studio requirements. It exhibits remarkably low distortion (right up to overload point) over the entire audio spectrum, considerably less than other more expensive condensers. Controlled low frequency, roll-off, tailored mid-range and clean, scintillating high frequencies set this mic in a class of its own.

4 SM7 Dynamic

The SM7 is among the finest studio professional dynamic microphones in use today. It features a wide range, very smooth frequency response with graphic response-tailoring switches to allow the choice of four different mic response curves. It has an accurate, symmetrical cardioid pick-up pattern, uniform with frequency and provides maximum rejection of unwanted background noise.

5 SM87 Condenser

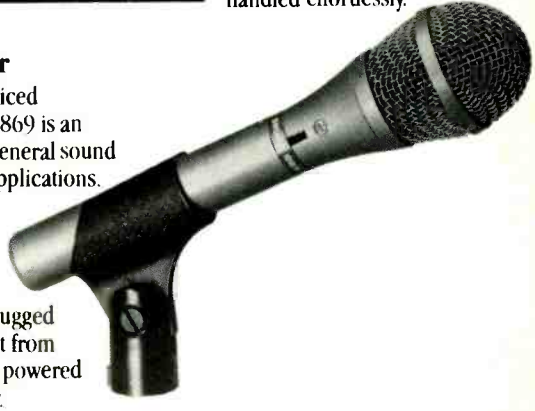
The SM87 is a studio-quality supercardioid condenser with Shure's legendary road mic ruggedness. New cartridge element and highly directional polar pattern enable the SM87 to reject unwanted sounds and produce high gain before feedback. Its vocal-contoured response provides tremendous flexibility at the mixing board and a warm, smooth, naturally rich sound. High SPL levels are handled effortlessly.

3 SM96 Condenser

This vocalist's microphone has features usually found in much more expensive condenser units. Smooth response has a controlled low-end roll-off to correct for proximity effect, and a slight presence rise to enhance vocals. Efficient 3-leg capsule suspension system minimizes handling noise. Optimized output level to control overloading. Steel-shielded against hum and RF pickup. Operates off phantom power, plus the convenience of automatic battery switchover.

6 869 Condenser

An economically priced electret condenser mic, the 869 is an outstanding performer for general sound reinforcement and music applications. The 869's controlled upper mid-range presence rise and low frequency roll-off give optimal clarity and crispness to voices. It's as rugged and reliable as you'd expect from Shure and can be phantom powered or uses a 1.5 volt AA battery.



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REVIEW

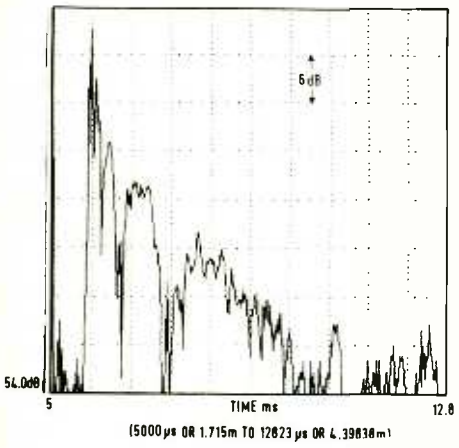

FIG 1 EXPANDED ETC
0 dB is located at 0.000002 Pascal
Scale: 7.3366E −01 m/in or 2.8884E −01 m/cm; 2138 µs/in or 842 µs/cm
Line spacing:
19.6072 µs or 6.72526E −3 m
Line width:
26.6658 µs or 9.14636E −3 m
Sweep rate: 500.96 Hz/s Sweep range: −20000.20 Hz to 31001.50 Hz
Window file name: A:HAMMING.W8T

cabinet would be measured in the same general way as cabinets measured and assessed in previous reviews, though with the appropriate low level signal being applied directly to the integrated system.

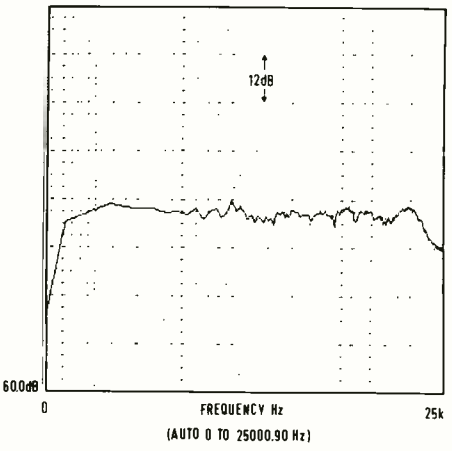

FIG 2 ON-AXIS AMPLITUDE RESPONSE
0 dB is located at 0.000002 Pascal
Log frequency axis: 2.7 decades
Resolution:
7.6111E +00 m and 4.5066E +01 Hz
Time of test: 5741 µs, 1.9690E +00 m
Sweep rate and bandwidth:
2030.90 Hz/s and 4.5066E +01 Hz

As is my standard practice, the ETC curve was taken with the microphone at a distance of 2 metres from the geometric centre of the cabinet, with the time window of some 7.8 ms selected to militate against room reflections. **Fig 1** is the resulting ETC, unfiltered, showing good decay with respect to time, the system settling within 4 ms, with little low frequency delay. This curve was taken both with and without the grille in place. The grille made so little difference to the ETC, that it was decided to leave this in place for the balance of the measurements, this being the typical operating condition in most facilities.

