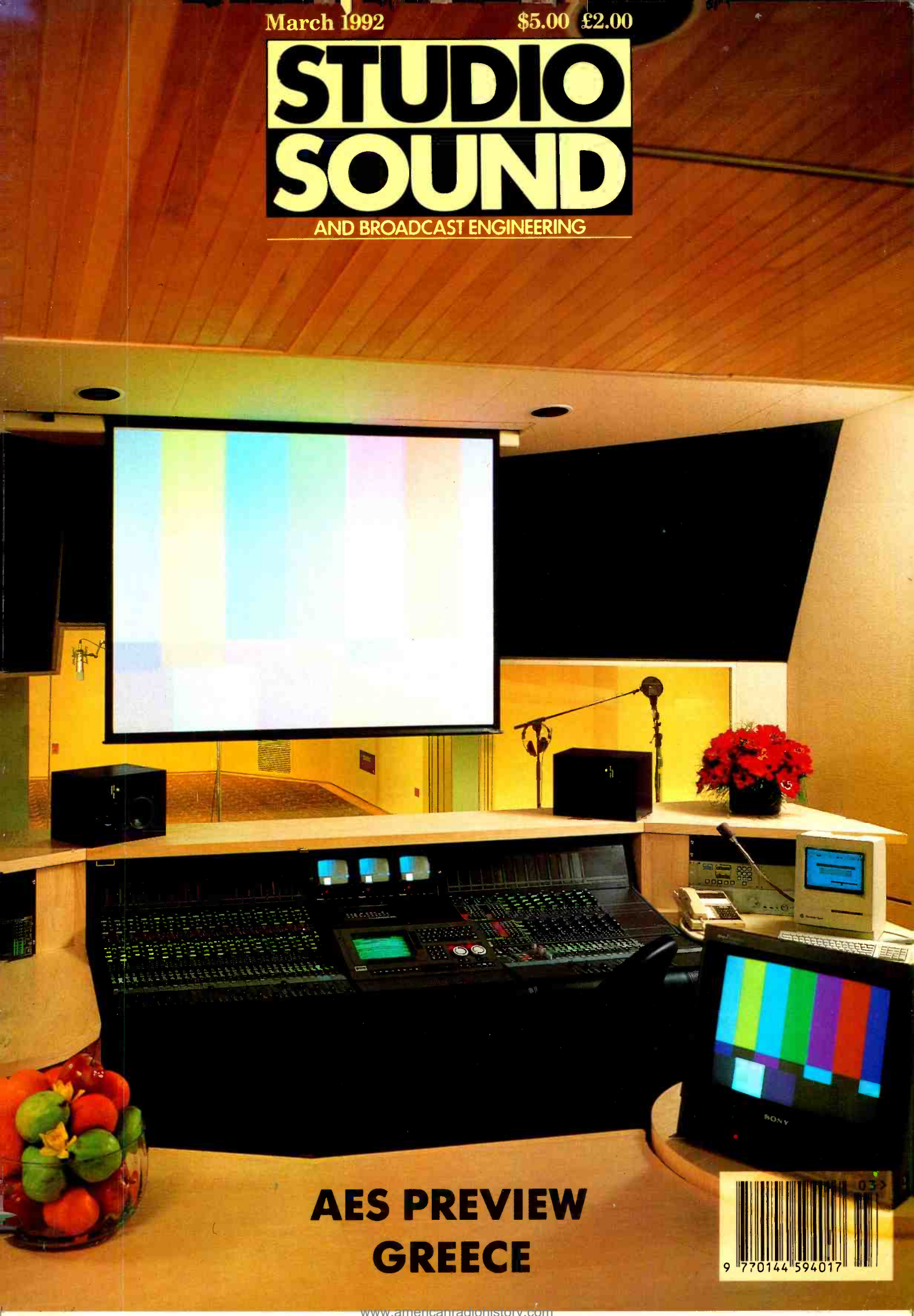


March 1992

\$5.00 £2.00

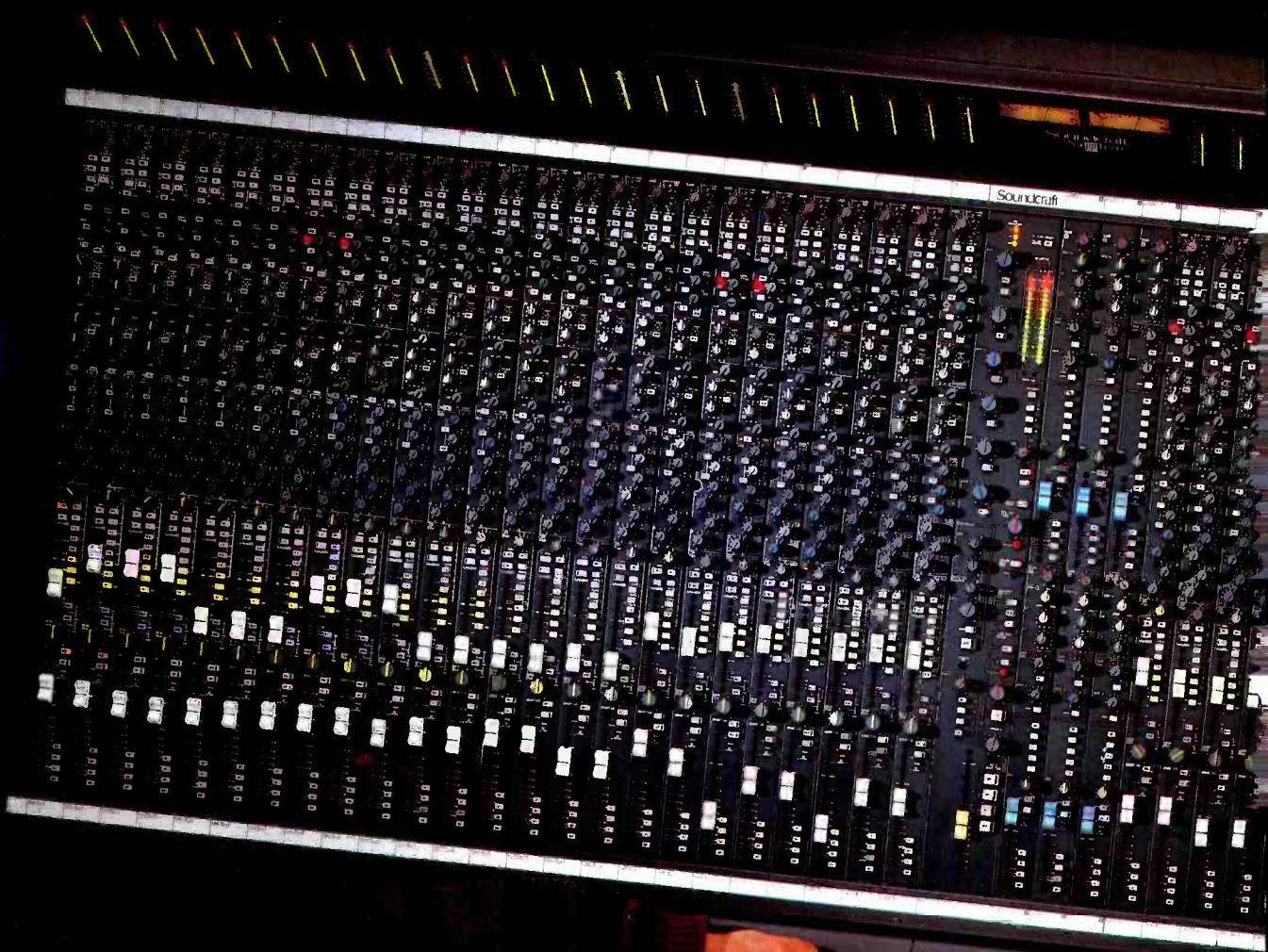
STUDIO SOUND

AND BROADCAST ENGINEERING



**AES PREVIEW
GREECE**





THE PERFECT PARTNERSHIP

It's late. You've both been working hard into the night, putting the finishing touches to a complex soundtrack. But you've done it, in time and on budget, thanks to your expertise—and thanks to SAPPHYRE.

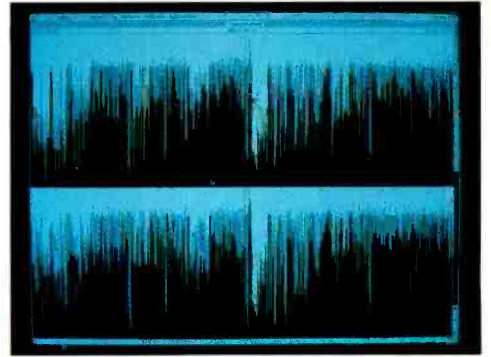
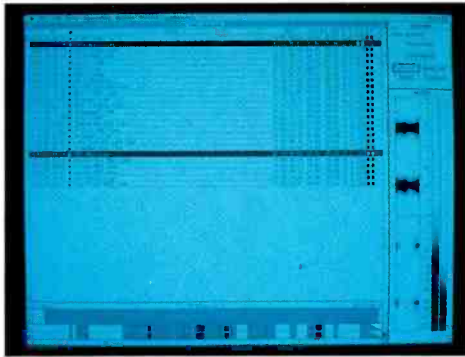
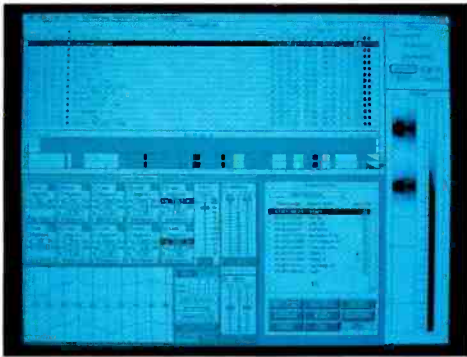
SAPPHYRE is ideal for the post-producer environment: dependable in tight corners, fast when you're working against the clock. Featuring advanced, patented Soundcraft technology. Ingenious routing offering all the benefits of an in-line design—without the hassles. A powerful noise gate—on every channel—making it easy to clean up rough audio tracks. Unique features that keep SAPPHYRE in a class of its own. Now there's an optional patchbay—for even easier access to practically everything.

And above all, Soundcraft quality, flexibility and performance. They're designed into every SAPPHYRE we make. Audio quality that's a match for any digital audio or stereo transmission system, from our famous padless mic preamp to the equally unique active panpot. Standard, dual line and stereo input modules for ultimate flexibility. And performance that has to be heard to be truly appreciated. With features like these, you know you'll get along fine: it's a brilliant way to work.

SAPPHYRE. It's everything you need in a production partner.



Soundcraft
Sapphyre



DYAXIS

**What you see
is what you hear...**

...and what you need. Because the digital audio production system **STUDER DYAXIS** offers an unimaginable wealth of creative possibilities and has tremendous advantages:

...Audio for Video: Sync multiple dialog tracks, music takes and sound effects with sub-frame accuracy, without ever typing in a timecode number. Fast lock to video reference (VITC or LTC). Superb quality time scaling (ensures that 29.5 seconds are exactly 29.5 seconds).

...Radio/TV Production of commercials: Digital layering allows unlimited number of tracks to be mixed without degradation. Large disc capacity allows for the online storage of frequently used material such as station identifications, music beds and effects for immediate access.

...CD Mastering: Apply real-time 5 band digital stereo EQ with level control for instant matching of songs or takes. Instant rearrangement and audition of songs or takes. Editing capacity up to ten

hours of stereo music with sample accuracy and unlimited crossfade times. Transfers to, from or between any of 7 digital formats!

...and finally the investment protection: Manufactured and supported by **STUDER**, a name you can trust. Over 500 Dyaxis systems already sold, every one of them upgradeable and expandable to the latest hardware and software. And the greatest advantage is naturally that with **DYAXIS** you see what you hear – in 1:1 ratio. Well, if that isn't professional...

Experience the difference – call today for a demonstration in your studio!

STUDER

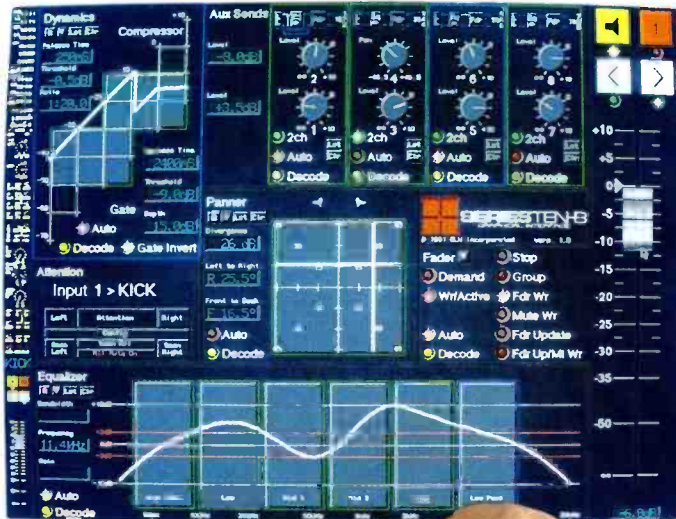
PROFESSIONAL AUDIO EQUIPMENT

Worldwide Distribution: STUDER International, a division of STUDER REVOX AG Switzerland, CH-8105 Regensdorf-Zurich, Althardstrasse 10, Telephone: +41 1 870 75 11, Fax: +41 1 840 47 37



Chameleon amplifier — See page 96

Editorial:	Studio Sound's viewpoint on events and trends and their implications	7
News:	Recording at All Saints Church; 3M 996 in use; Alesis launch ADAT in Europe; and news from inside and outside the industry	11
Products:	Information on new products, developments, upgrades and software developments	16
Letters:	Rupert Neve and Amek chairman Nick Franks respond to Amek hearing question	21
Music news:	Product updates and developments from another side of the business. Compiled by Zenon Schoepe	24
Live Sound:	Live Sound news and equipment news. Compiled by Mike Lethby	26
An Inside Story:	Last year a re-formed Electric Light Orchestra went on tour with the Moscow Symphony Orchestra: Mike Lethby reports on the unique internal miking system used	30
AES Preview:	A guide to manufacturers, agents and services exhibiting at the Austria Centre in Vienna	43
Greek Odyssey:	Our European recording survey moves to Greece this month. Report by Athanassia Duma and Mike Collins	55
The Amazon:	Amazon Studios have moved to larger premises in the centre of Liverpool and claim to be the biggest studio in the UK outside London. Tim Smith finds out	63
Air Movements 3:	David Mellor continues his fly-on-the-wall look at the building of the new Air Studios	68
Business:	DCC and Mini Disc — the format wars. The latest from Barry Fox	74
Perspective:	Nobody asked him but this month Martin Polon talks about exhibitions, AIDS, Grey imports, new talent and banks	76
Exploring Equalisers:	Part Two of Ben Duncan's series on EQ analogue circuits and their behaviour	81
License to Memorise:	Terry Nelson takes an operational look at Saje's <i>Memory</i> console	88
Chameleon:	A technical review of Malcolm Hill Associates <i>Chameleon</i> power amplifier	96

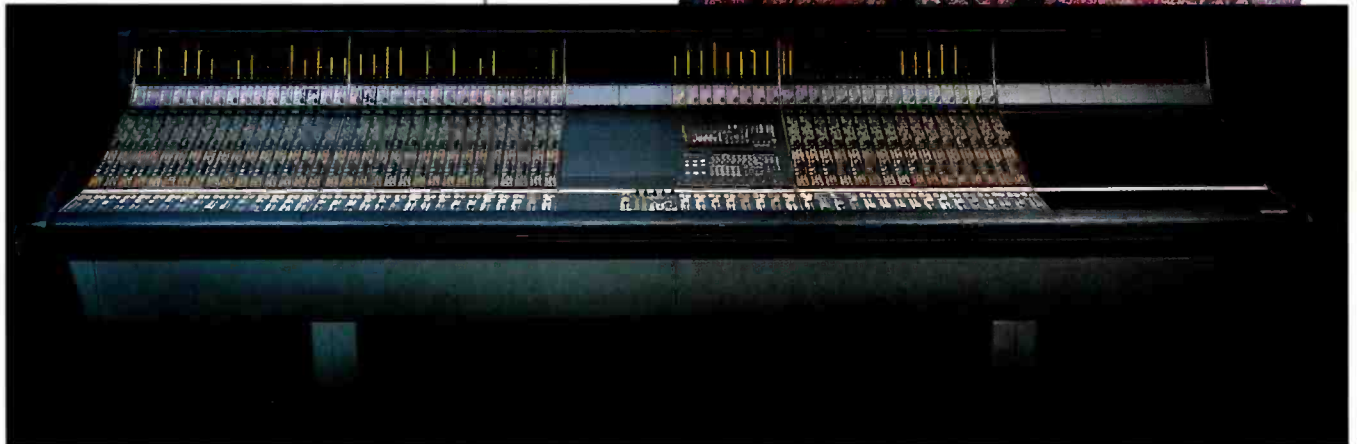


WOW!
THIS SERIESTEN B
REALLY DOES AUTOMATE
EVERYTHING!

REMEMBER
"TOTAL" DOESN'T
ALWAYS MEAN
EVERYTHING...

"VIC"

VIC is the world's only *complete* Video Interactive Control system. A computer graphics screen displays *and* controls all module functions and lets you fine tune your mix with a mouse. Available only from Harrison by GLW.



The SeriesTen B locks control of all functions to timecode and follows *every move the mixer makes*—a Harrison first. Six years in development. Winner of the 1991 *MIX TEC* Award for consoles. It's simply the most advanced console in the world...what true automation should be.

Harrison
by GLW

Manufacturer of Harrison Consoles • 437 Atlas Drive • Nashville, Tennessee 37211 • (615) 331-8800 • FAX: (615) 331-8883

STUDIO SOUND

AND BROADCAST ENGINEERING

March 1992
Volume 34 Number 3
ISSN 0144 5944

EDITORIAL

Acting Editor: Julian Mitchell
Production Editor: Peter Stanbury
Secretary: Mary Walsh
Consultant: Sam Wise
Columnists: Barry Fox, Martin Polon (US)

Regular Contributors:

Janet Angus	Mike Lethby
James Betteridge	David Mellor
Mike Collins	Terry Nelson
Ben Duncan	Francis Rumsey
Dave Foister	Zenon Schoepe
Yasmin Hashmi	Patrick Stapley

ADVERTISEMENTS

Executive Ad Manager: Steve Grice
Deputy Ad Manager: Phil Dearing
Advertisement Production: Mark Trainer
Secretary: Lianne Davey

CIRCULATION

Circulation and Development Manager: Colin Enderson
Controlled Circulation Manager: Maria Udy
Enquiries: See classified advertisement

Director: Doug Shuard
Publisher: Steve Haysom

EDITORIAL & ADVERTISING OFFICES

Spotlight Publications Ltd, 8th Floor, Ludgate House, 245 Blackfriars Road, London SE1 9UR, UK. Tel: 071-620 3686. Fax: 071-401 8036.

NEWSTRADE DISTRIBUTION (UK)

UMD, 1 Benwell Road, London N7 7AX, UK. Tel: 071-700 4660. Fax: 071-607 3352.

AMERICAN OFFICE

Publishing Services Manager: Fred Vega
Studio Sound, 2 Park Avenue, 18th Floor, New York, NY 10016, USA. Tel: (212) 779-1212. Fax: (212) 213-3484.

JAPAN & FAR EAST AGENT

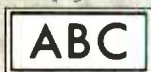
Contact: Mikio Tsuchiya, Media Sales Japan, Inc, Tamurcho Bldg 3 3 14, Shimbashi, Minato-Ku, Tokyo, Japan. Tel: (03) 504-1925. Telex: J25666. Fax: (03) 595-1709.

© Spotlight Publications Ltd 1992 all rights reserved.

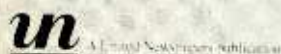
Origination by Ashford Scanning Studio Ltd, The Print Centre, 70-72 John Wilson Business Park, Thanet Way, Chestfield, Kent CT5 3QT, UK. Printed in England by Riverside Press, St Ives plc, 2 Grant Close, Gillingham Business Park, Gillingham, Kent ME8 0QB, UK.

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

The magazine is available on a rigidly controlled requested basis, only to qualified personnel (see classified advertisement for terms)



Total average net circulation of 19,166 per issue during 1991.
UK: 6,655. Overseas: 12,511.
(ABC audited)



Open arms, crossed fingers

One of the reasons the AES moved their European convention to Vienna this year was to be more attractive to the Eastern European pro-audio and broadcast industries. Next year Berlin is the venue with even more glasnost intended. Well intended and a good idea generally, but will the welcome visitors go shopping and justify the AES' decision, or will it be more of a matter of window-shopping and wish lists?