Frequency domain responses

General amplitude response: **Fig 2** illustrates the on-axis amplitude response. Generally, this is commendably flat, though there is a brief sharp rise at 900 Hz, and a flatter hump to the high frequency response between 12 and 18 kHz. It was also felt that a slightly more extended high response could have been expected from a high frequency driver of the diameter of the unit used in the *SCM 100A* (the only transducer within the system that is not made by Loudspeaker Technology themselves).

Low frequency amplitude response: **Fig 3** isolates the low frequency on-axis response. This shows a −3 dB point, normalised to 100 Hz, of about 50 Hz. Now this is measured in 4 π space, the

Dome loudspeakers

Though it may seem recent to some in the recording industry, especially to many of those in the American and Far Eastern divisions of the business, practicable direct radiating monitor systems have been with us since the latter half of the last decade.

It is ironic that the engineer responsible for the development of large diameter, high power handling dome loudspeakers should not have been one of the first to have benefited from his development work but instead it has been a number of other monitor manufacturers who purchased components 'off the shelf' to integrate into their own cabinets.

One of the most important and influential 'shelves' has been that of Bill Woodman, managing director of Loudspeaker Technology, based in Stroud, England. Now, however, some of Loudspeaker Technology's own products are to be found in studios, both in the UK and abroad, competing in some areas with OEM customers of their own dome products.

I think it is worth considering yet again why there has been such a fundamental shift in monitoring loudspeaker fashion and technology over the last 10 years, which has accelerated into a fundamental change, certainly in Europe, in engineers' expectations of monitor capabilities and performance that will no longer tolerate the distortion, bandwidth and dispersion problems inherent in the previous generations of monitor reference loudspeakers.

This is not to say that some of the current systems are entirely free of their own inherent difficulties, some of which we will discuss a little further into this review, but the fundamental shift towards lower distortion and superior dispersion has now just begun to match some of the efforts of the more enlightened elements of the high fidelity industry. This, in conjunction with some very real developments in the art and design of small acoustic spaces, has led to dramatic changes at the top of the recording industry.

Bill Woodman must now take an element of responsibility for this, and it is worthwhile looking at the immediate history of the development of the dome mid range to see why this should have had such a dramatic effect on the industry's monitoring standards in recent years, considering that this is a device that had been used in domestic systems for many years already with considerable success, albeit mainly in high frequency applications.

Recent history

The principal evolutionary force behind monitoring loudspeakers throughout the growth of the industry in the '60s and '70s had been that of sound pressure level. This had led development engineers to attempt to use transducers that had been designed for the sound reinforcement industry within studio monitors that were being developed at this time.

Typical of this mismatch has been the use of high frequency compression drivers, low Q bass devices and multiway speaker systems that divide the operating bandwidth into more than three sections.

While some of the world's finest transducers have been compression drivers, which are speakers designed for a particular purpose whereby sensitivity has been bought at the expense of bandwidth and dispersion. Now sensitivity is not necessarily a requirement in small rooms but I feel bandwidth and dispersion very much are.

Similarly, low Q_{ts} bass drivers have been optimised for sensitivity and have poor extended low frequency response. In conjunction with a single compression driver, this is familiar as the standard, level dependent, highly directional and aggressive control room monitor.

The first step away from this system had been taken with the realisation that the directional characteristics of the dual 38 cm bass section employed within these systems, did not match the directivity of the high frequency compression drivers. Since mechanical constraints prevent the crossover point, already in the middle of the critical mid band at around 1 kHz being lowered at all, there was an interest in developing a device to cover the mid band above the point at which the bass drivers started to beam and below the flare rate cut-off of the high frequency device.

Ideally, this mid range driver should have a piston diameter in the region of 15 cm but speakers with this cone diameter have small voicecoils and are incapable of withstanding the thermal and mechanical stresses imposed.

It was Bill Woodman who proposed scaling up the dome tweeter, thus developing a mid range device driven by a coil around its perimeter, rather than from the centre.

Mid range domes had existed before but not with a power handling capability that was anywhere near to being acceptable in professional monitoring installations.

Development of the ATC dome started in the mid 1970s, and the first consistently successful units were being produced at the end of that decade. This unit was then fitted with a substantially larger motor unit during the course of the early 1980s, and it is this driver that is at the centre of so many commercial monitoring systems today.

In the *SCM 100A* monitor system, the 75 mm voicecoil mid range dome is probably being used in the ideal size of system, without some of the more extreme stresses present in larger systems, and with an ideal match of low and high frequency components in terms of sensitivity and directivity.

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environment within which the system will invariably be used, rather than in half space, within a wall structure. I feel that this is not a particularly extended response, though the rate of roll-off below this point is relatively shallow.

In an industry increasingly concerned with monitoring offset and rumble, not to mention those musical components within the two octaves below 80 Hz, further low frequency extension may have been desirable.

Mid and high frequency level trims: **Fig 4** illustrates the level adjustment accessible to the user—the upper curve set is obtained by adjusting the high frequency control from maximum gain, through the centre level to minimum, and the lower curve set is obtained by a similar exercise on the mid level control. Both level adjustments fail to meet the manufacturer's specification of ±3 dB, the high frequency trim by a small margin and the mid frequency trim by a considerable margin. The result is definitely a little subtle for many users, though I think that this could be argued as being a good thing.

Regardless, if you are going to accept a philosophy of providing a basic level of adjustment, then ±3 dB is acceptable and the achieved ±1.5 dB is not.

System decay

The quasi-3D file set in **Fig 5** shows a broad and even decay, that confirms the results achieved from the ETC. Generally all frequencies from 200 Hz upwards are decaying symmetrically and coherently. There is some evidence of the very low frequencies hanging on, of which more in a moment.

Interestingly, there is also evidence of local diffraction above 2 kHz. This is visible as the progressive darkening of the upper section of the decay slope. This appears to be associated with dome radiators in general, though not with domes that radiate from a perfectly flat baffle surface. In the case of the driver used by Loudspeaker Technology, as is common with many other drivers and users, a bezel has been incorporated on the baffle face of the driver. This bezel has the effect of recessing the dome diaphragm. This improves the low frequency performance of the dome and has the secondary effect of protecting the diaphragm but would appear to induce the diffractive hash noted in this file set.

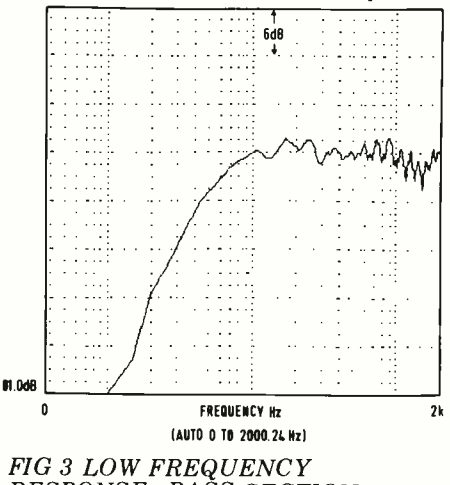

FIG 3 LOW FREQUENCY RESPONSE—BASS SECTION
0 dB is located at 0.000002 Pascal
Log frequency axis: 2.7 decades
Resolution:
2.4198E +01 m and 1.4175E +01 Hz
Time of test: 2920 µs, 1.0016E +00 m
Sweep rate and bandwidth:
200.92 Hz/s and 1.4175E +01 Hz

Off-axis frequency response

In order to measure off-axis response for this particular speaker, two file sets were accumulated, one in the horizontal direction, and one in the vertical direction. From this has been post-processed the conventional polar plots for both the horizontal and vertical planes but perhaps more interestingly, the data has been both vector and scalar averaged. The scalar average process averages the scalar magnitude data only, following data transform from its complex form.

The vector average process, however, averages the complex data, thus preserving the phase information within the raw data, and giving a measurement that much better approximates what will be heard by the listener in a real space.

The origin of this effect is partly the fact that in any multi-speaker system (including, though to a lesser extent, the co-axial systems) the drivers are not all occupying the same acoustical space. Thus, as you rotate the speaker, the perceived sources within the system change their relevant position with respect to you, the observer. This matters little throughout most of the bandwidth of the system, since the relative acoustic position is constantly moving with respect to frequency but it is critical through the crossover region, especially at the precise crossover point since it is here that two adjacent devices are radiating the same information.

If there is a path length difference between the two sources, which doesn't exist on-axis but certainly will progressively increase off-axis, then this will be seen—or rather heard—as an interference notch.

Fig 6 shows the vector average of the horizontal polar file set and **Fig 7** shows the vertical vector

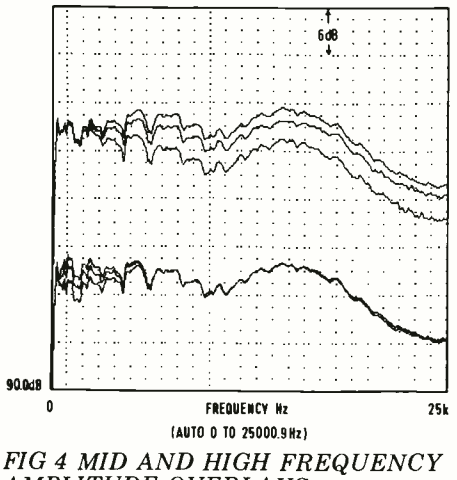

FIG 4 MID AND HIGH FREQUENCY AMPLITUDE OVERLAYS
0 dB is located at 0.000002 Pascal
Scale: 6835.48 Hz/in or 2691.13 Hz/cm
Resolution:
1.7876E +00 m and 1.9581E +02 Hz
Time of test: 5741 µs, 1.9690E +00 m
Sweep rate and bandwidth:
37571.70 Hz/s and 1.9581E +02 Hz