A major pro-audio supplier in Vienna told me that he had been to Hungary's capital, Budapest a number of times and was convinced there was money around. He had seen people driving large cars and buying expensive hi-fi products! He had even gone so far as to appoint a Hungarian agent for his distributed products. A few weeks later he received an invoice from his new agent for £500 petrol costs, with an accompanying letter saying that the agent had been doing well and had driven all over Hungary talking to people. But alas no business so far. Needless to say the relationship was short-lived.

Whether this was a demonstration of dodgy Hungarian business practices or an unwise Viennese choice, I know not. Another view on the subject came from the owner of a Vienna recording studio who was investing in a video edit suite as an extension of his studio just for the work coming from Eastern Europe. He felt he could make hay while the sun shone getting bookings from these countries before they bought equipment and were able to work for themselves.

We've also recently received a letter from the chief soundman (who is in fact a woman) at the Russian TV and Radio Broadcasting Company in Moscow, who said that she would like a copy of the magazine as she was in charge of a seven million dollar budget. I only mention this as its the first time I've heard a budget mentioned from this particular organisation.

Hopefully the Vienna show should answer more questions that are raised and we can see how far the Eastern European economies have to go if they are to act as a financial catalyst for the pro-audio industry recovery.

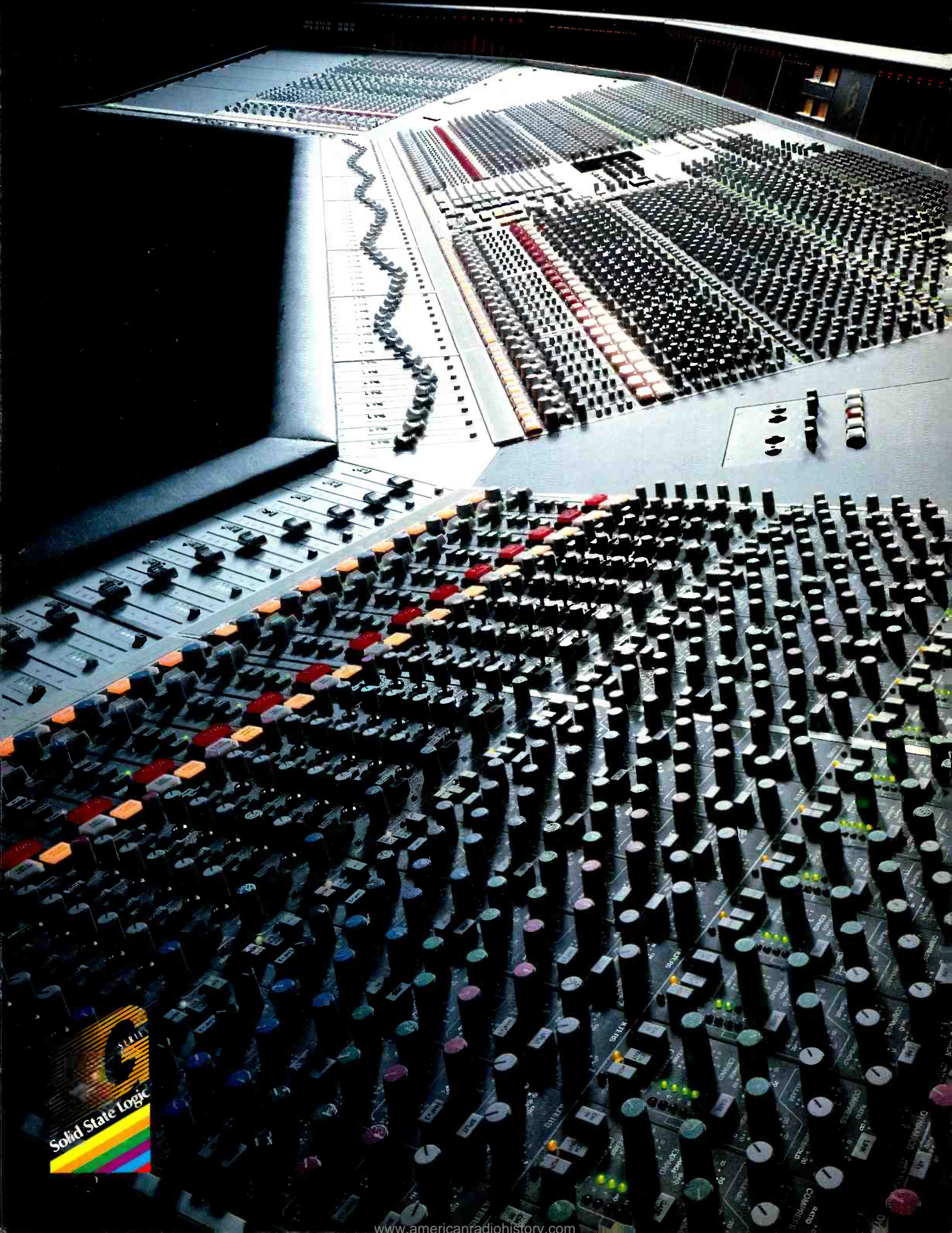
● There are a number of new products being launched in Vienna and not all are in our AES preview. This usually means a busy and exciting show as companies hold back launch information. Let's hope so.

At the time of writing we hear that Virgin Music, which includes Virgin Studios Ltd, has been sold to Thorn-EMI, the UK consumer electronics giant. This keeps recording studios Olympic, Townhouse and The Manor British-owned, halting a possible trend of foreign label investment in UK studios. ■

Julian Mitchell

Cover: The first sale of AMS' Logic 2 desk to Chicago's Editel Studios

D R E A M M A C



H I N E

SL 4000 G SERIES Master Studio System

'L' or 'U' shaped console wings

Mono or stereo modules

Advanced G Series circuitry and sonic performance

Two styles of equalisation

Compressor/limiter, expander/gate in every channel

G Series Studio Computer provides the world's most advanced session management software

Ultimation™ dual automation system
(moving fader or VCA operation)

Total Recall™ of all I/O module settings

Tape autolocation under computer control

Synchroniser system for master and slave and multi-slave autolocation and synchronisation of audio, video or film transports to all timecode formats and bi-phase or tach pulses

Events Controller for non-synchronous devices

Programmable equalisation and panning system

Worldwide standard in music production



Solid State Logic

International Headquarters:

Begbroke, Oxford, England OX5 1RU · Tel: (0865) 842300

Paris (1) 34 60 46 66 · Milan (2) 612 17 20 · Tokyo (3) 54 74 11 44

New York (212) 315 1111 · Los Angeles (213) 463 4444 · Toronto (416) 363 0101

Xtrack DIGITAL AUDIO WORKSTATION

by DIGIGRAM

....for the soul !

While producing/editing audio material, creativity is as important as the quality of the equipment used. Xtrack from Digigram combines unmatched technical performance with intuitive ease of use.

....for the speed !

With Xtrack a Digital Audio Workstation from Digigram, you can work and follow the flow of your creative thoughts, without the need to wait for the digital hardware to catch up. **Real Time** work is not just a "buzz word" it is a reality.

....for the ears !

Most of all, with Xtrack you are assured of a 16 bit 48khz CD quality audio with 1:6 digital audio compression resulting in increased recording capacity. Working with Xtrack will prove to the doubtful that compressed digital audio does not reduce the sound quality.

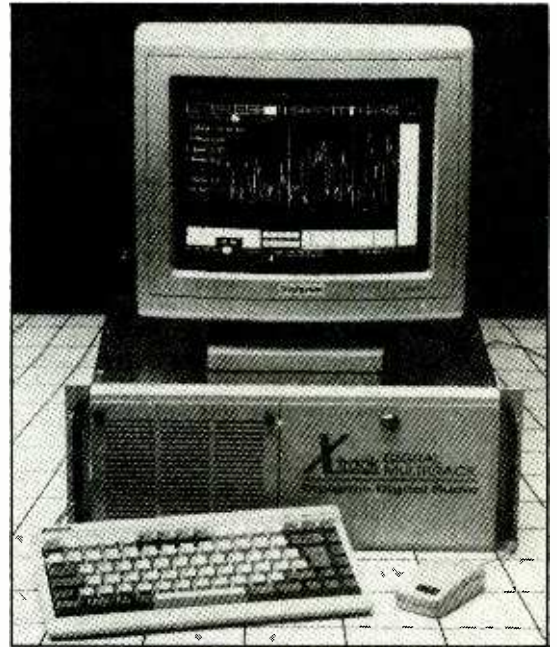
.....for the future !

Expandability and connectivity is assured with MS-DOS™, Local Area Networks and Optical Drives compatibility.

....for free !

If your business is audio recording, editing, audio-video pre/post production or indeed any kind of audio production, please contact Digigram or its representative for more information or demo to find out that Digigram's Xtrack is **For you.....!!!!**

See Xtrack and all the other Digigram's products at AES Convention in Vienna



Xtrack specifications:

- PC/AT based 2, 4, 6 or 8 channel multitrack system
- CD quality audio: 20 hz-20000 hz +- 0.1 db, s/n ratio 90db
- Real-Time data compression algorithm WB 48 SBC or Musicam
- Up to 16 virtual tracks and 8 real tracks
- Full post-production facilities with SMPTE Time Code sync and chase lock
- Fully Independent record and playback channels
- Editing functions: Cut, Paste, Insert, Move, Truncate,.....etc
- Multiple levels of UNDO and REDO functions
- Graphical Volume Envelope editing
- Full catalogue support for effects library.....etc.

DIGIGRAM SA

Parc de Pre Milllet
Montbonnot, France
Tel: (33) 76 52 47 47
Fax: (33) 76 52 18 44

DIGIGRAM UK Ltd

59 Portway, North Marston
Bucks MK18 3PL
Tel: (44) (0)29 667 777
Fax: (44) (0)29 667 740
For UK, Commonwealth and SA

Distribution:

Belgium: **OPNS SA**, Tel: (32) 02/537 63 40, Fax: (32) 02/538 34 42
Germany & Austria: **MEDIATRON GMBH**, Tel: (49) 89/271 23 57
Fax: (49) 89/271 42 90
Switzerland: **DISTRONIC**, Tel/Fax: (41) 21 24 73 94
All other countries: **DIGIGRAM SA France**

All Saints Acoustics

'It's the most glorious natural acoustic, it doesn't swim, the definition is extraordinary and everyone loves playing in it,' states an effusive Keith Grant, as we walk into All Saints Church at Petersham. Built in 1906 at enormous expense by an eccentric local woman, who felt the parish church was too small, this extravagant red brick and terracotta building is an exact copy of an Italian Basilican church. Its colonnaded interior offers a 90 x 45 ft recording area, under an impressive barrel vaulted ceiling 60 ft above. Although not a new recording venue — Decca used it extensively in the past — it has become a favourite location for Keith Grant and a permanent home for some of the equipment he took with him from Olympic Studios. Grant first came across the church three years ago when he was looking for somewhere to record the London Chamber Orchestra.

'I found it by chance. The LCO wanted to record their second album in a church but they wanted to record on a Sunday. Of course everywhere we tried had services, and I was about to say it was impossible when someone mentioned that All Saints Petersham had been deconsecrated. I came down here, clapped my hands and thought this sounds wonderful — so we made LCO 2 for Virgin, which got fantastic reviews — one paper actually said that the orchestra's seventeen strings sounded bigger than the Berlin Philharmonic! We've made nine albums with the LCO here and have got consistently good results. We're also doing a lot of film work and we've recorded a Johnny Mathis album and a Jack Jones album both of which were big band set-ups with rhythm section and strings.

'The recording we're doing at the moment is for a Merchant Ivory film, Howard's End, with music composed by Richard Robbins — he was very unsure at first about using the church, until I played him some of the things we'd recorded, then he was down here like a shot and has loved it ever since.'

This year will be Grant's 35th in the industry, and almost apologetically he confesses to being

as enthusiastic now as when he started at Regent Sound, London, on his sixteenth birthday. From Regent he joined IBC, and from there he went to Olympic in Carlton Street where he ended up running the studio. Grant moved with Olympic to its current Barnes premises in the 60s, which he was largely responsible for setting up, and as the studio went from strength to strength so too did Keith Grant's reputation as a first class recording engineer. When Olympic was sold to Virgin a few years ago, Grant left taking selected pieces of equipment to set-up a new facility. This he did at Twickenham Film Studios installing a 48-track remix room with most of the equipment from Olympic 3, including the computerised Raindirk console. He now does all his mixing here, and the majority of his recording at All Saints.

When he first started using the church, Grant like everyone else, would bring in mobile equipment which he set up in the crypt; but with the increasing work-load, this soon became less practical. So, in the early part of '91, a small side chapel adjoining the chancel was made into a permanent control room; here he installed his pride and joy, the console from Olympic 1.

'The console had been in storage for three and a half years, and everyone told me that I'd never get it working again — we brought it down here, connected up the power supplies, turned it on and everything apart from outputs five, six and seven worked perfectly — the reason for that was a junction strip had been ripped off when it was carried in — it was quite remarkable. Actually the console was never designed to be moved around, and it took four men just to lift the centre section of the frame. We built the desk over a three year period at Olympic to the most exacting standards — the components alone cost in excess of £75,000 (approx \$135,000) and that was 15 years ago — no expense was spared, whatever was the best of its type was used. I was recently asked to make up a little demo tape of some of the things I've recorded here — this involved material recorded on this and two of the mobile consoles. When I cut them together and compared them I was flabbergasted, the difference in this desk's bottom end and the cleanliness of the sound was astonishing.

Also from Olympic 1 are two 3M M79 24-track machines and Dolbys (SR or A). Digital multitracks are



Recording at All Saints Church, Petersham, London

hired in, but direct digital stereo recordings are catered for using Sony 701 with a DAT backup. The control room is fitted with full sound to picture facilities, and the main monitors are Yamaha NS1000s.

Over the years Grant has built up an impressive stock of valve mics; currently standing at 27, he believes it's the second biggest collection next to Abbey Road. He also has one or two vintage ribbon mics including STC 4038s and RCA 1001s. So far the largest session he's recorded at All Saints is a Christmas Album for Sony, with an orchestra of 60 and a choir of 24, but the church will comfortably hold more and has been used quite recently to record a 100 piece opera. I wondered if he had a favourite layout?

'I always set it out classically because it sounds so good. I'll use screens now and again — for

example I've screened off the percussion here to give me a cleaner woodwind feel, but you can easily work without them because the sound is so controlled. When I get a rhythm section, I usually encircle them with transparent screens and put a lid over the top.'

The church is still used by other companies who bring in their own equipment, and during my visit, Nimbus were making a duplicate recording from the crypt using their ambisonic set-up.

Its situation on the fringe of South West London has some plus and minus points — parking is never a problem but public transport can be more awkward; with its proximity to Heathrow, there are occasions where plane noise may be obtrusive enough to halt a take, but Grant believes the acoustic advantages of the church far outweigh this slight inconvenience.

3M 996 in use

There is a degree of irony in the fact that the greatest advances in analogue tape recording have come when it was becoming known as a format of receding importance. Just look at the history over the last ten years. First came the generation of tape machines that offered improved performance and a host of features such as auto-alignment and far greater headroom. These were followed in the mid 80s by Dolby *Spectral Recording (SR)* that effectively removed the distance in performance between analogue and digital recording systems.

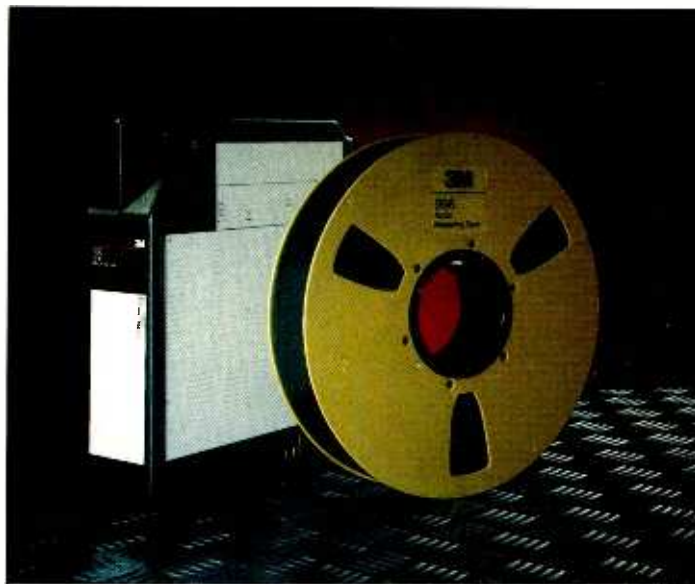
The last element in the chain is, of course, the tape. At the Los Angeles AES Convention in September 1990 3M announced 996 with claims that, if true, it would represent a significant improvement in tape technology.

Also of interest was the fact that 3M had retreated a certain amount from servicing the recording market over the years, and now appear to be back in a very positive way.

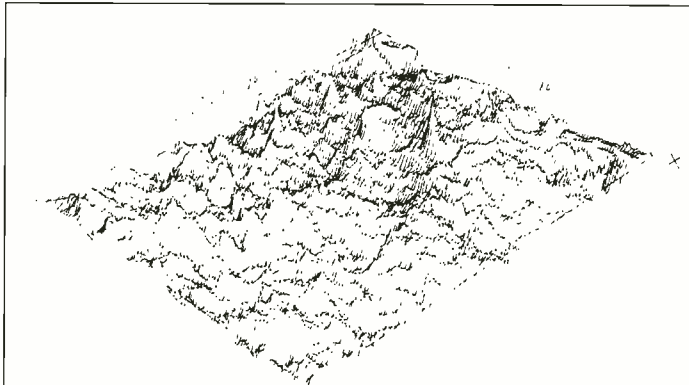
The most specific claim is that the user can set an operating level of +9 dB with no increase in print through — in fact an improvement of 3 dB over other mastering tapes. Bold claims if without any need for qualification. The tape is a polyester base and has an oxide coat and a back coat of brown and black respectively.

996 has been made available in the full set of widths — $\frac{1}{4}$, $\frac{1}{2}$, 1 and 2 inch and in reel sizes of up to 5000 feet on 14 inch reels. So this is not just a single tape area that they are entering but the complete range of uses.

There have also been some significant changes to the tape packaging that is also an attractive feature. The reels come in a TapeCare library box, a black 'high density' polyethylene container with integral carrying handle, locking clips and label space. The reel is held internally on a central hub (which can rotate on the 2 inch box) and cannot hit the sides of the box in a fall. Supplied inside are a set of adhesive labels for the back and spine of the casing. This is an impressive casing — almost certainly dustproof — and reminds me of the video tape containers that always seemed so ideal. The spools themselves are identified as 996 by their gold colour.



3M tape with its TapeCare library box.



An interferogram of 996, showing its surface profile.

If the claims for 996 were correct, then it would have considerable impact on the non-digital user. It would also appeal to analogue users not using any noise reduction. There would be little advantage in performance when used with Dolby SR for example.

3M provided reels of 2 inch and $\frac{1}{2}$ inch for evaluation and we have commenced a two part examination. Firstly, the tape was tested practically. Three tracks of different styles were recorded using an MCI *JH-16* 16-track. This machine is quite standard and I guess about 15 years old. It has been well looked after and would seem to represent a worthwhile test because it was designed to handle the tapes available at the time it was developed, and not the new high level types. But it had proved effective in the past and if this machine would function well with the tape I reasoned that a newer machine would show even greater

improvement.

The *JH-16* is normally run at 30 ips with Ampex *456 Grand Master* running at +4 dB. It was decided at first to run at this level and just realign the machine to run 996. 3M say that the tape is bias compatible to industry standards so we checked this as well. The *JH-16* has a record head gap of 0.25 mil and 3M recommend a 2 dB over bias at 10 kHz for 30 ips and we found this to be compatible with the normally used Ampex *456*. Record EQ was checked and, apart from some minor tweaking, was fine. The off tape signal, with a 10 kHz tone, is very impressive being almost rock steady. This was also reassuring as I had been rather concerned about the smoothness of the wind on the unplayed tape.

As an aside, I have a dislike of tapes that smell strongly when they warm up. If you are using a machine room then of course it is not a problem but with two multitracks

within ten feet of the user the smell can be unpleasant over a long period of time. I am pleased to say that 996 exhibits few of these symptoms even when on a warm tape machine for some hours.

The session was started and the first track was laid; a heavy rock number with two guitars, bass and drums. Record levels were run through carefully but the performance levels were regularly 3 dB higher than the run through. Playback was however a surprise with none of the expected increased distortion. Tape noise was absolutely minimal and the sound was very close to line-in. For subsequent takes we loaded the level on the tracks not caring if the meters strayed heavily into the red. Even meters occasionally pegging on the end stop seemed to have little audible effect on most signals. And it is true to say that about an hour into the session we forgot about the tape.

A few hours later we recalibrated the machine to run 4 dB higher. My feeling was however that the *JH-16* is not so suited to run at such elevated levels and then push the tape as hard as we were. I have to say that apart from a small increase in S/N performance I felt happier to run at the original level setting and use the headroom. The limitation is with the machine — a newer machine would have probably been far happier at these high levels — I am fairly certain that the tape is capable.

Other types of sound were recorded with equally favourable results. About a week later the tape was checked for print through and I was favourably impressed. There was far less than I would have expected from the standard tape even when the level had been really pushed.

It would be worthwhile carrying out further practical tests on 996 on a more modern machine and really pushing the operating level. I checked with some other users about this aspect and the use with machines capable of handling high record levels and I have received positive comments about 996 and how they were also surprised about the maximum peak levels you can get away with.

The next step in our testing is to measure the performance specification and this will appear in a few months time. Meanwhile I can only recommend that you try this tape if you run analogue without SR. It would seem to have a great deal to offer.

Keith Spencer-Allen



THE NEW PANASONIC PROGRAMMABLE DAT. JUST LOOK WHAT YOU CAN GET OUT OF IT.

ES-Bus and P2 interface, 9 pin D-sub connectors, RS-422 interface, balanced AES/EBU. No it's not Mission Control, it's the back of Panasonic's new SV-3900 DAT machine. A remarkable new DAT recorder that boasts an unprecedented array of remote control possibilities plus superb sound quality.

ES-BUS AND SERIAL CONTROL PROTOCOLS.

Such is the versatility of the SV-3900, it can be used equally successfully to record music or as a scientific research tool. You can, for example, interface it with a wide variety of digital devices – CD players, workstations, recorders. Or, alternatively, it can be networked with up to 31 other SV-3900 DAT machines. (To achieve this you can use either the RS-422 industry standard computer interface, or the optional SH-MK390 remote controller.)

Communication on ES-bus and P2 interface is two-way. All tape and transport modes and functions can be controlled by computer, which in turn can receive and act upon technical and diagnostic information imparted by the SV-3900. Absolute/program times, counter number, error rates and the sampling frequency setting can all be read by the control computer.

With suitable software, the potential applications are almost limitless.

You could for example compile an overnight radio broadcast by using pre-recorded material from one machine, library selections from another and then patch into network news broadcasts at the appropriate times. (It goes without saying of course that traditional eight track cartridges are a thing of the past.)

Other less obvious applications include sophisticated telephone call management, data capture and satellite radio broadcasting. And because any sort of digital information presented in IEC II or AES/EBU format can be handled, the SV-3900 can even be used as a data recorder for remote applications such as monitoring oil flow in pipelines. (Information could be downloaded over the phone, or other network.)

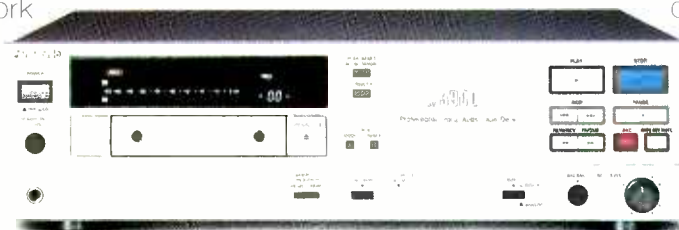
Analogue data logging is of course possible using balanced inputs between -14dBu and $+26\text{dBu}$ with $>92\text{dB}$ dynamic range.

ONE-BIT ADCs.

Naturally the SV-3900 also offers stunning audio performance. One-bit ADCs linked to 64X oversampling anti-aliasing filters mean a complete absence of zero-cross distortion, and ensure total transparency and lucid detail at both high and low levels.

Similarly, the high resolution 4DAC system ensures low distortion and enhanced linearity at low levels on playback. Other useful touches include an error rate display (on-machine or output to the control computer) to keep you informed on the condition of tape and heads. A new tape transport system that allows access to any point on a two hour tape within 27 seconds. And, as you'd expect, sampling rates can be switched between 32, 44.1 and 48Khz.

The list of features packed into this machine is truly remarkable. But go down to your Panasonic dealer and you'll find the most impressive feature of all is tied on with a piece of string. A price tag of around £1300.



Panasonic

LONDON: RAPER & WAYMAN, UNIT 3, CRUSADER ESTATE, 167 HERMITAGE ROAD, HARRINGEY, LONDON N4 1LZ TEL 081 800 8288 HBB COMMUNICATIONS LTD, 73-75 SCRUBS LANE, LONDON NW10 6GU TEL 081 960 2144 BERKS: AUDIO SYSTEMS COMPONENTS LTD, 1 COMEY HOUSE, CALLEAU PARK, ALDERMASTON, BERKS RG7 4QW TEL 0734 811000 CALIFORNIA: PANASONIC PRO SOUND DIVISION USA 6550 KATELA AVENUE CYPRESS CALIFORNIA CA90630 TEL 714 373 7278

Chameleon

power amplifier



NO GOING BACK

By rethinking the accepted principles of amplifier construction, the designers of Chameleon have presented the

industry with a totally new standard against which all other amplifiers will now be measured.

Brilliant technological innovation has created an amplifier which produces a full 2000 watts of so-called transparent audio power in a housing only one unit high.

A new era in professional audio amplification has dawned - the parameters have all changed.

Like its namesake, Chameleon can instinctively adapt to an altered environment, optimising its power to suit the workload.

There is no going back!



Malcolm Hill Associates Plc, Hollingbourne House, Hollingbourne, Kent ME17 1QJ, England.
Tel: #44 (0) 522 830 601 Fax: #44 (0) 622 880 664

www.americanradiohistory.com

Euro ADAT launch

Alesis have demonstrated their new 8-track digital multitrack, for the first time in Europe, at a pre-Musik Messe German dealer launch in Frankfurt.

ADAT uses a S-VHS 120 cassette and transport in a 19 in rackmount to provide eight tracks of 40 mins each.

Studio Sound were invited to the demo at the Inter-Continental Hotel by Alesis and their new German distributor Jacques Isler.

The demo showed all of ADAT's main features including its ability to be joined up with up to 15 others to provide 128 tracks. Timecode for the link-ups is internal, timecodes for synchronising with other equipment such as sequencers or video and film is either by SMPTE or MIDI. Also realtime, beats and bars can be displayed on the remote control.

An interesting and welcome feature is the fibre-optic input and output. The recorder does have analogue and digital I/Os, but those

using more than one machine, may find themselves very happy to be able to use fibre-optic connectors. Not just that they are remarkably easy to use and allow long runs free from interference, but the ADAT itself has no XLR connectors; all unbalanced -10 dBu I/Os are via conventional 1/4 in jack and balanced lines, in and out, are supposed to be connected to a single multi-core socket.

The ADAT uses 16 A/D Delta-Sigma 16-bit converters with 64 times oversampling and sample rates from 40.36 to 50.85 kHz. Output is 18-bit.

Alesis announced their plans to promote ADAT for a variety of markets, not just home recording where it is likely to find its first sales, but also film and video, the variety of timecode options and optional ES-Bus interface are witness to that.

Because of its low price, (approx. £3500 in the UK, Alesis are trying to keep prices the same across Europe apart from local taxes) Alesis are optimistic enough to envisage a day when ADATs will be in studios all round the world and the universal availability and low price of the S-VHS cassette is seen as a key to this development.

Contracts

● The French console manufacturer **Saje** has sold a *Memory* digitally controlled, automated desk and the new AFV universal video mixer interface to Eurosport for their on-air suite.

● Finespice the digital audio post production facility near Heathrow, London, has moved into 20-bit editing with a **Mitsubishi PDX-8620** 2-track digital recorder.

● Reykjavik based film facility, The Icelandic Film Corporation has taken delivery of two **AMS AudioFile PLUS** systems.

● One of the UK's premier post graduate arts institute, The Royal College of Art, has bought a **DAR SoundStation II** digital audio production system for their film and television department.

● Studio Instrument Rentals in Hollywood, CA, has taken delivery of an **Adamson Acoustic Design Corporation Concert System** for their Soundstage 6.

● Society Francais de Production, who were responsible for supplying sound and video equipment for the winter Olympics in Albertville were

using a number of **Soundtracs SPA** and *Megas Mix* consoles for some events.

● Belfast based **Audio Processing Technology** has recently won major orders from many Japanese AM stereo broadcasters for the **DSM 100** digital audio transceiver, an APT product that incorporates *apt-X100* 4:1 compression technology.

● **Trident** have announced the recent sale of a 64-channel *Vector 432* to CBS Television City in Los Angeles.

● **Neotek** have recently sold an *Elite* console to Yae Sung Records in Korea, through their agent Jin Loo Dee.

● Todd AO, one of the largest film scoring stages in the US has recently taken delivery of the biggest in ATC's range of monitors the **SCM300s**. These have been supplied in a special left-centre-right configuration.

● **Saturn Research** has won a contract to supply twelve Saturn 624 2in 24-track machines for the EBU's operations at this years Olympic Games in Barcelona.

THE FUTURE-PERFECT DIGITAL CONSOLE

YAMAHA
DIGITAL SYSTEMS



Talk about perfect timing. As audio is increasingly generated, edited, processed and recorded in the digital domain, along comes Yamaha with the DMC1000 – an all digital production/recording console with 22 inputs, 10 busses and 4 auxiliary busses, capable of handling all the major digital formats.

Touch sensitive moving faders, dynamic automation of all console parameters to timecode, 4 band parametric Eq on all inputs plus 2 FX processors make the DMC1000 ideal for audio post production. And as digital audio moves into the video edit suite, there is full ESAM II implementation and an accessible delay on each channel for frame delay correction. Of interest to all will be the familiar control surface, with extensive monitoring and talkback facilities.

But perhaps the best news about this console of tomorrow is that the DMC1000 is available from HHB today, for around £20,000.



HHB COMMUNICATIONS LIMITED 73-75 Scrubs Lane London NW10 6QU
Phone 081 960 2144 Telex 923393 Fax 081 960 1160



T.C. Multi Function DSP

The Danish company TC Electronic have announced the release of the *M5000* Digital Audio Mainframe. Digital processing is enhanced with tc's DARC (Digital Audio Reverb Co-processor) technology which provides the extra power required for extremely complex algorithms. Programs include Reverb, Ambience and Pitch Shift effects. The *M5000*'s High Speed 24-bit bus can support up to four modules — the standard configuration being one AD/DA module and one DSP module. The 2U unit may also be configured in the digital domain to provide up to four

stereo channels of processing with AES/EBU, SPDIF and Optical I/O. Standard interfaces include MIDI, RAM Card and SMPTE; options include SCSI, LAN and Disk interfaces. The company will produce additional modules for the system providing future updates.
TC Electronic AS, Grimhojvej 3, PO Box 1420, DK-8220 Brabrand, Denmark. Tel: +45 86 26 28 00. Fax: +45 86 26 29 28.
UK: TC Electronic, 24 Church Street, Oswestry, Shropshire SY11 2SP. Tel: 0691-658550. Fax: 0691-658549.

Future Equipment Group Products

German-based company, Future Equipment Group, have introduced a number of new products. *Optima* is a comprehensively specified video editing system with full listing and transfer to on-line capability. Up to four serial or parallel machines may be controlled with full transport control from the editor's control panel which is available in CMX or dedicated format. To aid integration, the screen can be configured to mimic other manufacturers layouts. LTC and VITC are available with the parallel machine control option. Extensive libraries of serial protocols for all commonly used VTRs are accessible.
The Audio Solution II is a digital audio recorder that is available in two forms. The first is a 2-track rack mounting unit that is intended as a digital mag machine replacement

system which may be serially controlled by edit controllers, or used as a stand alone record/replay. External reference include Biphase, T-Code, Video Sync and Pilot Tone.
 The second is an editing version that includes a control panel based around familiar film post operating techniques. Real time scrub editing and drop-in/out (either manual or programmed) are provided exactly as for present analogue systems. On screen waveform editing is also provided. Storage of FX is possible internally with access through a film type bin system. Both systems can be used with either hard disk or Magneto Optical disk storage.
Future Equipment Group GmbH, Fasanenweg 25, 2000 Hamburg 73, Germany. Tel: (49) 40 6449041. Fax: (49) 40 6448567.

DDA Profile Moves Uptown

Profile, DDA's latest 24-track console, is now available with a low cost version of Uptown's *System 2000* moving fader automation. *System 990* saves costs by using a processor to control eight channels rather than just one. The same mix software is used featuring on-line help, trackball control, 500 point cue list, MIDI, off-line mix editing for fader adjust, crossfades, splicing, snapshots and a switch event editor for channel mute, aux mutes and insert return.

Operationally the new system is very similar to the *2000* with commands being made from an eight-key control panel or from a built-in computer keyboard. Faders are accurate to a frame and 0.5dB, mutes will replay to within 1/4th of a frame.
DDA Ltd, Unit 1, Inwood Business Park, Whitton Road, Hounslow, Middx TW3 2EB. Tel: 081-570 7161. Fax: 081-577 3677.

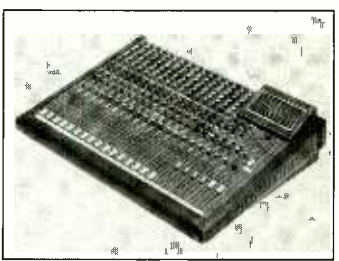
Audiosoft CAD Software

The Australian company Audiosoft have released version 2.50 of CALSOD, a PC-based software package for computer aided loudspeaker design and optimization. CALSOD can simulate the sound pressure and impedance response of individual drivers, as well as being able to compute the summed response of multiway systems. Closed box, vented box, passive radiator, band pass and filter assisted low frequency alignments can be defined using Thiele-Small parameters. The designer can inspect both the magnitude and phase of the summed sound pressure response, the impedance of each speaker, the input impedance of the crossover and

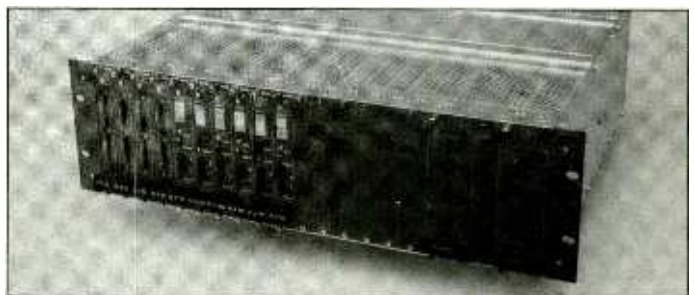
speaker combination, the response of each filter as it is loaded by its driver, the filtered and unfiltered sound pressure response of each speaker, and the desired target acoustic response function. Also included is a circuit optimizer that mathematically varies the components of user defined passive and active crossover networks to achieve a given target sound pressure response function. Data files containing sound pressure and impedance responses can be imported.
Audiosoft, 128 Oriol Road, West Heidelberg 3081, Melbourne, Australia. Tel/Fax: +61 3 497 4441.

Soundtracs Consoles

Soundtracs have announced The *Solo* range of consoles designed for PA and recording markets.
 The *Solo Live*, PA version, is a 4-bus split console with the option of 16, 24 or 32 inputs. Features include 4-band EQ, 6 auxiliaries, 4 stereo effects returns and 100mm faders. A meterbridge is standard. The console is intended for venues where 'the budget is limited but certain facilities are essential.'
 The *Solo MIDI*, recording version, is an 8-bus in-line console with the same input capability and features of the PA desk, but with the addition of MIDI muting on the channel, monitor, group and auxiliary outputs. An external PSU is



standard. The console is seen as a complement to the low cost digital products readily becoming available.
Soundtracs PLC, 91 Ewell Road, Surbiton, Surrey KT6 6AH. Tel: 081-399 3392. Fax: 081-399 6821.



Studer Digitec Modules

In the wake of the *Virtuoso* digital console and miscellaneous digital peripherals, Studer Digitec have launched the *DS-D* range of digital audio modules. These are housed in a 3U frame with PSU. Available modules include the DS-MC high precision digital audio reference clock or Master Clock, the DS-D DA dual

distribution amplifier 1-8, and the DS-D M 81 preselector 1-8 which is mainly designed for monitoring and maintenance. I/Os conform to AES/EBU.
Studer Digitec, 25 avenue de l'Europe, F-78400 Chatou, France. Tel: 33 (1) 34 80 87 00. Fax: 33 (1) 34 80 87 79.



Not to be opened until AES Vienna!



SONY®

For further information contact:
 Amsterdam 020 6581911 Athens 01 2618273 Basingstoke, UK 0256 483666
 Brussels 02-7241711 Cologne 0221 59660 Copenhagen 042 995100 Dubai 04 373472
 Helsinki 0 50291 Jeddah 02 6440837 Lisbon 01 859 4269 Madrid 091 536 5700
 Milan 02 6 18381 Oslo 02 303530 Paris 01 4915 4000 Rome 06 5920 801 Stockholm 08 7336100
 Vienna 0222 61051 Zurich (Schlieren) 01 733 3511 Czechoslovakia, Hungary, Poland,
 Romania - Vienna 0222 554 606, East Central Europe (others) UK 0256 55011
 Middle East, Geneva 022 7336350 Africa, UK 0256 55011

Sony Broadcast
 & Communications 



Optical Recorder from Audio Follow

French company Audio Follow have introduced the *DD02* magneto-optical disk recorder designed for broadcast and post-production applications. The system is designed to record, edit and/or broadcast a stereo sound on several independent channels, and more than five hours of stereo recording can be stored on one removable, rapid access disk. Two

stereo or four independently controllable mono channels are available, and MIDI, SMPTE and AES/EBU interfaces are incorporated. The rack mountable unit can be networked to allow sound sources to be shared between studios. **Audio Follow, 73 rue de l'Evangile, 75018 Paris, France. Tel: 46 07 26 26.**

Extended ADAM

Akai have developed an upgrade for their *DR1200 A-DAM* digital recorder which increases its recording time from 16 to 21.5 minutes. The DR-EX Extended Recording Kit is used in conjunction with Akai *DTR2130* Extended 8mm tape — existing recommended 8mm

tape remains compatible with extended systems. **UK: Akai Digital, Haslemere Heathrow Estate, Silver Jubilee Way, Parkway, Hounslow, Middlesex TW4 6NQ. Tel: 081-987 6388. Fax: 081-759 8268.**

Otari R-DAT Series

A new range of R-DAT recorders has been introduced by Otari called the *R-DAT* Series. Presently available are the *DTR-7* which is described as a competitively priced, basic implementation, professional R-DAT, and the *DTR-90* which tops the range.

The *DTR-90* is equipped with a unique removable front panel which can be laid flat, or mounted, for remote operation. The machine is designed with four heads to work in tandem with its companion editor, and an optional Edit Memory PC Board is available to provide non-destructive preview editing.

Switchable AES/EBU-SPDIF is standard, but an optional, interchangeable board will conform the interface to SPDIF-II. Other options include Memory Start, which offers instantaneous playback by loading audio into a RAM buffer, and a Time Code generator/reader/synchroniser.

UK: Otari (UK) Ltd, Unit 13, Elder Way, Waterside Drive, Langley, Berks SL3 6EP. Tel: 0753-580777. Fax: 0753-542600.

USA: Otari Corporation, 378 Vintage Park Drive, Foster City, CA 94404, USA. Tel: (415) 341-7200. Fax: (425) 341 7200.

Mytek Products

Mytek Technologies have announced two new products — *Private Q*, and *The Little Black Box*.

Private Q is a 12 channel cue system allowing artists to balance their own cue mix or update the engineers mix. Each individual cue-box is mic stand mountable, and up to 16 can be run from one distribution rack using single snap DL connectors.

The Little Black Box is designed to

interface between Sony digital multitrack machines and SSL G and E series consoles. The interface improves tach division versus SMPTE for precise locating. A version for use with *Lynx* synchronisers is also available. **Mytek, PO Box 1023, New York, NY 10276, USA. Tel: (212) 533-1787.**

HNB Upgrade Sony

UK distributor HNB have announced their own upgrade for the Sony *PCM-2700* DAT machine. The HNB *PCM-2700 'PRO'* provides full AES/EBU interface using balanced XLR connectors which replace the original

unbalanced phono-based IEC-958 Type 1 I/Os. **HNB Communications Ltd, 73-75 Scrubs Lane, London NW10 6QU. Tel: 081-960 2144. Fax: 081-960 1160.**

RTW Timer System

Modulation-controlled timer and studio stopwatch



Remote Display for viewing at a distance



Program Timer 1195 mounted into case 1123



Report printer 1187



RTW RADIO-TECHNISCHE WERKSTÄTTEN GMBH • W- 5000 Köln 71 • Germany
Post Box 71 06 54 • Telephone (221) 70913-0 • Telex 8885217 • Telefax (221) 7091332

Australia: SYNTEC INTERNATIONAL, Tel (2) 4174700 • Austria: ACOUSTA ELEKTRONIK, Tel (062) 824627 • Belgium/Netherlands: P.A.C., Tel (40) 510484 • Canada: J-MAR ELECTRONICS LTD., Tel (416) 4219080 • Denmark: SC SOUND APS, Tel (42) 996877 • Finland: AV-POINT ICS AB, Tel (0) 5666733 • France: SCV AUDIO, Tel (1) 48632211 • Great Britain: AUDIO AND DESIGN LTD., Tel (0734) 844545 • Israel: H.M. ACOUSTICA LTD., Tel (3) 5590266 • Italy: AUDIO EQUIPMENT SRL, Tel (39) 2000312 • Japan: SANIX CORPORATION, Tel (3) 7025315 • Korea: DAESAN INTERNATIONAL INC., Tel (2) 7368442 • Norway: SIV-ING BENUM AS, Tel (2) 145460 • Spain: SINGLETON PRODUCTIONS, Tel (3) 2377060 • South-Africa: ELTRON LTD., Tel (11) 7870355 • Sweden: AV MEDIA AB, Tel (755) 85498 • Switzerland: AUDIO BAUER AG, Tel (1) 4323230 • USA: ESL ELECTRONIC SYSTEMS, Tel (305) 7911501

Mark IV Interface Console

The *Interface* console is the first product to come out of the Mark IV Audio 'multi-brand concept'. Jointly developed by DDA and Dynacord, and manufactured by Dynacord in Germany — the console will be sold under DDA, Dynacord, Altec Lansing and Electro-Voice brands.