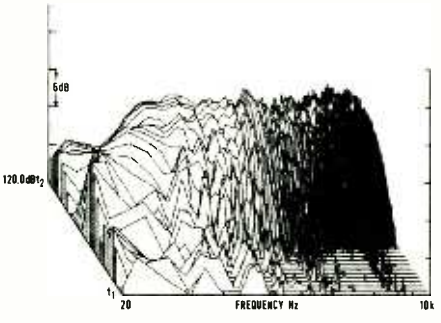

FIG 5 ON-AXIS 3D DECAYS—BROAD BAND RESPONSE
0 dB is located at 0.000002 Pascal
Scale: 2728.86 Hz/in or 1074.36 Hz/cm
Resolution:
4.7928E +00 m and 7.1565E +01 Hz
Time of test: 32000 µs 1.0976E +01 m (front) to 0 µs 0.0000E +00 m (back)
−1032 µs/step or −0.354064516129 m
Sweep rate and bandwidth:
5009.55 Hz/s and 7.0000E +01 Hz

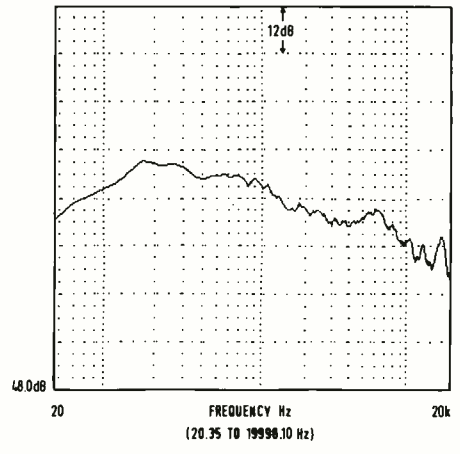

FIG 6 HORIZONTAL VECTOR AVERAGE FILE
0 dB is located at 0.000002 Pascal
Log frequency axis: 2.7 decades
Resolution:
3.3109E +00 m and 1.0362E +02 Hz
Time of test: 5742 µs, 1.9695E +00 m
Sweep rate and bandwidth:
10734.80 Hz/s and 1.0362E +02 Hz

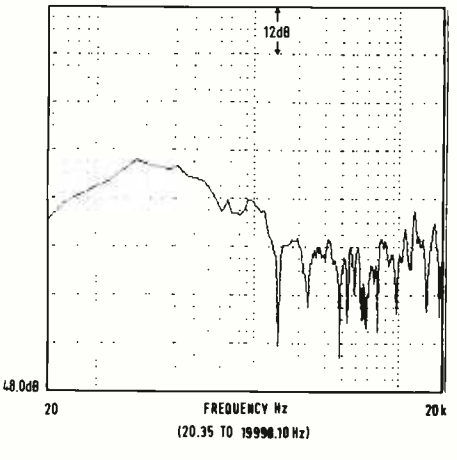

FIG 7 VERTICAL VECTOR AVERAGE FILE
0 dB is located at 0.000002 Pascal
Log frequency axis: 2.7 decades
Resolution:
3.3109E +00 m and 1.0362E +02 Hz
Time of test: 5742 µs, 1.9695E +00 m
Sweep rate and bandwidth:
10734.80 Hz/s and 1.0362E +02 Hz

average curve. The trailing curve is expected, of course, and reflects the rising directivity of the system with respect to frequency. What is of more interest though is the smoothness of the curve and the lack of anomalies at the crossover points. This would ensure smooth, even coverage off-axis and will thus preserve stereo imaging across a wide area without there being frequency-related notching in the response.

In the vertical plane, the response breaks down badly above 1.5 kHz. This is typical of the type of system but indicates that no attempt should be made to mount the system horizontally.

System distortion

Since I had elected to treat the cabinets as if the amplifier were invisible, it was necessary to reference the distortion measurements to some element within the system, rather than using the external reference and measurements normally used.

In the case of the *SCM 100A* cabinets, a low level sinusoidal voltage was applied to the system input, and the resultant voltage output was measured across the mid range dome of the system. This voltage output was then measured and averaged over three frequencies across the mid band. The input voltage was then adjusted to provide 1 W across the mid range dome, and the necessary input voltage for 0.1 W, 10 W and 100 W extrapolated from this point.

Fig 8 illustrates the system's overall distortion performance and with the exception of the very low frequency performance, the results are extraordinarily good. Low frequency distortion jumps dramatically between 10 and 100 W, effectively setting a usable limit on the levels to which the system can be run. Above this nominal 100 W level, however, distortion rises quickly and dramatically, partly due to the action of the system voltage limiters and partly due to the inherent excursion non-linearities in the drive units.

There is, however, some indication of the onset of power compression, in that a linear system would have returned a reference level of 113 dB for the 100 W level but the measured level was some 3 dB lower than this. This would probably be the result of voicecoil heating, with a resultant increase in temperature and lowering of output capability from a given input voltage.

In the case of the low frequency distortion, however, this would appear to peak at around 20 Hz, coinciding with the rather low resonant frequency of the tuned system comprising the low frequency driver, cabinet, long fibre wool wadding and tuned port. When running the 100 W sweeps, the low frequency driver appeared to have lost all control through the two octaves above 10 Hz, which is disturbing.