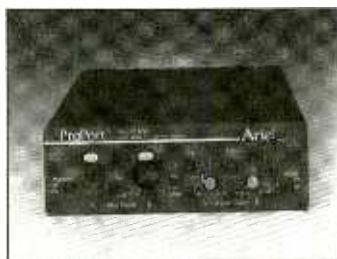
Interface is supplied in 8, 16, 24, 32, and 40 channel mainframes, with an eight-channel rackmount version also available. Various input, group output and master modules are available. Four group mixing buses allow the use of up to 4 group output modules. Six auxiliary buses are provided with master level controls. Optional I/O transformers are supplied to isolate the balanced XLR

connections. Other features include 5 segment LED input meters on every channel, padded mic inputs, switchable auxs to channel direct outputs enabling a single channel to drive an effects device without tying up an entire bus (a facility taken from DDA Q Series), pre/post switching for aux send 1 and 2, console configuration switching, subgroup to stereo mix switching, mono feed from stereo master, 100mm faders throughout.

UK: DDA Ltd, Unit 1, Inwood Business Park, Whitton Road, Hounslow, Middx TW3 2EB.
Tel: 081-570 7161.
Fax: 081-577 3677.

Ariel Digital Interface

Ariel Corporation have introduced the *ProPort 656* self contained digital audio interface intended for ISA/EISA, Sun, VMEbus, Macintosh, Hewlett-Packard and NeXT computers. Connection is via the DSP Port serial interface and sampling rate is selectable between 5 kHz to 96 kHz. The device employs 16-bit oversampling for the input converters, electronically balanced mic/line inputs, switchable phantom power, peak reading level indicators, continuously adjustable gain controls with 60 dB range, as well as over-voltage and surge protection. D/A conversion is 20-bit, eight times oversampled. Analogue outputs are driven by active balanced, low impedance line level amplifiers. Input and output channels are sampled concurrently.



ProPort's analogue inputs have an A-weighted dynamic range of more than 95 dB, and the A-weighted outputs attain 100 dB dynamic range, exceeding the 96 dB theoretical limit of signals with 16-bit resolution.

Ariel Corporation, 433 River Road, Highland Park, NJ 08904, USA. Tel: (908) 249-2900.
Fax: (908) 249-2123.

Martech Revitalize Echo Plates

Martech, the technology division of Martinsound, have introduced an upgrade kit for the EMT 140 Echo Plate which replaces all the electronics, pickup transducers and cables with low noise, low distortion components. Average installation takes approximately two hours, and mono EMT 140s can be converted to stereo by installing an optional mounting bar kit to attach the pre-amp for the second channel. Also included are level indicators and a warble tone oscillator to simplify level and stereo balance adjustments. The highpass filter has been refined by adding half octave steps.

According to Martech the problems encountered with old plates are noise, hum, distortion and the general aging of components. Primary objectives have been to improve headroom and cleanliness, while retaining the richness and warmth of the sound. The company claim their new transverse mode transducers minimize the pickup of longitudinal waves responsible for producing 'metallic' colouration.
Martech, 1151 West Valley Boulevard, Alhambra, CA 91803-2493, USA. Tel: (818) 281-3555.
Fax: (818) 284-3092.

The lengths we go to to satisfy our clients

15 minutes

Not satisfied simply with being the leading supplier of DAT recorders, HHB announces the first DAT tape designed specifically for professional recording applications.



30 minutes

An ultra-fine metal particle formulation on a stretch-resistant polymer backing guarantees performance and long-term stability, while a concave tape profile ensures optimum tape to head contact.



48 minutes

The high-strength, anti-static cassette shell is completely sealed against contaminating dust particles and features a calibrated window for at-a-glance indication of remaining remaining tape time.



62 minutes

Tape labelling conforms fully to the new APRS guidelines and easy archiving is further enhanced by the availability of optional "Twin Pack" library cassettes, storing two tapes along with detailed documentation.



92 minutes

And trust HHB Communications to go that bit further. Our PQ Series Professional Digital Audio Tape is available in six lengths, ensuring an economic use of tape whatever the application.



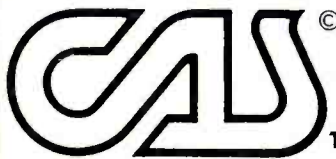
122 minutes

ALSO AVAILABLE AT
 ProTape (071 323 0277)
 and in Scotland at
 Sound Control
 (041 204 2774)



Digital Audio Tape

HHB COMMUNICATIONS LIMITED
 73 75 Scrubs Lane, London NW10 6QU
 Phone 081 960 2144 Telex 923393 Fax 081 960 1160



GÜNTHER KUTSCH
SCHÜREN 12, D-6670 ST
INGBERT, GERMANY
TELEPHONE (06894) 4717
AND 4727

Coach Audio Sales

FAX (06894) 383379

USED EQUIPMENT
MARCH 1992

CONSOLES:

- DDA-AMR 36/24, patchbay
- NEVE V1, 48 frame, 44 channels, patchbay
- NEVE V1, 48 frame, 48 channels, patchbay
- NEVE V1, 60 frame, 60 channels, patchbay
- SOUNDTRACS QUARTZ 48 Inline
- SSL 4056 E, 48 channels, VU-meter, patchbay left
- SSL 4048 E, 48 channels, VU-meter, patchbay left
- WESTEC 3020, 56 frame, 48 channels, automation


Various SSL-parts: channels, total recall, computers, etc.

OTHERS:

- ADAM-SMITH ZETA Three Synchronizer
- AKAI-ADAM 12 track digital
- AKAI DD1000 Optical Recorder
- AKI S 1100 Sampler
- AUDIOFRAE WAVEFRAME System + direct-to-disk
- FM ACOUSTICS FM 800 amplifier
- FOSTEX E16 + Mixer
- FOSTEX D-20 R-DAT recorder
- GENELEC TRIAMP 1022 B
- LEXICON 480 + LARC
- LYREC TR 532 + ATC locator
- MITSUBISHI MX-80 2-track + locator
- MONITOR TECHNOLOGIES nearfield monitors
- NEUTRIK MAINFRAME Measure-Computer
- OTARI DTR 900, 32-track digital + locator/remote, 8 months old
- OTARI BTR 5SD
- OTARI MX-80 + remote, 2 years old
- OTARI MTR-100 A + remote, 1 year, only a few hours
- QUESTED 209 speaker system + all amps
- QUESTED 412 speaker system + all amps
- SATURN 824 24 track machine
- SONY U-MATIC VO 9600 F
- SONY 1630 with 1100 A editor and 2 x DMR 2000 tape analyzer
- SUMMIT AUDIO equalizer TPA-200
- SUMMIT AUDIO compressor TLA-100
- SYNCLAVIER 9600 in flightcase
- STUDER Sound Library
- TUBETECH CL1A valve compressor

Subject to prior sale!

For further information contact MR. Günther Kutsch!



SEEPORT
THE PORTABLE
AUDIO MIXER

- 8 input channels, mono or stereo
- 4 auxiliaries, with returns
- 2 band equalizer in each channel
- Pre fader listening and channel on switches
- M/S switch in each channel
- Penny & Giles long scale faders
- 2 stereo instruments
- DC or AC powered
- Weight 9.8 kg
- Fits in a 19" rack

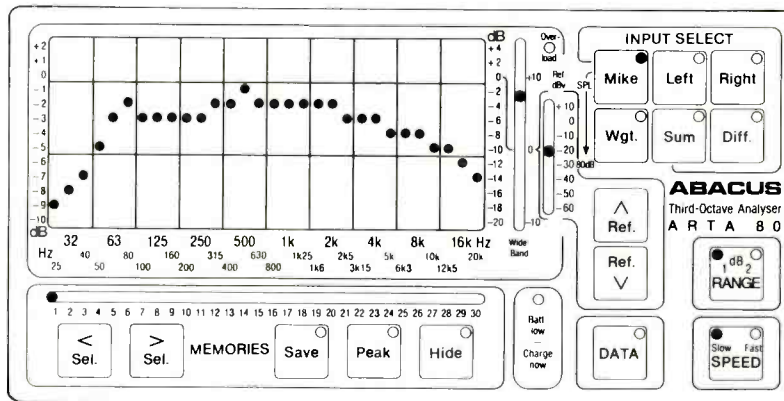
SEEM AUDIO A/S Broadcast Telecommunication Audio/Video

P.O. Box 115 - N-1380 Heggedal - Norway
 Tel. + 47 2 79 77 30 - Fax + 47 2 79 61 54 - Telex 79207 SA N

ABACUS
ELECTRICS

*For exacting engineers, a precise instrument, the **ARTA 80** third-octave audio analyser.*

- Incorporates precision pink-noise generator.
- Ultra-bright LEDs for clear display and battery power saving.
- Thirty non-volatile memories. View any memory simultaneously with "live" display.
- RS232 serial port for down-loading memory data to a personal computer.



ABACUS
ELECTRICS

10 Barley Mow Passage, Chiswick, London, W4 4PH, U.K.
 Telephone (081) 994 6477 Telex 8811418 SPACES G

- Battery portable — size 24 x 16 x 8 cms. weighs only 1.5 kg.
- Microphone plus two line inputs.
- Parallel printer port for plotting spectrum graphs directly on dot-matrix printers.
- 12dB or 24dB display range, fast or slow response.

Rupert Neve of Amek replies

Mr Brooke asks AMEK to '... explain whose brain can be so added with fullness from signals ...' etc., citing his garage door transmitter as his reference. (*Studio Sound Letters February 1992, P.70*).

In fairness I don't think that Mr Brooke is the only person in our Industry who cannot hear discrete signals that are well above the normally accepted human hearing cut-off of around 18 kHz.

As the author of statements that have aroused Mr Brooke's scorn, I am glad to answer as helpfully as possible within the limits of my own experience which, I suppose, now goes back to nearly 55 years if you accept that I first built sound equipment at the age of 11 and was dissatisfied with the sound quality!

I cannot 'explain' how we respond to sounds. There are many researchers who have made and are currently making extremely valuable contributions to this field and there is valuable reading in the references given below.

Extended frequency response is only one characteristic of sound quality. Freedom from non-linearity in the transfer characteristic at all levels and frequencies, is another obvious one. That this must include those frequencies well beyond the 18 kHz criterion, must also be apparent when you consider the different signal produced by two similar frequencies beating together above normal audibility.

I was always puzzled by the fact that two pieces of equipment which measured pretty much the same often sounded different. The early NEVE consoles were designed in fear and trepidation. Everything was class A and even although transformer coupled, the bandwidth and linearity were well in excess of the figures considered necessary at the time. We were accused of over-designing, of course!

During the late '70s Geoff Emerick, at AIR Studios, showed me that he could hear a difference between two channels in a console, one of which had not been correctly terminated and was producing a 3 dB rise at 54 kHz. The maximum point of the rise was itself several dB down.

Shortly after that I designed the Montserrat console for AIR. Three were built and one is still in daily use by them and the other surviving one

at A & M in Los Angeles. These consoles represented a substantial step forward in terms of noise, distortion and the bandwidth was well in excess of 100 kHz. It is not just my opinion but that of many famous names who have used them that the advanced performance made a worthwhile difference.

To confirm whether harmonics falling outside the audio band could make a difference to the audible sound, I devised a simple test, switching between a sine and square wave. I first tried this at an IBS lecture in London some years ago and have repeated the tests with a number of audiences in other countries more recently. I do not usually take my own equipment, so the audio path provided is always different.

Audiences are always professional audio people, musicians, engineers and producers who are used to critical listening. I make no claims but ask whether they can hear a difference as I switch between sine and square. There has been a remarkable co-relation in that some 60% of those present on each occasion have been able to hear a difference when the fundamental is as high as 10 kHz. A smaller percentage have been able to make the distinction as the fundamental is raised as high as 18 kHz.

I have always believed that, no matter what the subsequent processing and ultimate destination of the signal, the sound quality at the end always benefits from the most meticulous attention to detail in the early stages of the signal chain. This belief is shared by many professional friends who have used my equipment over the years. The frontiers are being pushed back and new layers are being explored. Who is to say there's nothing there?

The MOZART-RN is a signal path of which I am proud and which, thanks to AMEK's incredible skill in the manufacturing field, has been affordable to many studios with modest budgets. An ever increasing circle of users have endorsed its performance. However, we try not to stand still and as we learn more and continue to listen to the musicians and producers, so we will build the sort of equipment that we think adds fullness and enjoyment to music even if we do not fully understand all the factors that make it so.

One final point, I have never been able to give a quick A/B assessment in paired comparison tests. I find that 'straining' to hear something is counterproductive. I like to leave ►

How far will you have to go?

- Australia**
Studio Supplies Pty Ltd
Phone Leon Hart 612 957 5389
- Belgium**
Amptec BVBA
Phone George Lemmens 011 281458
Mill's Music
Phone Patrick Voets 03 8289230
- Denmark**
SIT Studie & Lydteknik
Phone Ole Lund Christensen
31 71 33 44
- France**
Denis the Fox
Phone Denis Kabia 1 40 38 01 12
Hilton Sound SARI
Phone Gabriel Nahas 1 46 67 02 10
- Hong Kong**
Advanced Communication Equipment
Phone Perry Tai 852 4240387
- Ireland**
Control Techniques Ireland Ltd
Phone Jim Dunne 1 545400
- Israel**
More Audio Professional Stage Systems Ltd
Phone Chanan Itzioni 03 6956367
- Italy**
Audio International SRI
Phone Riccardo Zunino
02 25390121
- Japan**
Cameo Interactive Ltd
Phone Seiji Murai 03 5272 1871
- Malaysia**
Meteor Sound & Lighting System
Phone Mr Y T Tan 03 291 6559
- Netherlands**
K&D Professionele Elektro Akoestiek
Phone Daan Verschoor
31 2526 87889
- Portugal**
SPGC Audio Pro Department
Phone Paulo Ferreira 1 692456
- Spain**
Kash Productions SA
Phone Jim or Carmen 91 267 5222
and 91 377 0068
- Sweden**
Intersonic AB
Phone Mikael Sjostrand 08 7445850
- Switzerland**
RTG Akustik AG
Phone Thierry Sutter 061 272 19 12
- UK**
HHB Communications Ltd
Phone Sales 081 960 2144
- USA**
Stellar Audio
Phone Bill Griffith 914 735 8107



Digital Audio Tape

HHB COMMUNICATIONS LIMITED
73-75 Scrubs Lane, London NW10 6QU
Phone 081 960 2144 Telex 923393 Fax 081 960 1160

something playing in the background while I do something else (such as writing to you Mr Editor) and after a while something starts to irritate me and I have to find out what it is. Perhaps Mr Brooke can take advantage of his quiet environment and let the music flow without straining. My cut-off is around 12 kHz these days so I know it would be useless for me to offer to help locate his garage door opener.

Papers read at the AES Convention, N.Y. Oct 4-8th 1991
 1) High-frequency sound above the audible range affects brain electric activity and sound perception.

Tsutomu Oohashi, Emi Nishina, Norie Kawai, Yoshitakam Fuwamoto and Hiroshi Imai National Institute of Multimedia Education, Chiba-Shi 260, Japan.

2) Estimating the significance of errors in audio systems. J. Robert Stuart.

3) Predicting the audibility, detectability and loudness of errors in audio systems.

J. Robert Stuart, Boothroyd Stuart Ltd., Huntingdon, Cambridgeshire, PE18 7EJ.

Lecture given to the AES London, 24th Sept., 1991, by Bob Stuart. Understanding Noise and distortion

— a new approach.

Witness to hearsay

Dear sir, pursuant to the letter from the County of Spires and Squires (*Studio Sound Letters February 1992 p.70*) rubbishing comments made by Mr Rupert Neve as to the extent and limitations of human hearing, I would like to describe an experiment performed by Mr Neve on an

audience at the University of Lowell, Massachusetts during October 1990. The writer of this letter was present at the lecture.

Mr Neve was invited to lecture on sound and console technology. One of his propositions, and a fundament of his design approach, is that although measuring techniques propose that human hearing at its best hears an audio band of 20 Hz to 20 kHz, human perception can be aware of frequencies which are far higher. As a consequence the elimination of these frequencies from the audio chain result in a loss of quality in music. This quality is perhaps not at

**BY NOW IT MUST
 HAVE REACHED YOUR EARS
 HOW OUR
 MAIN MONITORS, FOR THE
 VERY FIRST TIME,
 CAN ACTUALLY SEE A
 PERFECTLY
 SYMMETRICAL CONTROL ROOM.**



present quantifiable but certainly appears to be subjectively identifiable.

In practical terms this means that, especially in the origination part of the recording process, techniques used in digital audio engineering or even a step as simple as rolling off an analogue console severely above the audio band, will reduce the system performance and the listener's enjoyment.

The audience at Mr Neve's lecture consisted of around 30 or 40 people. Their average age was probably about 20 years old. Mr Neve alternated a sine wave with a square

wave manipulating the signal in such a manner that the audience was unable to see him pressing any switches on the signal generator. He also raised the base frequency during the experiment, and each time he changed the waveform he would ask the audience how many of them detected the change.

As your readers will know the 3rd harmonic of a square wave is three times the frequency of the fundamental, so that a 12 kHz fundamental has (sic) a 36 kHz 3rd harmonic, which is well outside the 'established' hearing range and therefore should be impossible to

detect. In fact, a substantial number of the audience could detect when Mr Neve changed the waveform up to a base frequency of about 18 kHz, which indicates that they could detect something happening (or the effect of something happening) at 54 kHz. The writer of this letter could not distinguish between sine and square waves above about 8 kHz or 9 kHz but he puts this down to catarrh rather than his age (40).

It is fair to say although that this experiment was not conducted under absolutely rigidly controlled conditions as a demonstration, in my view, the results were more than

suggestive that Mr Neve's proposals are at least in their basic premise, correct.

**Yours faithfully,
Nick Franks, Chairman, Amek Systems and Controls Limited, New Islington Mill, Regent Trading Estate, Oldfield Road, Salford M5 4SX, UK.**

Letters should be addressed to:
The Editor, Studio Sound,
Spotlight Publications, Ludgate House, 245 Blackfriars Road, London SE1 9UR, UK.



STUDIO: HIRE A/0000MR ©PHO O. PE E-JOHNSON

BUT HOW MUCH HAVE YOU HEARD ABOUT OUR WILD NIGHTLIFE ?

IT GOES WITHOUT SAYING, HOW, IN THE RECORDING JUNGLE, ACOUSTIC VOLUME IS KING. WE'LL SAY IT ANYWAY. ERGO, THAT ALL THREE CONTROL ROOMS WILL BE INFRASONIC WITH A PRESSURE BANDWIDTH OF 12 Hz - 20 KHz, IS NOT ONLY A WORLD FIRST BUT NOTHING SHORT OF AN ACOUSTIC MIRACLE. BUT ENOUGH OF THE GADGETRY, YOU CRY. GIVE ME AFRICA. WIDE OPEN SPACES. AIR I CAN BREATHE. ANIMALS WITH NO BARS AROUND THEM. AND ALL THE CREATURE COMFORTS TO RELAX ME. (WE DID SAY A WILD NIGHTLIFE.)
OK. IT'S ALL YOURS.



Hard core cases

The US made SKB range of cases for instruments are all fully moulded and use rolled rivets for support of the hardware fixtures. They are available for electric guitars and basses, acoustic guitars and violins.

The company also manufactures lightweight rack road-cases that are stackable, have O-ring gaskets for water and dust proofing, use welded frames and are available from 2U to 12U sizes. A similarly endowed mic road-case is also offered.

US: SKB, 3906 Sandshell Drive, Fort Worth, Texas 76137.

Tel: (817) 847 5400.

UK: JHS, Salem House, Garworth, Leeds LS25 1PX. Tel: 0532 865381.

Akai master

Akai's *MX1000* master keyboard can be converted to a ten sound 16-bit sampled piano with an optional *PM76* module.

The weighted 76-note keyboard — with velocity key follow and six preset and eight user programmable velocity curves — can be split into four keygroups each with various MIDI parameters assigned to it.

Each of the 100 internal programs includes four keygroup settings and can be arranged in four program chains with information shown on a 320 character LCD with six software keys. Assignable MIDI parameter controllers include four sliders, four switches, four footpedals, four footswitches, one sustain switch and program up/down switch. A panic button transmits all notes off from the four individual MIDI out and data storage is via card.

UK: Akai Professional, Haslemere Heathrow Estate, Silver Jubilee Way, Parkway, Hounslow, Middlesex TW4 6NQ. Tel: 081 897 6388.

BBE pre-amps

BBE has launched three guitar pre-amps all with Sonic Maximiser circuitry. The *381* has clean and distortion channels, a stereo effects loop, noise gate, remote switching and a speaker simulator.

For bass players the *383* has a compressor, effects loop and a crossover for bi-amping purposes. With parametric EQ and a

switchable notch filter and unbalanced output the *386* is applicable to acoustic guitars in live and studio situations.

BBE, 5500 Bolsa venue, Suite 245, Huntington Beach, CA 92649. Tel: (714) 897 6766.

Europe: TCI, Unit 12, Barnwell Road Business Park, Cambridge CBN5 8UY. Tel: 0223 416660.

SD TARA

Seymour Duncan's True Acoustic Response Amp has been designed for acoustic guitar reproduction. The two channel 100W amp, with two-way speakers, has a sweepable notch filter for feedback suppression. Duncan has also released the *SA2* acoustic guitar pick-up and the beefed-up, PAF-style, Blues, Parallel Axis Trembucker with Alnico V magnet and Parallel Axis pole piece design.

Seymour Duncan Research, 601 Pine Avenue, Santa Barbara CA 93117. Tel: (805) 964 9610.

EMG acoustic PU

EMG has entered the acoustic guitar pick-up market with its *AS93* and *AS125* piezo electric film devices. Both include the *APA1* active buffer pre-amp as standard — a matchbox-sized lump of circuitry that, together with the required battery, is mounted to the instrument's neckblock. Units are supplied with fitting instructions, diagrams, screws and an end-pin jack.

EMG, PO Box 4394, Santa Rosa CA 95402. Tel: (707) 525 9941.

Rotary effects unit

US company Rolls Corporation have released the 1U rackmount *RP147* Rotorhorn processor that simulates rotating speaker effects under MIDI control and the *MP1288* MIDI Wizard with eight continuous controller inputs and the ability to map program changes to two external devices. For karaoke and church installations, the Rolls

RA5KM singer pre-amp is a stereo mixer intended for mic and programme applications.

Europe: TCI, Unit 12, Barnwell Road Business Park, Cambridge CB5 8UY. Tel: 0223 416660.

US: Rolls Corporation, 6995 South 400 West, Midvale UT 84047. Tel: (801) 562 5628.

Bass Combo

Hartke's model *2000*, 200 W into 4 Ω, bass amp has a 10 band EQ and a valve pre-amp running through a solid state power section. The amp is coupled to a 15 in aluminium coned driver in the *2115* bass combo. Cabinets supplied by the company now include the *215XL*, powered by a pair of 15 in sub-bass drivers, and the *405XL* is designed as a high frequency add-on to existing rigs, using four 5 in aluminium coned drivers.

Europe: TCI, Unit 12, Barnwell Road Business Park, Cambridge CB5 8UY. Tel: 0223 416660.

Carlsboro combos

Carlsboro Electronics has released the *Viper* bass guitar amp series, *Colt* keyboard series and the *Sherwood Baby*.

Available in 30 W and 65 W versions, *Viper* bass amps have active inputs and Celestion speakers. The 30 W has 3-band EQ and compression while the 65 W has footswitchable 9 band EQ and compression.

Colt combos are available in 30 W, 65 W and 100 W versions with Celestion speakers. The *Colt* 100 has three channels, one of which has an XLR mic connector and all of them have reverb and effects control and switchable limiting.

For electro acoustic guitars, the 30 W *Sherwood Baby* combo has a high impedance input channel and a high and low impedance input channel.

Carlsboro Electronics, Cross Drive, Kirkby in Ashfield, Nottinghamshire NG17 7LD. Tel: 0623 753902.

Studio Sound's Music News is compiled by Zenon Schoepe.



Worldwide Distributor List

AUSTRALIA
Audio Oz

Tel: 03 696 5690 Fax: 03 696 5691

AUSTRIA
Hi-Fi Stereo Center
Tel: 0662 437701 Fax: 0662 43770127

BELGIUM
ASC
Tel: 02 520 08 27 Fax: 02 521 19 77

CANADA
Soundcraft/IMG
Tel: 514 595 3966 Fax: 514 595 3970

DENMARK
Kinovox
Tel: +2 18 76 17 Fax: 42 18 90 24

FRANCE
Music-Land Distribution
Tel: 1 42 77 29 70 Fax: 1 42 77 28 47

GERMANY*
Groove Music
Tel: 059 03 1759 Fax: 059 03 1463

HOLLAND
Van het Meer Import
Tel: 05143 1297 Fax: 05143 1360

HONG KONG
Tom Lee Music Co
Tel: 730 10098 Fax: 730 3573

ITALY
Grisby Music Professional
Tel: 071 7108471 Fax: 071 7108477

KOREA
Sion Corporation
Tel: 02 565 3565 Fax: 02 565 3561

NORWAY
Benum
Tel: 02 145 460 Fax: 02 148 259

SPAIN
Audio Sintesis
Tel: 93 420 8764 Fax: 93 420 6995

SWEDEN
InterSonic
Tel: 08 744 58 50 Fax: 08 18 43 54

TAIWAN
Taisheng Trading Corp.
Tel: 02 531 3802 Fax: 02 563 7278

USA
ProMusica Sales
Tel: 800 553 2819 (Toll Free)
Fax: 603 352 8787



LA DISTRIBUTION LIMITED
15 Cam Square, Wilbury Way
Hitchin, Herts SG4 0TZ, England.
Tel: +44 462 421919 Fax: +44 462 421171.

*New Dealer

Sixteen into One will go



16 Conventional Noise Gates in 1U

With the Multi Gate offering 16 High Quality Conventional Noise Gates, 16 Programmable Noise Gates, 16 Duckers, 16 Midi Mutes and 8 Auto Panners all in a 1U high rack mounting unit, there must be a catch.

Fortunately there isn't.

With low noise and distortion figures to rival any professional noise gate on the market, coupled with an extremely fast attack time, the Multi Gate will complement any professional audio system. Be it a full blown 24 track studio, a live venue or the simplest of musical instrument set-ups.

And as it does all this, and more (without mentioning the 96 patch memories and extensive Midi control), maybe there is one catch.

- Trying to find a dealer who hasn't sold out!

Multi Gate*



For your nearest dealer/distributor contact
LA Distribution Limited, 15 Cam Square, Wilbury Way, Hitchin,
Herts SG4 0TZ, England. Tel: +44 462 421919 . Fax: +44 462 421171.

Also known as MultiGate in the UK and Europe.



DIGITAL RECORDING... A-DAM HAS THE ANSWERS.

- Q.** Analogue or digital – which is better?
- A.** Digital recording has many advantages, the most obvious being its superior sound quality. What's more, digital tracks can be overdubbed or transferred without any loss of audio performance.
- Q.** What exactly is an A-DAM?
- A.** A digital multi-track recording system, which uses 8mm cassette tape costing under £10.00 – significantly less than ordinary tapes.
- Q.** Is the A-DAM a fully professional system?
- A.** Of course. It's a superbly engineered piece of equipment from a company with over 60 years' experience in audio technology.
- Q.** How easy is it to operate?
- A.** Very. A-DAM has been designed for ease of use.
- Q.** What about maintenance?
- A.** A-DAM is quicker and simpler to maintain than an analogue system.
- Q.** How reliable is it?
- A.** Just follow A-DAM's straightforward maintenance procedures and you can enjoy total peace of mind.
- Q.** Supposing I want to expand beyond 12 tracks?
- A.** No problem. The A-DAM system is designed for operation up to 36 tracks.
- Q.** That's all very well, but what about the cost of the equipment?
- A.** You can buy an A-DAM 12-track digital recording system for less than £10,000 (excluding VAT).
- Q.** How can I find out more?
- A.** Call us on 081-897 6388 to request a copy of our FREE video. It will tell you everything you need to know about A-DAM.

AKAI
DIGITAL

Akai (U.K.) Ltd,
Haslemere
Heathrow Estate,
Silver Jubilee Way,
Parkway, Hounslow,
Middlesex TW4 6NQ.
Tel: 081-897 6388
Fax: 081-759 8268

A-DAM

AKAI DIGITAL AUDIO MULTI-TRACK FORMAT RECORDING SYSTEM



SSE Analyses Simply Red

SSE's tour with Simply Red — whose Stars album topped the 1991 UK LP sales charts — featured further refinements to the company's EV *MT-4* system packaging and a new room analysis/system pre-emphasis control set-up.

Some 45 kW of *MT-4* was used on the UK arena dates with a flown stereo *MT-4* delay, engineered by Robbie McGrath through two, linked, TAC *SR6000* desks. Steve Flewin mixed 56 channels of monitors with a Midas *XL-3*.

Extending the packaging ideas developed by Chris Beale & Steve Connelly for SSE's six pack amplifier racks, the grey-carpeted control rack and desk flight-cases now have integral multiway connector panels to simplify patching, while every system component shares utilised flight-case sizes — allowing, said SSE's John Penn, the Stars show to tour in just two trucks.

The System Control has been enhanced using a completely new drive rack set-up. System crossovers are the TOA *Saori* digital units which have integral time alignment, equalisation, frequency points and filter scope, all adjustable under software control. The *Saori* is programmed with the relevant system pre-emphasis EQ and cabinet time alignment. A TEF Room analyser is used for room measurement via a Mac computer, and is used in conjunction with a Sound Technology *RTA 4000*. The TEF information is then used to set system delay times in the *Saori* for the delay system, and also to adjust the response for the six te Electronics *1128/1128X* programmable EQs. All these elements — plus FX racks patches — will be combined soon via a Mac Hypercard MIDI Cue Sheet programme which SSE Director Chris Beale has specially written.

Soundcraft's new Vienna

Vienna, the show, is the launch pad for *Vienna*, the console — Soundcraft's replacement for its *Series 8000* SR desk.

Vienna — in 16, 24, 32 and 40 channel frames — adds a number of features to its predecessor's design. Like the new styling, many features are derived from the *Europa* desk. However, overall size is similar (it will be a 'two-man lift') and, at the

time of going to press, Marketing Director Alison Brett confirmed the list price would be 'not much more'. Both conventional and VCA Master-equipped variants should be available immediately, with a monitor version likely to follow later this year.

Among the new or upgraded facilities now fitted as standard are eight fully-equipped stereo input/return channels, Mix L, R and

mono buses, bargraph metering on all inputs, and solo-in-place. Illuminated buttons (as used throughout the console) alongside channel faders select the eight mute buses, with a 'Safe' switch for security. Input EQ is a revised 4-band sweep design with dual-Q mid-bands, eight aux sends and an electronically balanced direct output are provided on each input module. Electronic enhancements including balanced internal buses are claimed to improve noise and crosstalk performance.

Optional extras are headed by a full matrix capability — space

F2 for London rock venue

London's latest regular music venue, the newly refurbished Grand Theatre in Clapham, has chosen a Martin F2 system for its house SR system. South London, hitherto something of a musical desert, apart from Brixton's Academy, stands to gain most from The Mean Fiddler Organisation's determination to transform this theatre into an established fixture.

Encore were contracted to install four Martin F2Bs and two BSX's a side, along with 10 Martin LE700 stage monitor wedges and a Midas XL-3 house console. According to Martin Audio's Dave Bearman, it rates as one of their most comprehensive installations to date in the capital — as well as being the first permanent UK installation for an XL-3.

BSS FCS-926

BSS launch its FCS-926 Dual Equaliser Analyser in Vienna, with the new Varicurve system of EQ processing and control. Configured as two separate channels of programmable 6-band parametric EQ, it provides assignable controls and a large graphic display that shows the composite EQ curve and RTA response (generated by an internal 30-band analyser). The FCS-926 also features a Peak Mix mode that is said to minimise interactions between adjacent EQ bands. A 1U EQ slave module and a hand-held remote control will be available later in 1992.

for four dual matrix modules is provided in each frame — and eight VCA groups (located above the audio groups in an optional version of the Master Group module). Unlike *Europa*, the latter are single-assign only; nor is there a VCA 'grand master' output fader. Aux masters are on one module, while the new Grand Master module features more bus metering, source monitoring and talkback routing options than before. *Vienna* also has full logic and audio bus linking — either to another *Vienna* or (thanks to identical connector specs) to a *Europa*.

On tour

AUDIOLEASE has a Meyer MSL-3 system on tour, in the UK and Europe, with Lou Reed. It seems the star has both an uncommonly deep interest and the expertise to match in all matters audio, specifying AKG 460 condenser mics and Massenburg line amplifiers on stage. Paul Young dates and the Red Hot Chili Peppers are also out — using the second production run of Audiorelease's A2 PA system, now in its final, more compact, form.

BRITANNIA ROW PRODUCTIONS has a Flashlight system out in the US now with Dire Straits, while home credits include the Brit Awards, Barbara Dickson, Love Hate and 'supergroup' Little Village.

CLAIR BROTHERS' Stan Horine professes 'cautious optimism' from their US base, on the subject of an upturn in 1992. They have Sting, U2, Prince, Lynyrd Skynyrd, Kenny Rogers and Joe Cocker ready, either out now or soon, to head towards Europe.

SHOWCO also looks to have a healthy start to the year with the Beach Boys, Eric Clapton, Harry Connick Jr and Ozzie Osbourne onboard. Genesis, the Moody Blues and Salt'n'Pepe are on for the spring, while Little Feat, Anthrax and Santana have just finished.

SSE, besides Simply Red, has had a fully occupied start to the New Year with no family contacts allowed. After installing the aforementioned band's tour bus quad hi-fi system; they won Wet Wet Wet through to April-May, had an on-going situation with Metallica, and supplied a couple of large European TV specials. Chris Beale wearily described his slice of the market as 'blistering'. ■

THE THINGS PEOPLE SAY ABOUT A-DAM...

"The transport is excellent - really fast and precise, and the whole system has been extremely reliable. I've had no real problems at all."

Mike Hedges - Producer

"The Akai A-DAM is a high quality product by a manufacturer with a stable history and good technical support."

Studio Sound - April 1991

"Our clients love this system and we're getting lots of repeat business. You can drop in and drop out on a syllable. It's superb!"

Richard Lightman - Triple X Studios

"We find the system really useful, especially for doing remixes; and it syncs perfectly to our analogue machines. Furthermore, due to its reliability and inexpensive running costs, it makes commercial sense for us as a studio - it helps us sell time."

Richard Boote - Strongroom Studios

"This is a great system. I particularly love the low-end response and the auto-locate facilities."

Mark Lawrence - Project Studio

"A - DAM is a proven system, with a number of units in the field giving reliable service."

Audio Media - November 1991



AKAI
DIGITAL

Akai (U.K.) Ltd.
Haslemere
Heathrow Estate,
Silver Jubilee Way,
Parkway, Hounslow,
Middlesex TW4 6NQ.
Tel: 081-897 6388
Fax: 081-759 8268

A-DAM

AKAI DIGITAL AUDIO MULTI-TRACK FORMAT RECORDING SYSTEM

LOGIC 2, BREAKS THE SOUND



SEE US AT AES
STAND No A22

CARRIER



Logic 2 is the latest breakthrough in audio technology from AMS.

It's the all digital mixing console the professional audio industry has been waiting for.

And it's available at a price never thought possible.

The Logic 2 uses leading edge transputer based technology, has an internal dynamic range of 1500dB and can control up to 256 fully equipped dynamically automated signal paths. However it incorporates a control surface which resembles a traditional analogue console and is both familiar and logical to the operator.

The audio quality, control and flexibility of the fully automated desk will give an immediate competitive edge to any studio, whether it's involved in music recording and mixing, post-production, broadcasting or sound for film.

Not only can Logic 2 be used for a wider range of applications than any conventional console but you will be amazed to learn that it's price is competitive with any world class analogue mixer.



To find out how Logic 2 breaks the sound barrier complete the coupon below and send for a detailed profile today.

ams

A Siemens Company

AMS Industries plc, Billington Road, Burnley, Lancs BB11 5ES, UK.
Tel Int. +44 282 57011 Fax Int. +44 282 39542.
AMS Industries Inc., 7 Parklawn Drive, Bethel, CT 06801, USA.
Tel Int. +1 203 792. Fax Int. +1 203 730 8549.

Name _____
Position _____
Company _____
Address _____
Tel: _____



AN INSIDE STORY

The Symphonic Microphone System is an internal system for stringed instruments. Mike Lethby reports on its use on ELO's last tour.

Back in May last year, a re-formed Electric Light Orchestra set up camp in the Birmingham NEC's cavernous Forum Hall for two weeks of production rehearsals, in advance of a planned world tour of remarkably ambitious concept.

The band (retitled ELO Part II, with five members of the original ELO but minus former

leader and hitwriter Jeff Lynne) were to play their 'greatest hits' plus songs from a new album, in the esteemed company of the Moscow Symphony Orchestra.

The tour was ambitious, in fact, on at least three counts.

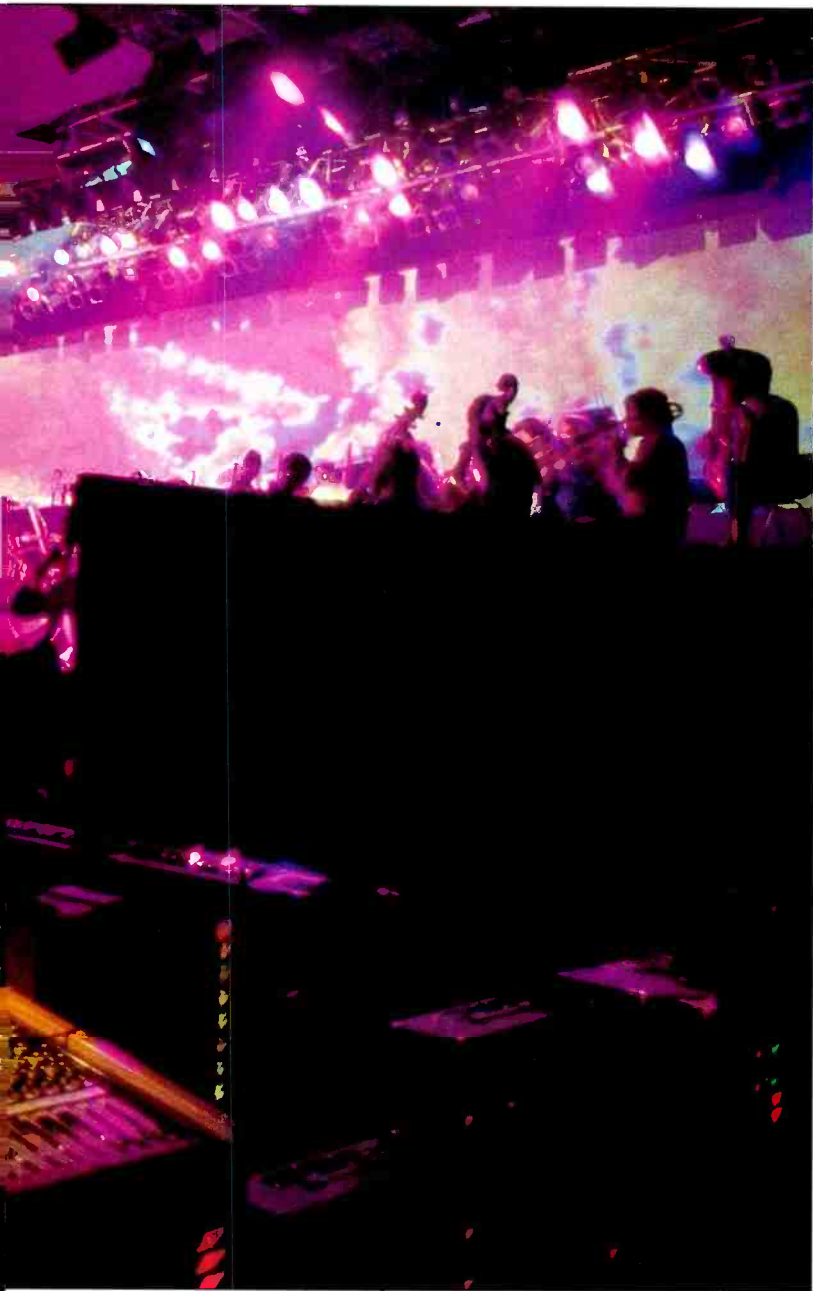
One: Not even their legendarily sharp manager, Don Arden, could have predicted how well the

ELO phoenix would sell seats. Despite their awesome back catalogue of hits, it's been a long time since the band were fixtures on the road.