Either a rather more aggressive highpass filter to assist in controlling the speaker's excursion, or revised cabinet tuning, would assist with this problem.

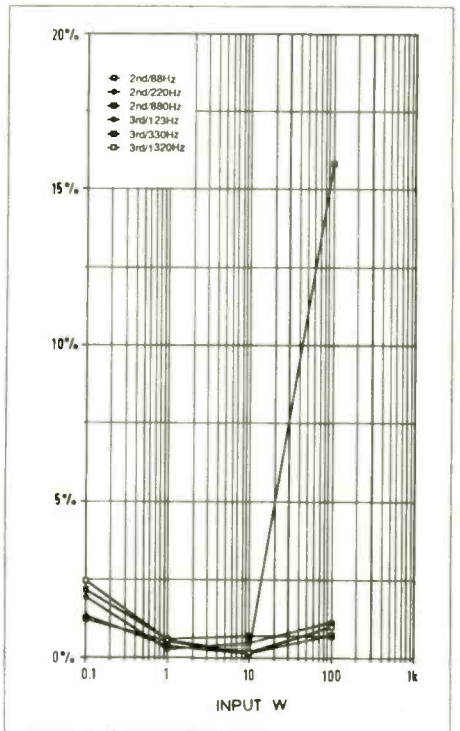

FIG 8 DISTORTION

Manufacturer's comment

The pair of monitors we loaned for review were in fact the third that we made and they have spent the last two years as demonstrators with one of our agents. The current models use a different tweeter, which extends past 20 kHz and has a much smoother amplitude response, the result is a system that measures flat anechoically to ±2 dB from 50 Hz to 20 kHz and is 6 dB down at 35 Hz. In choosing this particular LF response we were careful to consider the opinion of a number of classical/acoustic music producers, and the general consensus of opinion surrounding certain competing designs with greater bass extension. We believe that LF information is accurately displayed in a way that does not mask the all-important mid range where tonal imbalances and distortion cause considerably more offence to the listener.

The standard finish, is, in fact, textured black but a variety of veneers are available at extra cost.

We can, for a small additional charge, move the tweeter to the side of the dome so that the monitors can be laid on their side.

Neil's comments about the amplifier do, however, concern us, they do run quite hot because both the mid and the tweeter amplifiers have a fair amount of class A. The back plates are aluminium and not steel. Both the heatsink and the main transformers have independent thermal protection. The uncontrolled bass driver cone movement he described will be as a result of overdriving the bass amplifier, which gives up 3 dB before the mid. What Neil has not explained is that all this is happening at something like a 10 dB higher SPL than any competing design, and that in operation the momentary gain reduction circuits only function at the onset of what would otherwise be clipping. In use they are inaudible unless severely overdriven.

We do take Neil's point concerning the manual; we are in the process of preparing one at the moment. In the UK we operate a 24 hr service on all our monitors, which in any case are guaranteed for six years against defective design or workmanship.

Our final point concerns the phase plates we fit to the tweeter and the mid range dome. These have little or no effect at low frequencies but actually improve dispersion at the top end, hence our unrivalled stereo imagery.

Summary

The Loudspeaker Technology *SCM 100A* occupies an unusual and expanding market niche and there would appear to be very few other devices with similar system capabilities with which it cannot compete very successfully. The on-axis response of each cabinet is good and the symmetry of the system rise and decay excellent.

Most favourable, however, are the excellent distortion figures within the system operating range. These are quite outstanding even for a system of this type.

Of concern, however, is the marginal vertical off-axis performance, the rather restricted low frequency performance and the lack of driver control at very low frequencies, resulting in the distortion anomaly noted above. There is also the disappointing lack of constructive documentation to help the professional user extract the best out of the system and maintain the cabinets in the condition in which they were delivered.

As an integrated product the general lack of problems in associating amplifiers, crossovers, cabinets and cabling should help many mid band and production facilities off to a better start than buying either from the high-fidelity clone market, or the lower ranges of 'professional' systems.□

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The attention of advertisers is drawn to "The Business Advertisements (Disclosure) Order 1977", which requires that, from 1st January 1978, all advertisements by persons who seek to sell goods in the course of business must make that fact clear. From the above date consumers therefore should know whether an advertisement relates to a sale by a trader or a private seller.

SERVICES

CLASSIFIEDS

Services

AA Tape Winders
0268 765010
For rapid supply of exact length Audio Cassette + Tape Duplicating

SELECTA REAL TIME AND LOOP BIN DUPLICATION EXACT LENGTH CASSETTES STUDIO SUPPLIES 04024 53424

SOUND WHERE THE CHOICE IS YOURS

QUALITY CASSETTE MASTERING AND COPYING, any quantity. Video duplication PAL/NTSC/SECAM transfers. 24 hour, seven days a week service. G.W.B.B. Audiovision, 42 Lancaster Gate, London W2 2NA. Tel: 01-723 5190.

THE COMPLETE SERVICE. Disc cutting, pressings, duplicated cassettes and blanks. Bin Masters. Location Recording. Free Brochure. Tam Studio, 13a Hamilton Way, London N3 1AN. Tel: 01-346 0033. (X)

REAL TIME CASSETTE DUPLICATION in Yorkshire, from ¼", PCM-F1, or cassette, quality service. C.P.S., The Westfield Centre, Westfield Lane, S Elmsall, WF9 2PU. (0977) 45141 ex 222.

For Sale Trade

STUDIO·WORLD

Fully re-furbished Multitracks always available + Desks, Monitor Systems, Outboard, etc
PHONE FOR FULL LIST
Call (0727) 58977
153a Victoria Street, St Albans

DISC CUTTING EQUIPMENT and systems bought, sold, installed and manufactured by TAM/ENGLAND, 13a Hamilton Way, London N3 1AN. Telephone: 01-346 0033.

LOCKWOOD, TANNOY, etc., new and used equipment always available and wanted. Lockwood Audio Sales 01-866 0671. (X)

TASCAM/SENN/BEYER, trade counter. Erricks VCD, Brighouse 722121. (X)

RECORDING TAPE on 10½" NAB Spools. No edits, USED once only and Bulk erased; 2" Ampex 456 £35.00; 468 £30.00; 2" Scotch 256 £25.00; 2" Racal 888 £20.00; 1" Ampex 456 £15.00; 1" Agfa 468 £15.00; ½" Agfa 468 NEW £18.00. All prices plus VAT. Call Portsmouth 251328.

WOULD YOU BUY A CAR WITHOUT A TEST DRIVE?
THEN WHY BUY A MIXER WITHOUT A TEST DRIVE?

Thinking about a new project – from a small Mixer to a large studio complex – come and talk over ideas with the people who offer manufacturing and user experience at our new premises:

Unit D, 318 High Road, Benfleet, Essex SS7 5HB

TO TAKE THAT TEST DRIVE – PHONE 0268-793381
(Weekend Committee visits welcome by prior arrangement)

PARTRIDGE ELECTRONICS
A. C. PARTRIDGE LTD.
Head Office: 56 Fleet Road, Benfleet, Essex SS7 5JN
Telephone 0268-793256

Education

SOUND RECORDING & PRODUCTION TRAINING

ADVANCED SOUND RECORDING & PRODUCTION
One year full-time DIPLOMA Course in Modern 24-track studio and 32/48-track digital studio
Digital audio concepts: DASH & PD formats; analogue/digital recording, processing, mixing & editing; automation & synchronisation: MIDI & SMPTE timecode; computerised sound mixing consoles, analogue/digital sound synthesis & sampling; working with various bands & individual artists; music writing, song & orchestral arrangements, radio jingles & commercials, TV/film sound tracks; local radio operation, introduction to pop promo production, business practice in music industry.

3-month intensive or 6-month part-time CERTIFICATE courses in

ANALOGUE SOUND RECORDING & PRODUCTION
Modern 24-track sound recording & production; introduction to digital audio; analogue/digital sound synthesisers & sampling keyboards, studio work with bands & individual artists; music for TV & film; song arrangements for record release.

DIGITAL SOUND RECORDING & PRODUCTION TECHNOLOGY
Digital sound recording; DASH & PD formats; digital multi-track operation; SONY PCM-3324 & MITSUBISHI X-850; rotary heads digital recording, tapeless recording; AUDIOFILE & SYNCLAVIER; digital synthesis/sampling incl. FAIRLIGHT digital audio processing, mixing, electronic & manual editing; computerised sound mixing consoles; automation & assignable consoles; MIDI & SMPTE timecode, their practical application in creative music production; MIDI controlling, networking, triggering & sequencing; ATR/VTR synchronisation.

CREATIVE MUSIC RECORDING & PRODUCTION TECHNIQUES
Music notation & song/music writing; rock, funk, jazz, soul, reggae, TV/film theme & background music, song & orchestral arrangement techniques; arrangements for strings, brass section, woodwind, etc. creative use of instruments & microphones; working with artists & artistes recording vocals & choirs; local radio operation.

Also courses in Programming FAIRLIGHT SERIES III

Many former students are now employed in TV/video and audio industries

MEDIA PRODUCTION SERVICES
BON MARCHE Building, Ferndale Road, London SW9 8EJ
Tel: 01-274 4000 x.328 or 01-737 7152 ★ Telex: 8955126 BRIENT G

Wanted

WANTED NEVE EQUIPMENT of all types. We buy and sell valve microphones, outboard gear and consoles. Dan Alexander Audio, 2944 San Pablo, Berkeley CA, USA 94702. (415) 644-2362/Telex (650) 291-8567 MC1.

Studios for Sale

STUDIO PREMISES in detached house (5 Beds) with most conceivable luxuries located in pleasant South Manchester suburb. Freehold offers over £85,000 invited for whole property 061-881 5228.

For Sale Trade

TECHNICS SP10 MK2 Professional Turntable complete with tone arm and cartridge. Speeds 33/45/78 with a ±5% pitch adjustment. Start time 0.25 seconds. Facility for remote/fader start. Two available, excellent condition £800.00 + VAT pair. Call (0705) 251328.