Two: on a massive, motorised 'Star Ship' stage set were the aforementioned 88-piece orchestra, on their first major international tour and — for most members — facing their first experience of playing with a rock band. Equally new for the MSO were the massive moving lights and lasers rig, and the special demands of sound reinforcement at rock-n-roll levels via ShowCo's *Prism* PA system.

Three: David Scheirman, ELO Part II's Sound Designer and FOH sound mixer, chose a radical solution to the task of miking orchestral instruments within a loud ambient sound field.

By boldly replacing each stringed instrument's tail-pin with a non-destructive 'intravenous' mic insert, he aimed to eliminate feedback problems and otherwise simplify the FOH mixing job.



It was the first large-scale SR usage of the new string microphone system (complete with notch EQ and pre-emphasis) that's being packaged by Soundlab GmbH Munich as the 'SMS' (Symphonic Mike System).

Seeking further control, Scheirman also specified a cut-down version of the Tube Trap LF absorption system to quell resonance around the stage risers.

To assess the fruits of these ideas, *Studio Sound's* Keith Spencer-Allen and I spent an afternoon at the Forum talking to David Schierman, ShowCo's senior crew and some members of the MSO. In this article, we examine the microphone techniques they employed — and take a closer look at SMS itself.

ShowCo personnel included Mike Poncaek, System Engineer; Chris Wade-Evans, Monitor mixer and Jeff Cohen, Symphony mixer, with Tour Manager Barrie Evans. They had arrived for a fortnight of rehearsals at the Forum: a huge, low-ceilinged exhibition hall, echoing despite heavy wall drapes and smelling of stale hamburgers.

Incidentally, while the sound crew put the MSO and their SR systems through their paces, both the set design and the lighting (by LSD, Vari-Lites and Laser Media) were being busily re-worked ▶

PERSONNEL KEY

LS-F
Lothar Strunk-Fenner

DS
David Scheirman

KS-A
Keith Spencer Allen

ML
Mike Lethby

JC
Jeff Cohen.

DN735

SOLID STATE RECORDER

Time management in V.T. Editing.



Time is of the essence in V.T. editing — especially with today's commercial pressures and looming deadlines.

That is precisely where the Klark Teknik DN735 Solid State Audio Recorder provides the answer — adding up to six minutes (mono) or 3 minutes (stereo) of instantly accessible digital audio, it transforms editing with a blend of simplicity and sheer speed.

Specifically designed for video post production, uses include stereo editing, adding audio to solid state video devices and "instant access" tasks such as station idents.

Whether used for audio "lay off" with SMPTE (LTC), in conjunction with an Abekas DVM or Switcher, or simply to solve one of the many audio problems encountered each day in VT editing, the DN735 saves you time and money.

With powerful software and RS422 interface supporting both Sony and Ampex protocols, the DN735 bridges the video/audio standards gap and ensures complete compatibility, whatever your equipment. And because the DN735 is controlled by your video recorder or VTE, the unit is as transparent to use as it is to your audio signal.

The DN735 — managing time in VT editing has never been simpler.



KLARK TEKNIK

a MARK IV company
Audio excellence for video post production

Klark Teknik PLC Klark Industrial Park, Walter Naals Road, Kidderminster, Worcestershire DY11 7HJ, England.
Tel: (0562) 741513 Telex: 339821 KJARTRK G Fax No: (0562) 745371

Klark Teknik Electronics Inc. 200 Sea Lane, Farmingdale, N.Y. 11735, USA. Tel: (516) 249-3660 Fax No: (516) 420-1863

with Don Arden in attendance. It was, you might say, a little hectic.

The orchestra

The Moscow Symphony Orchestra was founded by Stas Namin in 1989 under musical director and chief conductor, Konstantin Krimets, and principal violinist, Grigory Mishouris. In its ranks are some of Russia's top musicians. They claim a special affinity for modern music, citing first-time performances for Soviet music admirers of works hitherto hidden due to 'certain historical and political circumstances'.

The MSO, in fact, is the hub of the Stas Namin Centre in Moscow — a new 'music and cultural centre' that was very much a child of *glasnost*. Orchestra Manager Ellen Levine's words now have a poignant ring in the light of subsequent events: 'We have the first independent radio station in the USSR, where we play rock and roll music, jazz and classical music, and we also have a recording studio and concert agents at the centre. Before, there was only one, Melodiya, the state recording organisation, but we're truly independent'.

The musicians, she says, had adapted remarkably well to working in this novel way. 'They're very co-operative, because it's such an interesting project. Normally they play symphony music in big halls and I thought they might find it compromising, but in fact they love it.'

Defining the PA

David Scheirman, with his company Concert Sound Consultants, was appointed sound designer for the tour, charged with specifying a system and inviting tenders from PA companies.

DS: 'They (the tour management) were looking at different sound consultants. They heard some shows I did last summer as SR director for the Pacific Symphony Orchestra in southern California — outdoor shows for up to 20,000 people with traditional classical mic systems and 48-location delay speaker systems. They liked what they heard — so they asked me for a proposal about sound for this tour.'

He explains that while the organisers appreciated the project's complexity, time for action was short.

DS: 'They finally committed to a contract for the sound design in early March. They asked for the specifications two days later and wanted to put them out to bid a day after that. I would have liked more time to handle the details but . . . it happened fairly quickly!'

Having conceived an overall plan, he identified three crucial requirements: top-notch monitor and symphony pre-mix engineers; no large-area coverage (for example side-fills) on stage; and acoustical treatment of the stage itself to attenuate potentially troublesome frequencies.

The tender spec was aimed, Scheirman says, at 'sorting the wheat from the chaff' — meaning the choice of PA companies.

DS: 'I specified an SR provider with a minimum of 15 years in world-class SR touring; a minimum of eight similar systems on the road; a proven history of work with symphonic projects as well as rock and pop bands; and a large number of foundation-type items.' All of which, he says, would guarantee the tour producers 'a certain quality, consistent with the best in the industry,' while sifting out 'a lot of smaller, aggressive companies that might make marketing claims about possible performance but then not have the resources to



back them up.'

ML: 'In other words, ShowCo, Clair Brothers and Maryland Sound?'

DS: 'Yeah — it was a kind of narrow band-pass filter.' David, who regularly engineers for ShowCo, emphasises that the tight spec left the final choice of PA company with the tour producers — rather than his own opinions.

DS: 'It came down to those ground rules to "shield" the tour producers from proposals that were not in their best interests. All three of those companies responded to the proposal with a different approach; and the producers went with the one that was most in alignment with the specifications and which made the best attempt at meeting the challenge.'

'Available inventory in the UK was also a factor; ShowCo have an arena system warehoused here in the UK. In the event, they decided on ShowCo.'

MIC systems and Levels

David Scheirman's main tasks were to achieve 'rock concert' PA levels out front, give the band acceptable monitoring volume — and simultaneously keep it all out of the orchestral mics for the sake of clarity.

The band had wedge monitors, while a wide gap between them and the orchestra aided microphone separation. The only losers — as he freely admits — were the orchestra, who could not be given monitors; again, in the interests of clarity.

The orchestra itself was mixed in stereo, using two specific microphone systems — the SMS internal mics and a more conventional overhead pattern.

DS: 'The biggest problem in getting a realistic ensemble sound (in this type of arena) is that there's no reflected advantage into a traditional overhead mic system. And there's a 30ms delay between one side of the stage and the other.'

'We don't expect studio quality, but the quality we're getting is quite fantastic for the situation we're in. There would be no other way to do it; we couldn't put condensers on all these instruments and turn them up. There are some sacrifices you have to make in this kind of situation.'

The levels on stage were fairly daunting, as Jeff Cohen, symphony pre-mix engineer, affirms.

JC: 'Between the drummer and the conductor there's about 108-110 dB C scale; and up on the top around 102-103 dB. We're trying very hard not to put a lot of band sound in the orchestra and the other way around, just enough to hear each other. There are 12 JBL Control-1s up there for percussion, brass and strings — and for hi-hat and snare from the band.'

KS-A: 'It must be difficult for the orchestra to pitch — can they hear themselves above the band's monitors?'

DS: 'I doubt that they hear it very well. But they have been able to play so far; basically, we've tried to only add things if required.'

'The close mic'ing has helped us a lot; we've been able to get a lot of gain before feedback and a good orchestral sound. We have a few other mics up, there as well for the problem areas like the tuba player; we're teaching him how to play consistently into a microphone. It's kind of a learning curve for all of us. It's not often you have to get 88 orchestral instruments over the sound of a rock and roll band.'

Jeff adds: 'It's great having no clip-on mics or the like picking up ambience. And you have to remember that with the ELO, the cello and violins are a big part of the music.'

DS: 'In the finale, Back In The USSR and Roll Over Beethoven, I can have the symphony at the same or greater level than the mix without compromising the band's sound. There are points in the show where the band stops and the symphony takes over the same instrumental passages, and it's a smooth transition; the overall level doesn't change.'

'When this system is correctly implemented, it gives a very full, realistic, naturally balanced sound of the symphony for reinforcement in very large-scale environments. But you obviously have a gain-before-feedback barrier; a symphony has tremendous dynamic range.'

On the role of reverb, he adds: 'The close-mix inputs are panned to some extent, but much of the stereo image comes from a Lexicon 224 programme for the close-mic inputs, to give a more natural-sounding ambience. We have a separate stereo reverb for just the high strings, the violins and the violas; on a programme with the low end tapered out where the strings tend to 'bark', like 1-2.5 kHz, ►

You've Heard The Applause For The PRM™ 308S ...



The PRM™ 308S is being applauded by top professionals — like *Don Was, Kenny Loggins, Joe Hardy, and Walter Afanasieff* — for their uniform frequency response, minimum coloration of signal, a selectable switch for reference and EQ playback, and most of all just for "THE SOUND!"

PRM 308S Features

- Mirror-image (left & right) pairs
- Switch-selectable response modes (equalized and reference)
- Acoustic foam blanket reduces baffle reflections
- Impedance 4 ohms

Plus, there's more where that came from ... Peavey. Namely the PRM 205A, 208S, 310S, and 312A phased reference monitors, all with many of the same great characteristics as the 308S to meet your particular needs and budget.

... Hear Here!

PRM™ 205A PRM™ 208S



- High-accuracy two-way system
- Small size fits atop most consoles
- Impedance 4 ohms



- High-accuracy two-way system
- Switch-selectable response modes (equalized & reference)
- Impedance 8 ohms
- Acoustic foam blanket reduces baffle reflections

PRM™ 310A PRM™ 312A



- Mirror-image (left & right) pairs
- High-accuracy three-way system
- Switch-selectable response modes (equalized & reference)
- Acoustic foam blanket reduces baffle reflections
- Impedance 8 ohms



- Mirror-image (left & right) pairs
- High-accuracy three-way system
- Independent variable control of mid and high frequency levels
- Impedance 8 ohms
- Acoustic foam blanket reduces baffle reflections

PEAVEY
AUDIO MEDIA RESEARCH™

Peavey Europe Corporation • Gildenweg 16, 334 KC • Zwijndrecht • Netherlands • 31-78-10-0044

Peavey Electronics U.K. LTD. • Hatton House, Hunter's Rd. • Weldon Ind. Est. • Corby, Northants NN17 1JE • United Kingdom
44-536-20-5520

© 1992

and a long reverb tail from above 6.5 kHz up.

'So you get the natural sense of what happens when they're all bowing together and the time smear that occurs in a wooden concert hall — it's a very pleasing combination. With close-mic'ing through an SR system in an arena, you haven't much chance of getting that sound unless: one, your signal is as close to the instrument's sound as possible and two, you have the signal processing to take that sound and build or layer a re-creation of a concert hall environment.'

Pre-mixing the orchestra

With most members of the MSO having their own microphones, the role of the 'symphony pre-mix engineer' was crucial in balancing those mic lines to feed a sub-mix into Schierman's FOH console. **DS:** 'The symphony comes into a stereo group on my FOH console with the overhead mic system that's used on the symphony — only when the rock band is not playing.'

Keith suggested to Schierman that he and Jeff Cohen, on the pre-mix desk, were doing a job that the orchestra would normally do for itself.

DS: 'Precisely — Jeff Cohen acts as my extension. He has to do things the way I want them done without having to discuss it.'

He's an amazing guy, he has an electrical engineering degree, and on Paul McCartney's tour he was responsible for mixing 80 stage inputs down to 32-track digital. He was a violinist himself; he's used to orchestral work in large arenas; plus he's got great stamina and experience.

I needed someone who understood the symphonic world, so he was ideal. If you rang a PA company and asked for that kind of CV, it would trigger some high-level discussions about available personnel!

Jeff confirms: 'The two of us are working side by side. We're trying to complement each other all the time.'

KS-A: 'You're almost becoming a member of the orchestra.'

JC: 'Yeah, though I don't speak Russian — yet!'

KS-A: 'When you mic an orchestra in sections, you're relying on the internal balance of the orchestra. The minute you start mic'ing every individual instrument, that balance is down to the sound mixer. Coming from a studio background, I can't think of any case where we've had a microphone on every instrument. Do you involve the orchestra leader in the balance or has it been left to you?'

DS: 'It's all down to Jeff — he's following the score, muting sections when they're not playing a passage, anticipating emphasis on things that might not stand out like the harp or triangle. He's aiming to give me an average O VU at all times; I couldn't do a good job of the whole show if I had to do Jeff's job as well.'

JC: 'We're trying to balance them as best we can; we solo them to find out what they're playing and get the proper blend. I listen to every line pre-EQ, if I hear one instrument that doesn't sound as good as another I might bring it down just a touch. To get a triangle versus timpani . . . I have to play my gain structure a little bit! Kick up the volume on the on compression side and back it down once it's inserted back in.'

Cohen pre-mixed the MSO on a customised Ramsa desk that he says is the only one in existence. 'The funny part about it is that's what Ramsa actually designed this desk for, to be able



to do a full orchestra mix. But this is the first one with this many inputs.'

His experience was also important in positioning the musicians on stage.

JC: 'Since I work with symphonic ensembles I understand why they are laid out as they are; for the timbres of the different instruments and the locations of the various sections. I wanted to keep all the brass up at the highest point so that they fire out, and have the strings down at the lowest level — so that the area behind them has the greatest amount of absorbent material — with the percussion up on the top corner so the cymbals and timpani radiate into the open air.'

KS-A: 'A major issue for you must be noise — do you have any problems on that score with so many channels?'

JC: 'No, the mics are real quiet, and we've spent a lot of time isolating grounds between the house, monitors and us. I send eight feeds to David and three sends to monitors; monitors in turn feeds me a send of the band, and with all those sends we have to make sure we're absolutely quiet. We've got the system to the point in rehearsals where you wouldn't even know it was on, except when the orchestra are tuning up!'

KS-A: 'What about handling noise? When a musician's finished his little piece and he puts his instrument down you see him nervously tapping; don't you pick that up?'

DS: 'They're doing it very softly. They've been very good. We've shown them how to leave the stage, what to take with them and what to leave; what's theirs and what's ours. Not a problem!'

Overhead mics: by tradition

David explains the overhead system used to pick up the orchestra.

DS: 'The overhead ensemble pattern is modelled after the old Decca recording engineers' "tree" — from above it looks like a Christmas tree, with a single centre mic in front of and above the conductor, and the principals of the reed and woodwind sections arranged in a line on-axis with that mic, with your oboe, flute, clarinet, french

horn and so on in line, two by two, going up each instrument.'

'Then there's a left and a right mic in the "tree" pattern in alignment with the principal first and second violinists, the principal viola and cellist — plus two "outrigger" mics, left and right, for the principal double-bassist, harp and keyboard; then the percussion section in line with that but farthest away. The brass comes in of its own accord on the right mics.'

'With a minimal number of mics we have minimal phase problems. Yet we pick up the whole ensemble before anyone has to touch the faders, which you can bring up evenly so the symphony sort of balances itself.'

'It's vital to have the greatest microphone sensitivity and the lowest line noise possible. We used Sennhesier *MKH-20* omnis which have the highest sensitivity of just about any current microphone, and they're all converted to line level onstage via a high-quality mic pre-amp. Those signals go to the house console, directly into outboard parametric equalisers, then into the console's fader and EQ section. So each one only passes through one mic pre-amp, located as close as possible to the microphone.'

'The EQ is the highest quality that's readily available from our road package; I have parametrics from George Massenburg for the "outriggers" and Klark Teknik *DN-410s* for the left/centre/right "tree" mix. Those mics get adjusted on a daily basis, they're on aluminium boom poles that can go up to 15 ft, so the initial balancing is done by minute adjustments to their declination angle and axial placement.'

ML: 'What mics are you using on the percussion?'

JC: '81s on the snare and the bass; 57s on the tympanies; and I have 81s on the gong and bells; 201s on the clarinets. Trying to keep the spill down and still keep a good condenser sound is very difficult; we tried some 441s but those didn't work out well.'

Tube traps

Another unexpected sight on the MSO's riser was a new version of the familiar Tube Traps LF absorption system. Unlike the Tube Trap, these

DIGITAL AUDIO UNVEILED

Over the last five years, Apogee filters have become an industry standard. But we've known that filters were only part of the story. To fully capture your recordings, a great deal more was needed.

Our **AD-500** and **DA-1000E** portable reference converters are the answer—packed with features you've been waiting for. Like the ability to lock to virtually any sync source or word clock while using any digital format. Or the A to D's 'Soft Limit' feature that imperceptibly controls 'over'-causing transients, permitting several dB more average level to be put on CD or DAT. And its 'Soft Saturate' feature actually simulates the sound of analog tape compression.

The DA-1000E offers accurate, uncolored monitoring of a wide range of digital sources. That's why it's already the converter of choice in many top mastering facilities worldwide.

All this in a pair of converters so transparent they, quite simply, sound as if they aren't there. And at a price that's barely there.

Try them. Hear digital audio unveiled...at last.



APOGEE ELECTRONICS CORPORATION
2103 MAIN STREET, SANTA MONICA, CA 90405.
TEL: (310) 399-2991. FAX: (310) 399-7665

were semi-circular in profile.

DS: 'We needed acoustical treatment for the difficult areas of the symphony's stage riser, some absorption to attenuate the frequencies I felt would be a problem, around 150-300 Hz.' It was the stringed instruments that most needed this protection, he says, from 'That typical low-mid build-up which would mean death to the sound of the symphony if we couldn't contain it. You can't stop it with plexiglass, which is good for HF but not for lows.'

'So we have 256 ft of Tube Trap, from Acoustic Sciences Corporation, on the symphony risers, mounted vertically on every surface that faces the band, on 2ft centres.'

JC: 'They're placed on the borders of each level and they're working real well. There's little spill between the instruments and they help with our slight problem areas. They break up the direct reflections. But this is quieter than most rock and roll stages.'

DS: 'They contain special rockwool fibre and have very good absorption in the lower mid-band. It does double the job that Sonex would do in the same situation.'

'It's called Trim Trap, this is the standard tube, cut in half, with a hard face on the back for mounting onto walls and ceiling surfaces. It's used a lot for critical situations in conference halls and boardrooms — anywhere you need high attenuation of room — resonance and control of articulation and intelligibility.'

'Again, that was a last-minute thing: I contacted them since I knew the product line and exchanged a blizzard of faxes with the set designer Tom McPhillips — he's quite gifted — convincing him to use that instead of grey carpet or some kind of cheap foam. Once he understood what I faced acoustically, he plunged into figuring out how to make it work.'

'And it's neat: the half-rounds sandwich

together nicely to fit a big vertical road-case. The tour producers felt getting something worthwhile would be a good investment since they planned for a two-year project around the world.'

On tour with the MSO

However the tour shaped up later, the sound crew at The Forum had already twigged that it would be (to paraphrase Stormin' Norman) an anecdote-rich environment.

I enquired how chief conductor, Konstantin Krimets, had been coping with the mega-production.

DS: 'On the first day, he took me aside and explained that he wanted "a natural sound — not electronic."' David laughs: 'I just nodded!'

LS-F: 'Yesterday in the run-through he was conducting up there in all the lasers and he was really going for it.'