DISC CUTTING EQUIPMENT FOR SALE: Complete Neumann VMS-80 from November 1985, 2 stk Studer A 820 ¼" or ½", 1 stk Studer DAD 16 Preview, 1 stk Transfer Console, 1 stk Klark Analyser, Sony System PAL or MTSC, Sony 701 Processor, RTW AD2 Interface, Studer A 710, Dolby A-361, 2 stk Tannoy-FSM, Bargain retirement. Contact Box No. 971.

SOUNDCRAFT FCM 761 Mk III 16 track 1 inch tape machine in excellent condition. Package includes remote on stand/bell 16 track noise reduction system/Webber test tape/7 reels Ampex 456 and delivery and installation anywhere mainland UK. £4,950 + VAT. Ring Brook Trickett 0204 395412.

For Sale Private

TRIDENT TSM Mixer 32 ch. 24 groups privately owned little used offers in excess of £20,000. Call 0737 551213.

REVOX PR99 Mk I Stereo tape machine, speeds 7½ + 15 IPS. Broadcast version with all superfluous controls removed. Good working condition £900.00. Contact David on (073 081) 3607.

AMPEX, SCOTCH RECORDING TAPE, boxed with NAB spools 13 2" £75, 74 1" £150, ideal for demos or spools, may split. Tel: 0272 427727.

To advertise in this space call David on 01-686 2599 X189

Solid State Logic

Solid State Logic is the world's leading manufacturer of audio mixing consoles and studio computers. The company is a major exporter, with dealings in more than 70 countries worldwide, in areas including music recording, radio and TV broadcasting and film and video post-production.

Our continuing expansion has created a vacancy for a

PROJECT ENGINEER

As a member of the SSL Project Engineering team, you will provide technical support and liaison between our sales engineers, clients, production staff and installation teams. This position involves both console systems and complete project specification and execution. You must possess a keen understanding of audio production requirements, a background in practical audio electronics, and an eye for detail.

If you feel that your abilities, experience and ambitions make you a suitable candidate for this position we would like to hear from you. Of course, all enquiries will be handled in strictest confidence. To apply, please write to or telephone Gill Rivett at Solid State Logic, Begbroke, Oxford OX5 1RU – 08675 4353.

BROADCAST ENGINEERS

REF: 40/88

Required for work in the Broadcast Engineering and Production Departments of the SSVC, which provides Radio, Television and Training Services for the British Forces and their dependants in the UK and abroad.

Candidates (preferably aged 22-35) should be educated to HND standard in electronic and electrical engineering and have had at least three years' work experience in broadcast or related industries.

The work, often overseas, includes the operation, maintenance and installation of the full range of professional radio and television studio equipment and, in some areas, medium wave and VHF transmitters.

The salary offered is tax free when on overseas service, plus generous overseas allowances and other fringe benefits. There are promotion prospects to higher grades and opportunities for training and transfer to other departments of the SSVC.

For further information and an application form please contact:

MRS A R SIVE, ASSISTANT PERSONNEL MANAGER, TEL: 02407 4461 Ext. 221

SSVC

The Services Sound and Vision Corporation
Chalfont Grove, Narcot Lane, Chalfont St Peter, Gerrards Cross, Bucks SL9 8TN.

INDEX TO ADVERTISERS

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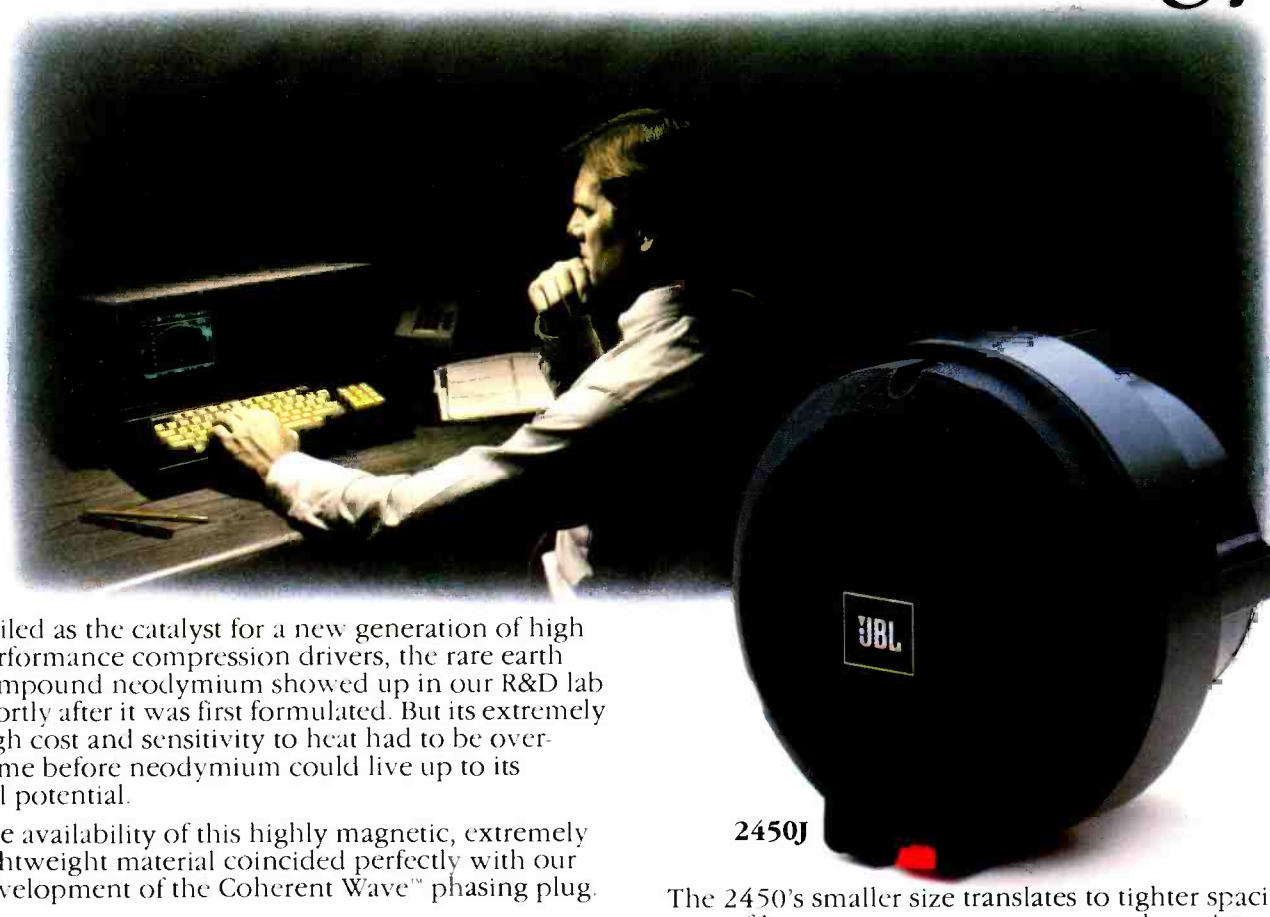
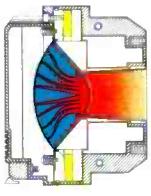
It Takes More Than A Little Neodymium To Change The Face Of Driver Technology.



2450J

Hailed as the catalyst for a new generation of high performance compression drivers, the rare earth compound neodymium showed up in our R&D lab shortly after it was first formulated. But its extremely high cost and sensitivity to heat had to be overcome before neodymium could live up to its full potential.

The availability of this highly magnetic, extremely lightweight material coincided perfectly with our development of the Coherent Wave™ phasing plug.



JBL's 2450J Neodymium Compression Driver with Coherent Wave™ phasing plug provides in-phase combining of sound waves for extended high frequency performance. JBL's patented diamond surround titanium diaphragm with new embossed dome greatly reduces distortion and damage at high SPL.

This new design, a phasing plug with annular apertures of constant path length, uniformly directs sound through to the throat providing in-phase combining of sound waves for extended high frequency performance. This new technology is combined with our patented diamond surround titanium diaphragm, incorporating a new embossed dome, to reduce the possibility of distortion or damage at high SPL.

The 2450's smaller size translates to tighter spacing of horn arc arrays, more even and precise coverage and greatly reduced requirements for delay. Plus, the 2450 nets out at a mere 4.8 kg (10.5 lb). The benefits of this dramatic weight reduction include lower shipping costs to the site or on the road and significantly less load bearing requirements for both structures and rigging. With built-in mounting points, the 2450 will take much less time to install.

Yes, it took more than a little neodymium to change the face of driver technology. But we're confident you will find the breakthrough results were certainly well worth the wait and the effort.

JBL

JBL Professional
8500 Balboa Boulevard, Northridge, CA 91329

TIME ON YOUR HANDS

In an average 48 track analogue studio, it can take a good engineer up to 2 hours a day to line up the multi-track recorders. (Half an hour per machine, twice in the day).

Now consider this: The Studer A820 multi-track recorder, after automatically optimising its bias setting, takes less than 2 minutes to create a complete record alignment. This alignment is accurate to 0.1 dB resolution, which is about half the width of the needle in a conventional VU meter. In the noise reduction alignment mode, the 50 segment meters become noise reduction reference meters and bring into force special Studer-created algorithms.

The A820 was already a Capital Investment offering the realistic cost effective alternative to the digital problem. Automatic alignment merely adds strength to the argument. After all, in a studio environment, time really is money.

STUDER
INTERNATIONAL AG
CH-8105 Regensdorf Telephone (01) 840 29 60

STUDER REVOX AMERICA INC Nashville Telephone (615) 254-5651
STUDER REVOX S A R L Paris Telephone 533 5858
STUDER REVOX CANADA LTD Toronto Telephone (416) 423-2831

BAUCH

F.W.O. Bauch Limited, 49 Theobald Street, Boreham Wood, Herts. WD6 4RZ. Tel: 01-953 0091. Fax: 01-207 5970.