DS: 'But this morning he asked if we could provide him with a cosmonaut's helmet, to shield his eyes from the lasers — and to shield his ears from the sound of the band. He had not anticipated things being this much, er . . . *rock and roll.*'

JC: 'He's actually understood what we're doing very quickly. I'm sure it was all quite a culture shock though! And we haven't hit the best part yet. I don't think they realise this whole rig tours with us — that they'll find the same cables in front of them every day. It's less than a week we've been together; it can't get anything but better.'

Finale

As many readers will surely already know, the world tour plan suffered an ignominious demise

after the British dates. The MSO musicians didn't get to taste the world — maybe their chance will come again. And while parts of the concept may well yet re-surface here and there (possibly in the form of one-off shows), it seems some of those original participants are unlikely to see a return on their investments. But many of the technical aspects remain the same.

Listening over Jeff's shoulder as he PFL'd orchestral channels through a pair of monitors was illuminating. His is not a job for the faint-hearted.

Deciding how to balance those individual instruments within the mix (some of the SMS-originated lines sounding a little thin) was only part of the story. Jeff had also to be careful with mics that were picking up excess rumble (Tube Traps notwithstanding) and/or handling noises. All this had to gel once everything was brought together into a *fait accompli* mix for Schierman's house console — and from what we heard Jeff met his brief successfully.

But how well does this concept (and the all-important part played by the SMS) tackle that most difficult of SR jobs — a rock band amplified cheek-by-jowl with a full symphony orchestra?

In the bleak Forum, it was hard to be certain. We felt a touch disappointed with the MSO's sound in this huge mix — there was a certain lack of 'naturalness'; not the sound you'd expect from a conventionally-mic'd orchestra. (But how many orchestras play amid such levels — and who else would want to try it?)

So there were many caveats.

As an SR task, this bordered on the extreme. The empty rehearsal hall, too, was a harsh listening environment. (Although two audio professionals I spoke to later reported hearing similar effects on the first public shows.) Moreover, ShowCo's *Prism PA* (reviewed in *Studio Sound* in June) is an excellent system in the right hands — and both Scheirman and Cohen have impeccable blue-chip engineering credentials.

The heart of the matter, then, is the Symphonic Microphone System. Largely responsible for the MSO's sonic detail, SMS is definitely a serious, and ingenious, attempt to help place stringed instruments in a high-level mix. As a handy solution for a tough production like this, it's doubtful whether any other mic technique could have provided better results.

Yet while SMS promises a lot, by its very nature it must impose an element of artificiality on an orchestra's natural sound — as immutably dictated by the laws of physics and acoustic science.

To conclude: we were deeply intrigued by SMS, and impressed by Scheirman and Cohen's ingenuity in tackling the show.

It will be equally fascinating, then to see whether Sound Lab can turn the early promise of SMS into the new standard for orchestral miking that they are so boldly seeking.

SMS: the concept

The most adventurous aspect of the ELO Part II/MSO sound reinforcement was the 'SMS' (Symphonic Mike System) — launched in September 1991 by Soundlab GmbH Munich. At the time of writing the company, according to spokesman Denis Werp, was seeking a UK distribution deal.

The original end-pin idea came from leading orchestral violinist Klaus Winkler. What we saw was effectively a 'beta test' version of the prototype co-designed by Lothar Strunk-Feuher — one of Sound Labs touring engineers, who oversaw the ►

JOHN M. STORYK

ARCHITECTURAL & ACOUSTICAL DESIGN

FULL SAIL/
PLATINUM POST
ORLANDO, FLORIDA
USA

TEC
1991
WINNER

TEC
1990
WINNER

A DIVISION OF

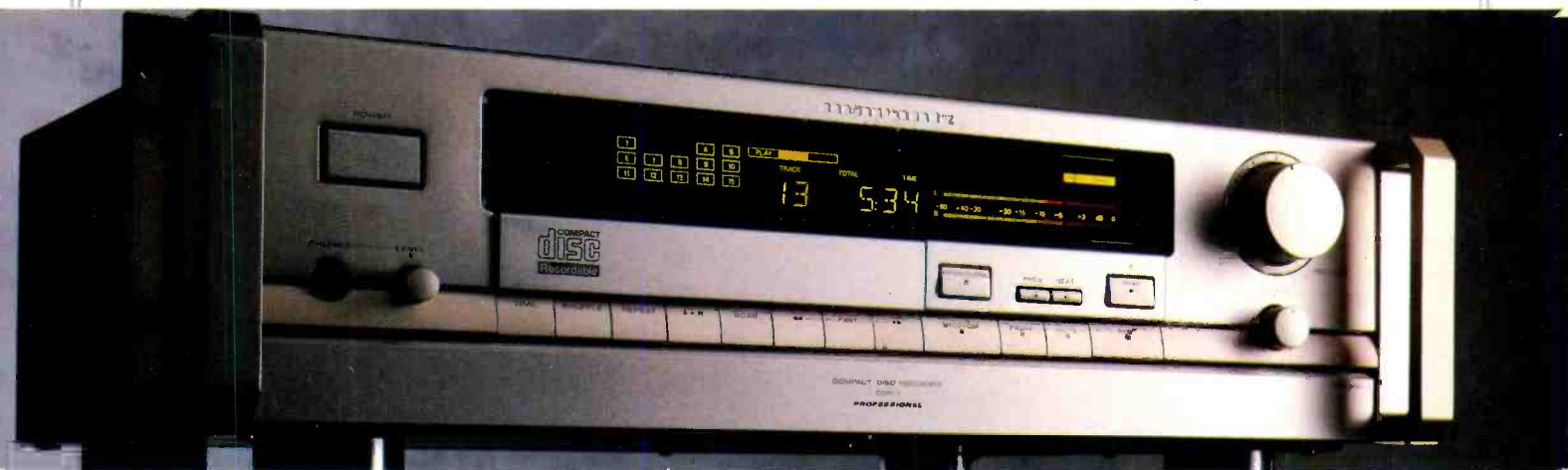
WALFERS-STORYK DESIGN GROUP, INC.



31 UNION SQUARE WEST, NYC, NY 10003 • (212) 675-1166

134 MAIN STREET, NEW PALM, NY 12561 • (914) 255-2255

DIY CDS PDQ



RECORDABLE CD opens up an extraordinary spectrum of application possibilities for the professional user. Fortunately, there's now a remarkably affordable professional solution: the Marantz CDR-1 from HHB.

Compact Disc players are in universal use. Now, thanks to CD-R, this existing hardware can bring instant access to custom recordings. Jingles, commercials, sound FX and ident music can be triggered or cued with micro-second precision. And while CDR is a natural archiving medium, studios can at last provide record industry clients with a digital format they can appreciate at their convenience.

Disks are recorded to the full red-book standard and a

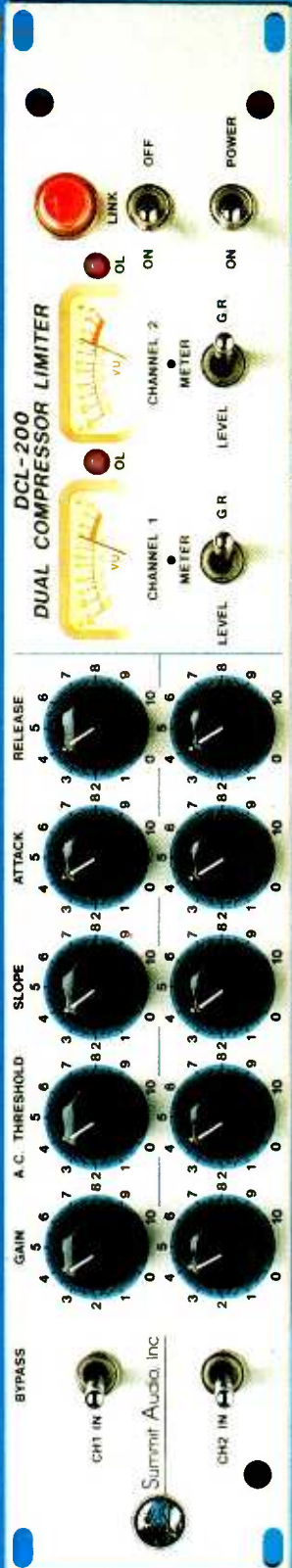


highly versatile remote protocol supports a multiplicity of powerful control options. Alongside fully digital inputs and outputs, balanced analogue I/Os use the latest 'Bitstream' converters to provide the best sound quality. The CDR-1 can re-record on part-recorded discs. And even at HHB's new low prices for blank CD-R media, that's a professional economy that is very difficult to ignore.

All these exciting features would mean little without superb after-sales service, and an extremely keen hardware cost. With the CDR-1 from HHB, keen is only putting it mildly. So don't delay, for the full story call HHB Communications - PDQ.

marantz®

Hear The Warmth . . . Summit Tube Processing



Summit Audio, Inc.

P.O. Box 1678, Los Gatos
California 95031 U.S.A.
408-395-2448
Fax: 408-395-1403

SMS on tour — and chief engineer/Business Manager Klaus Kaetel, who developed the system's mechanics and technology.

SMS, according to SoundLab's literature, 'preserves the natural sound of the stringed instrument and combines an extreme headroom with an evident reduction of disturbing extraneous noises.' The objective being to: 'integrate stringed instruments into the sound of popular music.'

By way of justification, they add that 'former studio recording techniques' had proved inadequate for larger classical performances. While the latter statement sounds contentious enough to be a discussion topic for a *Studio Sound* engineers' debate, the attributes claimed for SMS clearly demand serious examination.

For, if the idea of placing individual microphones on an orchestra (and balancing them on a mixing console), is an anathema to many classical engineers, siting microphones *inside* stringed instruments must be tantamount to heresy. Unless, as in this instance one is faced with seemingly in possible ambient sound levels around the acoustic instruments.

Strunk Fenner explains its origins. **LS-F:** 'The company started as Sound Lab Rental and Klaus Kagel, who was their first engineer, is now the Director of Sound Lab Electronics. He took his experience from the road, researching ideas he used for rental companies.'

'1989 saw the first version of his microphone system, when SLR did a big open air show for 250,000 people. His first idea for a violin microphone was just the fittings and a regular pre-amp, then, after about a year, we found the optimum frequency curves for each instrument and he started building this pre-amp/pre-EQ system.'

Five international patents are held jointly by those gentlemen and by Sound Lab Electronics — the latter an Electronics research-to-manufacturing off shoot of the core company, whose own roots are in full-service PA and lighting for large open-air concerts, orchestral SR and theatres. The Electronics division, says Denis Werp, made its mark with an active splitter and DI box built to German TV standards.

So how does SMS meet its objectives — and Sound Lab's claim to bring exciting symphonic sounds onto the platform that could previously only be composed for recordings?

SMS consists of three key components, mechanically and electronically adapted to suit each type of stringed instrument — violin, viola, cello and double bass — making the four standard versions of SMS.

1: The End-Pin Adaptor

A locking aluminium collar replaces the standard wooden end-pin of each type of instrument. The microphone capsule is inserted into each instrument's body via this adaptor, which is identical in size to the original end-pin.

LS-F: 'It's not glued or screwed, so it's easy to change, and once it's in you can screw in the microphone. It's pointing right inside, and it's mounted hard to the body.'

The cello insert is an exception, featuring a 'wand' extension to place it alongside the sound block.

DS: 'It's so convenient: we just plug in a cable, and if necessary we can replace the original end-pin without damaging the instrument'

2: The Microphone Capsule

The miniature omnidirectional capsule is based on Sennheiser's Red Dot microphone. Produced by Sennheiser for Sound Lab, it's identical for each instrument and has a quoted response of 40 Hz — 20 kHz.

LS-F: 'These take more pressure, because especially in violins when they play really hard there's 135 dB SPL down in the curved part of the body.'

KS-A: 'Does it pick up the bow attack?'

DS: 'Yes, very well; a very full, natural sound but with all the gain you need — it's quite amazing.'

ML: 'How do you pick up the rest of the instrument's sound — the external "ambience"?'

LS-F: 'Believe it or not, there is a lot of "outside" sound inside an instrument, especially when they're playing hard. It was a case of finding the right position inside to get an optimum sound.'

3: The Pre-Amplifier

SMS's third component is a pre-amp with an integrated filter network — whose range matches the capsule's, qualified as ± 3 dB at maximum level.

While the pre-amp is a standard design, tailored EQ cards provide HF pre-emphasis to suit each instrument. Those curves are fixed, but the EQ can be by-passed internally.

Each pre-amp is phantom powered from the desk, with a red LED confirming '48 V present'.

SMS In Action

KS-A: 'Does the insert make the instrument sound different?'

DS: 'Not at all. The conductor and the principal violinist came and talked to us; I explained that although it sounds dangerous, it won't hurt your instruments. And, if we don't do this, no-one will hear what you play. So we got their trust first.'

'We also hired the best luthier in Birmingham, Mark Lawrence, who specialises in restoration of old stringed instruments; he worked with each musician individually. So everyone has a system we can plug straight into every day, but that doesn't change the tonal quality of their instrument.'

'Before they come out on stage we check for phantom by looking for the red light on the pre-amp at each position. Then we're ready to go.'

Braving a major language problem, and wary of sparking a minor diplomatic incident, I asked an MSO violinist whether the SMS insert had affected the tone she heard from her instrument? She looked to Ellen Levine before replying.

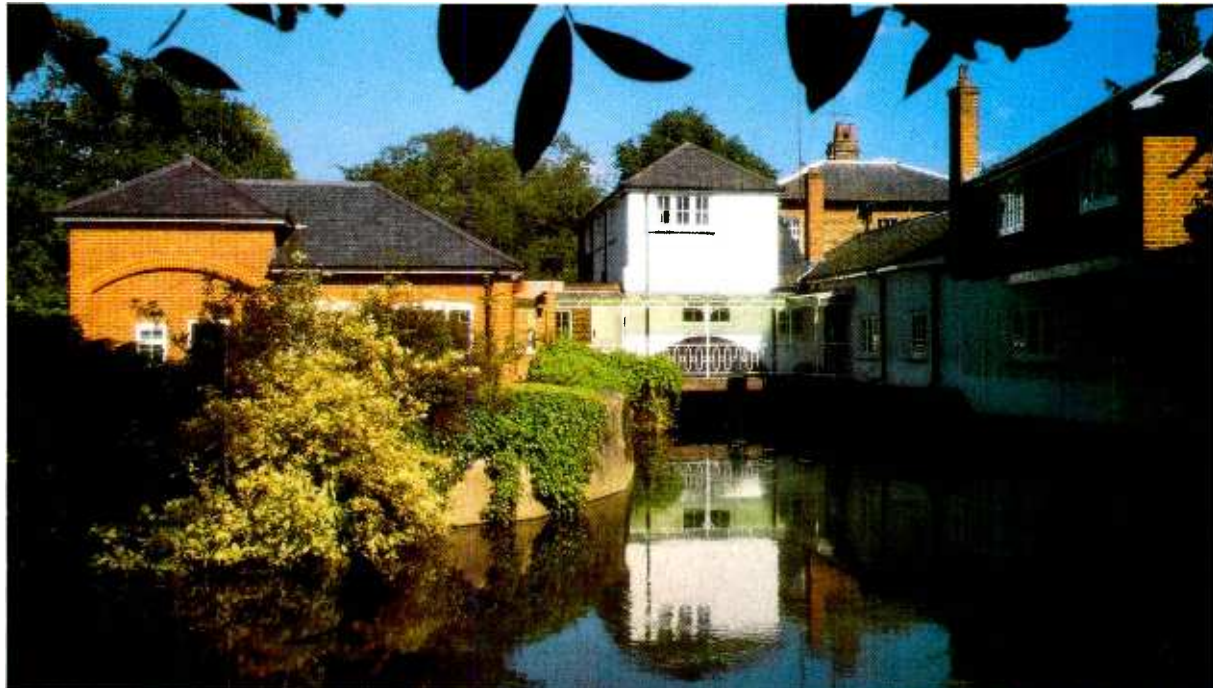
'I don't hear any change. I don't think so.' Smiles of relief all round.

ML: 'Will the orchestra go home with their new fittings in place?'

DS: 'Only the cellist and the bassist will keep their new end-pins, so they'll be the talk of Russia with their expensive adjustable Swedish end-pins, but minus the microphones.'

Ellen Levine's casual final comment unexpectedly highlights the crux of the sound designer's task: 'I think, in the beginning, they didn't like the idea that somebody can listen to a single instrument in the orchestra.' There was, as David Scheirman said, quite a learning curve for all involved. ■

Dolby[®] SR at The Mill



**"Our purchase of Dolby SR was a straightforward commercial decision.
It sounds wonderful and is extremely cost effective!"**

Rod Halling – Managing Director

When The Mill bought an SR multi-track they didn't just get another piece of equipment in the rack.

We made sure that record companies and producers knew that they had installed SR.

We back them up with a product servicing policy which we believe is second to none.

*A*nd of course, they get sound quality second to none from their analogue multi-track at a price that's right.

More and more studios are realising just what Dolby Laboratories can do for them.
Call **Andy Day** on 071 720 1111 and find out for yourself.

Dolby Laboratories Inc.

346 Clapham Road, London SW9 9AP • Tel: 071 720 1111 • Fax: 071 720 4118.
100 Potrero Avenue, San Francisco CA 94103-4813 • Tel: 415 558 0200 • Fax: 415 863 1373.

Dolby and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation. L91/142

 **Dolby[®]**

Level The Castle Recording Studio

SuperDupe Creations Advantage

R.O. Studios American Zoetrope

Independent Sound National R

Video Produ

Top Dis

These studios demand an audio console that sounds as good or better than any in the world. And they'll break tradition to get it.

These professionals have a tendency to "go for it" — to put all other considerations aside except the quality and originality of their work. They care little about "the way it's usually done," and even

less about who has, or has not, done it before. As a result, they show up a lot at the top of the charts, and on Emmy night, or Oscar night...

Otari Corporation
U.S.A.
(415) 341-5900
Fax: (415) 341-7200

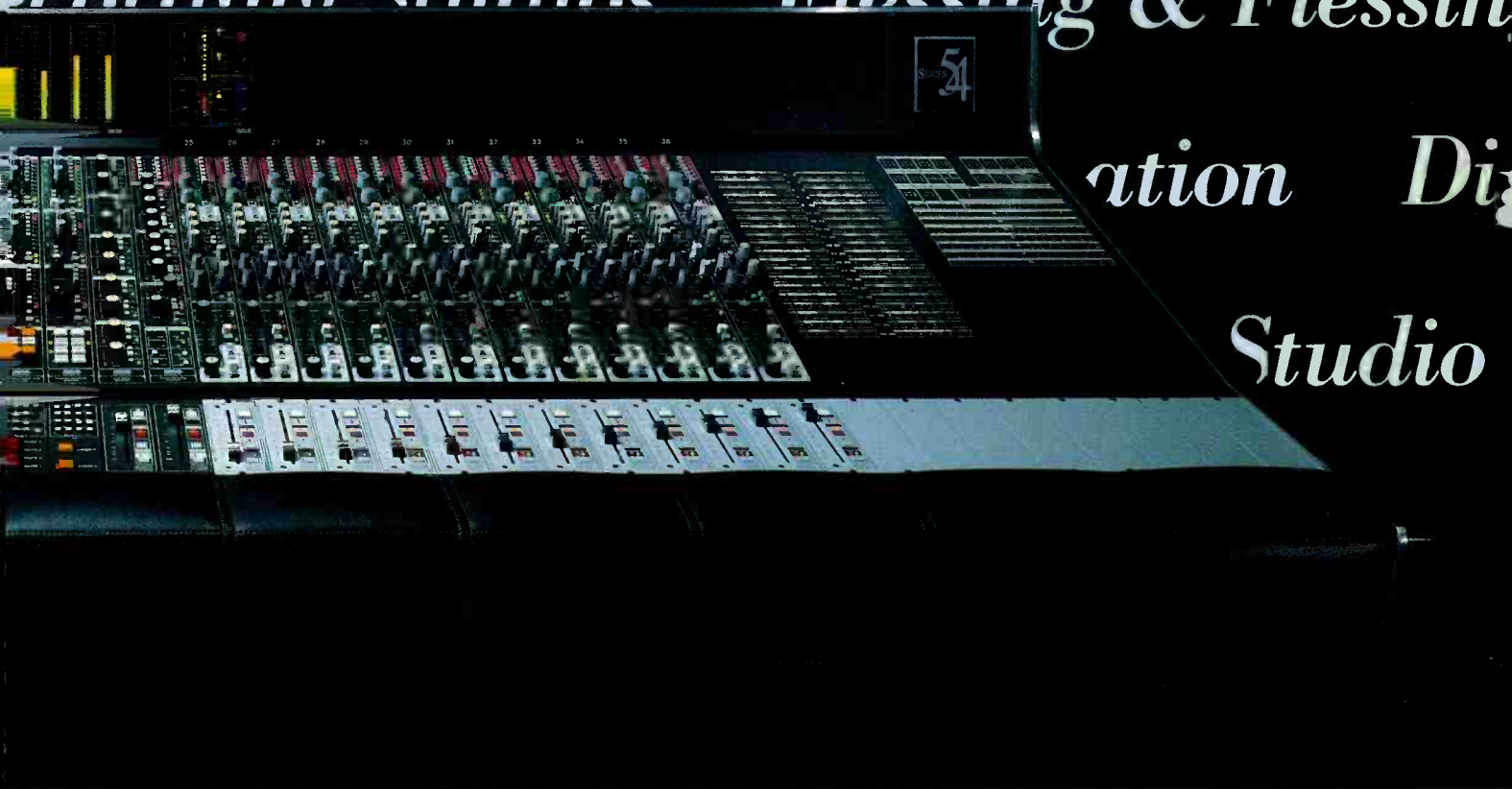
Otari Inc.
Japan
(0424) 81-8626
Fax: (0424) 81-8633

Master Sound Riga Renown Sound

Audio Delta Studio Sonic Images

Serafine Studios Studio Avalon

Recording Studios Flossing & Flessing



ation Dig

Studio

They recognize that in the audio console business, terms like "vintage" and "traditional" are often ad-speak for *old*.

And not only do they demand a console that sounds as good or better than any console in the world, regardless of price, they're also business-smart enough not to mortgage their entire facility to get it.

They buy Otari's Series 54 for music recording, and the Series 54-P for post.

While Otari's name is new to the *console* business, three decades in the *audio* business have taught us that most audio professionals reject the practice by manufacturers of selling new names on old technology, year after year. Instead, they expect

fresh, rigorous designs that work, and the best customer support in the business.

They get it from Otari.

If you don't own an Otari console by now, it's time to figure out why.

Call Otari. (415) 341-5900.

OTARI

Otari Corporation
378 Vintage Park Drive
Foster City, CA 94404
U.S.A.

Otari
(UK) Ltd
United Kingdom
(0753) 580777
Fax: (0753) 42600

Otari
Deutschland GmbH
Germany
(02159) 50861-3
Fax: (02159) 1778

Otari Singapore
Pte., Ltd.
Singapore
(65) 743-7711
Fax: (65) 743-6430

The AKG Blue Line. Everything Clicks into Place...
The Complete Modular System for Professionals.



AES PREVIEW

The 92nd AES convention will be held during 24th to 27th March at the Austria Centre, Vienna, Austria. A list of exhibitors has been compiled with details of their products and services available at the time of going to press

A

● **Acutron Electroacustica:** This Portuguese company will be showing a range of broadcast products all under the Larsen Brand. ● **AD Systeme:** will be showing the *Optifile 3D* console automation system with the latest updates and also the *Optiview* a 24-track previewer that will give a full seven seconds advance warning of all up and coming cues or drop-ins. ● **Adams Smith:** will be showing the *2600 E-A/V* audio editor with its new Super-Sync software, and the Zeta family of products including Transport Emulation for the Zeta-Three. ● **Adamson Acoustic Design:** new products on show include the *B118*, *MH121*, *FR12* and *S218* loudspeaker systems; also the *AX400* and *DSPX 4000* loudspeaker controllers. ● **Adtec:** will be showing their range of audio and video tapes including R-DAT. ● **AEQ:** new products include broadcast mixing console *BC-1000*. ● **Agap:** introducing their *DIANE* broadcast and recording management system, plus the *GAETAN* extended range system for local radio stations and the *SYGAR* system for automatic radio network management. ● **AGM Digital Arts:** no information received. ● **Akai/LMC:** will be demonstrating new software revisions for their *DD1000* optical disc recorder/editor and *S1100*

stereo digital sampler. ● **AKG Acoustics:** along with other products, the new *Blue Line* modular microphone system, the *C547BL* boundary mic and *C647* paging and sound reinforcement mic. ● **Alphaton:** full range of products including DI boxes, line splitters, matching links, cable testers, and signal distribution systems. Also the *FC-8000* Feedback Killer providing eight channels of feedback control. ● **Altec Lansing:** showing their speaker systems and power amplifier ranges. ● **Amek/TAC:** European debut of the Rupert Neve designed *Media* multi-purpose console, and the *Einstein*, a new low cost automated console aimed at private production facilities. Also being shown are the *Hendrix*, the *Mozart* with new machine control option and dynamics package, the *BC3*, the *B2*, *The Bullet*, the *TAC SR6000* sound reinforcement console and the *Medici* equaliser. ● **Ampex:** full range of professional audio tape products including *478* Low Print mastering tape. ● **AMS:** new products will be the *AudioFile Spectra*, a new colour control surface for AudioFile using high definition colour LCD panels. In addition the unit's depth is reduced to only 3in enabling easy mounting; and the *Logic 2* large format, stand alone all digital, recording console with dynamic automation of up to 256 channels; and the *AudioFile Plus 16* hard disk recording and



ATC's new SCM10

editing system. Also on show will be the *Logic 1*, *SoundField* and *ST-250* mics and the range of signal processors. ● **Analog Devices:** add several new products to their range of high-performance signal processing ICs including the *SSM-2018* wide dynamic range/low distortion VCA, *SSM-2142* integrated balanced line driver, and the *SSM-2017* ultra low-noise preamplifier. ● **Apex Machine Company:** manufacturer of audio and video cassette printers, will be showing three new printing machines, the *RS-100*, *RG-1000*, and *CA-20*, along with their recently introduced rotary offset print heads. ● **Apex Systems:** full range of audio processing equipment and interfaces. ● **Apogee Electronics:** will be showing their range of A/D and D/A converters including the enhanced version of the *DA-1000*, the *DA-1000-E*. Also new is the *SSM* loudspeaker, which is an extremely compact, high output, wide-bandwidth system intended for front audience fill and monitor applications. New *P* series processors for both permanent and portable use with the company's speaker systems will be on show as will companion integrated processor amps and stereo amps. ● **ATB:** displaying spring pads, single or reel-in, with or without bosses; coloured leader tape; Inox pins. ● **ATC:** showing their complete range of monitors including the new *SCM10* 2-way stand or shelf mounted monitor. ● **Audio Animation:** featuring the *Paragon*, a fully digital on-air broadcast signal processor, display includes the *Paragon Studio* offering four channels of expandable DSP. Also featured will be the *Muse* digital mastering console. ● **Audio Design:** showing the *AudioDesign CD-R*, an addition to the *ProBox* digital interface range, the *Smartbox* and a SCMS defeat box. ● **Audio Development:** two new products, *CDCATS ST1* stamper tester, and *CDCATS SA3* multiplayer system for quality control of CD-ROM, CD Audio and CD-I. ● **Audio Developments:** debuting two new mixers designed for location recording, the *AD261* four input mixer featuring comprehensive *MS/XY* facilities, and the *AD146* four output mixer featuring a selection of modules. ● **Audio Follow:** the *DDO2* optical disk recorder and accessories, and *ETA1* magnetic 16/35mm perfo recorder. ● **Audio Kinetics:** new software and enhancements for the *ES.1.11* Synchroniser, *Penta 5* and *Eclipse 8/16* machine controllers. ● **Audio Precision:** will be introducing their *Portable One* ▶



ACC2000 Series from Audix

Plus test and measurement system, also two new DSP programs for *System One*. ● **APT**: debuting the *DSM100* digital audio transceiver using the established *apt-X100* 4:1 compression. ● **Audio Sales**: showing a range of studio designs plus SSL's *ScreenSound*, Timeline's *Micro Lynx*, and intercom systems from Clear-Com. ● **Audio-Technica**: full line of wired and wireless microphones including *40 Series*, *Artist Series*, *800 Series* and *UniPoint Series*. Also range of accessories. ● **Audiomation**: two new moving fader automation systems — *Series 990* and the MIDI based *600M*. Also new Sellmark 60 mm conductive plastic fader and *Digipot* motorised digital potentiometer. ● **Audiopak**: complete range of broadcast tape cartridges with redesigned shells for easier identification. ● **Audioscope**: featuring the series *9000* measuring system. ● **Audix**: a range of broadcast products including the *ACC2000* Series of stereo modular mixers, the *ARM Series* of rack mounting peripherals and the *Digital Adaptive Telephone Hybrid*. ● **Autograph**: exhibiting the Meyer range of sound reinforcement systems.

B

● **Barco-EMT**: displaying digital PA processor; digital reverb and delay units. ● **BASF**: will be exhibiting their range of tape products including a new ferric cobalt tape *PE 668/968*, a cassette calibration kit with mechanical and azimuth test tapes, a new length LNS voice tape *LNS 17,300*, and the *Eco Shuttle* which is a new recyclable pallet for duplication products. ● **BEC Technologies**: featuring digital audio fibre-optic communication systems. ● **Behringer**: their range of signal processing units including the *Dualflex* enhancer/exciter, the *Intelligent* expander/gate/ducker, and the *Composer* programme adaptive dynamics processor. ● **Beyer Dynamic**: dynamic, condenser and wireless microphones, dynamic headphones and headsets, gooseneck mics and accessories. ● **BFE**: no information received. ● **BGW**: featuring their new *GTC Grand Touring Amplifier*. ● **BNS**: range of studio monitors. ● **Broadcast Electronics**: cart machines; *DV-2A* digital recorder/playback



Chevin Research A1000 amplifier.

unit and *FX50 50 W* FM exciter. ● **B&K**: featuring series *4000* microphones with the unique equalisation attachments for the *4003* and *4006* omnis, and the *Type 5930* Head And Torso simulator. ● **BSS Audio**: the new *FCS-926* Dual Equaliser Analyser will be used to introduce the *Varicurve* System of advanced EQ processing and control elements. Also the *FDS-318* Multimode Variable Crossover and other products.

C

● **Calrec**: showing five new products, the *Q Series* Broadcast Production Console, *Minimixer II*, the *RQP4200* stereo channel amplifier based on the mono version, the *RQP8400* dual stereo mic preamp, and *RQM1212* AB/MS convertor. ● **Canford Audio**: one of the UK's leading established distributors shows its large product range. ● **Chevin Research**: A new British company launching a series of new power amplifiers. ● **Community Light & Sound**: expand their range with two new loudspeakers, the electronically controlled *RS660*, and the *CSV-8* foreground music system featuring professional grade components throughout. ● **Concept Design**: exhibiting *DAAD*, the digital duplication system; the *CD 9000* and other equipment and products for the duplication industry. ● **Crown International**: full range of range of amplifiers and microphone systems.

D

● **DAR**: introducing a new internal digital mixing package for *SoundStation Sigma*, and *SoundStation Network* a true multi-access networking system for *SoundStation II* and *Sigma*. Also enhancements to the *DASS 100* multifunction digital audio interface. ● **DDA**: will be showing examples from its range of consoles including the new *Interface* mixer, a four bus multi-application console which features a unique module that sub-mixes six mic inputs, with a single EQ, aux and routing section following the mixed signal path. Also on the stand will be the *DCM224V* post-production console, the *DMR12* and the new 24-track console, the *Profile*. ● **Deltron**: first time AES exhibitors showing their range of audio/video connectors and leads. ● **Dialog4**: will be showing the *ISDN MUSICAM* ▶

audio

audio warehouse

0462 490125

AUDIO WAREHOUSE
0462 490125

QUALITY NEW &

USED EQUIPMENT

AT AFFORDABLE

PRICES

W

warehouse

LTD

tony larking professional sales

CONSOLES (used)		RECORDERS (used)	
DDA		FOSTEX	
DDA AMR24 28 channels, Optimix automation	VGC £25,000	Fostex G24S	NEW £7,500
DDA AMR24 36 channels, cancelled order	NEW £28,995	JVC	
NEVE		JVC 6400 pro VHS edit machine, recent new heads	VGC POA
Neve V-3 52 channels, Flying Faders	VGC POA	MCI	
Neve 8068 Mk2, 32 inputs	VGC POA	MCI/SONY JH110 2 track, private use	IMMACULATE £1,995
Neve VR	VGC POA	MCI/JH110 2 track 1/2" & 1/4" head blocks	£1,500
Neve comp/lim modules	VGC £600	MITSUBISHI	
Neve 19" rack with 10 channel line amps	VGC £995	Mitsubishi X880 32 track digital	VGC POA
Neve spare modules, PPM's, frames etc. phone or fax for list		Mitsubishi X850 32 track digital	VGC POA
Neve 2 eq modules, fitted into new 1Ux 19" rack with psu.		OTARI	
110/240 volt. Balanced separate mic & line inputs, balance out.		Otari MX5050 MK3 8 track	£1,995
1 year warranty.	VGC £1,250	SATURN	
		Saturn 824 24 track, private use, low hours	IMMACULATE £13,995
SOUNDTRACS		SONIFEX	
Soundtracs MEGAS 16 or 24 bus/monitors, p/bay, up to 40 channels giving 88 inputs, very high spec. very low noise & cross talk. From £6,500 to £13,500. Phone for brochure.		Sonifex HS series cart record/replay	VGC £1,495
Soundtracs IL4832 with automation	EX DEMO £24,995	Sonifex HS series cart replay, 3 available	VGC £995ea
Soundtracs IL3632 with automation	EX DEMO £19,995	STUDER	
Soundtracs ERIC 64 channels with automation	NEW POA	Studer A800MK3 low hours, remote	VGC POA
Soundtracs QUARTZ 48 channels	VGC POA	TASCAM	
Soundtracs CP6800 32 channels private use	VGC £10,995	Tascam MS16 with rem/auto	VGC £3,995
Soundtracs MRX 24/8/16	VGC £2,995	Tascam MSR24S	NEW £7,500
Soundtracs PC MIDI 24	NEW £3,995	3M	
Soundtracs PC MIDI 16	NEW £2,500	3M M79 24 track	VGC £5,500
Soundtracs FME 24/4/2	EX DEMO £2,995		
SML			
SSL 4000E 48 channels, total recall	VGC £2,995		
TAC			
TAC Magnum 36 channels, midi muting	VGC £12,995		

**PHONE FOR COMPLETE USED LIST
USED EQUIPMENT WANTED
EXPORT ENQUIRIES WELCOME**

All prices are exclusive of VAT
Subject to availability. E. & O.E.

TONY LARKING professional sales ltd, LETCHWORTH, ENGLAND Callers by appointment only
25 mins from M25, A1 Junction 9, 25 mins from Kings Cross.
Tel: 0462 490125 Fax: 0462 490126 International Tel: +44 462-490125 Fax: +44 462-490126

FRIDA FRIDA FRIDA



for portability

for value

in the studio

on air

with timecode

in the OB van

the recorder/editor



European Distributors

Austria:	Tel 02236 26123	Fax 02236 83223
Belgium:	Tel 011 415278	Fax 011 491662
Finland:	Tel 90 5664644	Fax 90 5666582
France:	Tel 1 42815047	Fax 1 42858247
Germany:	Tel 06171 4026	Fax 06171 4401
Greece:	Tel 01 6475659	Fax 01 3639234
Italy:	Tel 039 746815	Fax 039 743422
Netherlands:	Tel 020 6141749	Fax 020 6140065
Norway:	Tel 02 797730	Fax 02 796154
Portugal:	Tel 01 836112	Fax 01 837481
Switzerland:	Tel 01 8400144	Fax 01 8410726
Spain:	Tel 91 2507877	Fax 91 4581093
Sweden:	Tel 046 320370	Fax 046 320360
U.K.:	Tel 0844 278866	Fax 0844 278810

Lyrec 

Lyrec Manufacturing A/S, Box 123 (Mileparken 22)
DK-2740 Skovlunde, Denmark, Tel +45 44 53 25 22
Fax +45 44 53 53 35, Tlx 37568 lyrec dk



Codec, a digital fully duplex audio code and decoder able to transmit CD quality 20 kHz stereo audio on switched 64/56 kBit/s networks using terrestrial, fibre optic, ISDN or satellite facilities.

● **DIC Digital:** displaying full range of 4 mm/8 mm data cartridges and digital audio tape including the new *MQ* Series of professional DAT. Also introducing a 3.5in Magneto Optical Disc.

● **Digidesign:** manufacturer of *Sound Tools* will debut their *Pro Tools* system which integrates multitrack digital recording and editing, DSP, MIDI sequencing and automated digital mixing into a *Macintosh*-based workstation. ● **Digigram:** introducing a new generation of digital audio systems, and new software for the *XTRACK* digital audio workstation. ● **Dolby:** showing for the first time their low cost version of Dolby *SR* — the *SRP* Series. Also new the *430* Series single-ended background noise suppressor. ● **Dorrough:**

featuring the stereo signal Test Set which allows dynamic measurement of level, balance, crosstalk, phase and signal-to-noise. ● **Drake:** showing their range of intercom, mixing consoles and



Focusrite 72-channel console at Metropolis Studios, London

© 1992 3M, 3M, SC280

NO AUDIO TAPE HAS EVER GONE SO HIGH. SO LOW. SO HOT. SO QUIETLY.



Introducing 3M 996 Analogue Audio Mastering Tape. It's the first tape that lets you record as hot as you want (level +9), capturing the highest highs and lowest lows with virtually no distortion or print through. From its consistently clear sound, to its protective TapeCare™ Library Box, 3M 996 audio tape takes analogue recording where it's never been before. We won't be satisfied until you are.

3M United Kingdom Plc
Professional Audio/Video Group
3M House, P.O. Box 1
Bricknell, Berkshire RG12 1UL
Tel: (0344) 3388114 Fax: (0344) 858175



Worldwide Supplier 1992 Olympic Games

distribution amplifiers along with the new *PD5050* 20 bit AD converter, the *PD9375A* single card AD converter, and the *NVision* range of broadcast equipment. ● **Drawmer:** will be showing their full range of processors, featuring the new *DL251* Spectral Compressor. ● **Duran Audio:** showing new products the *UFM-265* floor monitor and *UB-25* subwoofer. ● **Dwight Cavendish:** routing switcher systems, video duplication systems and monitoring systems. ● **Dynacord:** featuring processor-controlled amplifiers; time delays, EQs, mixers, and speaker systems. ● **Dynaudio Acoustics:** four new monitors, the *PPM2* nearfield, the *ABES* (Active Bass Extension System), and the *M3.3* and *M4* main monitors.

E

● **EELA Audio:** featuring various consoles for broadcast and audio follows video. ● **Electro Sound:** featuring their new *9000* high speed audio duplication system, that offers a dual slave unit and a new *480* IPS loopbin. ● **Electro-Voice:** showing the *Deltamax* electronically-controlled speaker system; *MT-2* Manifold Technology concert sound systems; studio mics; horns and drivers. ● **Estemac Electronic:** tape testing equipment; also a range of audio cassette duplication tape. ● **Estudios Gemma:** audio cassette C-O range; audio/video duplication; record pressing; CD manufacture. ● **Euphonix:** featuring the *Crescendo* digitally controlled production console. ● **Eventide:** will be showing their *VR240* Digital Voice Logging Recorder, the *Ultra-Harmonizer* range with the new *HS395* Internal Sampling Board, and a selection of broadcast delays.

F

● **Fairlight:** introducing their new *MFX2* digital audio production system, featuring a dedicated control surface with hard and soft keys for all control functions. ● **Fidelipac:** *DCR-1000* digital audio cart machines; modular *MX* series consoles. ● **FM Acoustics:** range of amplifiers including the *FM 801A* power amplifier. ● **Focusrite:** showing their *Studio Console* and range of rackmounting modules. ● **For-A:** launching the *AR-200* digital audio record and playback system, design to provide automated commercial insertion from its storage unit. ● **Fostex:** highlighting ▶



New

Digital Multitrack Audio Work Station DYAXIS II



New

The STUDER Sound Transducer A823



New

STUDER R-DAT-RECORDER D780



New

STUDER 927 Inline Console

Professional audio for the audio professionals.

STUDER

including the STUDER DIGITEC and STUDER NUMISYS product lines

See us at booth A44



Fairlight MFX2 Audio Workstation

their PD2 four-head portable timecode DAT recorder, and the 2412 compact console. Updates for the D20 DAT recorder, and demonstrations of DAT editing and synchronisation. Range of other products including the G24S 1in analogue recorder with Dolby S noise reduction.

G

- **Gauss:** exhibiting full range of speaker components.
- **Genelec:** latest additions to their monitors include the 1031A active two-way design.
- **Ghielmetti:** showing their new analogue/digital jackfield.
- **Giese Electronic:** audio recording systems; timecode equipment; video, audio, film synchronisers and ADR systems.
- **Gotham:** new products include GAC-2 digital data cable and GAC-4/1mini small size conductor audio cable.
- **GTS:** audio C-Os and cases, VHS V-Os and DAT D-Os.

H

- **Harmonia Mundi:** updated Penguin digital mastering system; the IBIS digital mixing console.
- **Harrison:** featuring SeriesTen console and the ARS-9 audio routing switcher.
- **Haufe:** will be featuring their compact input and output modules. Also shown will be the 100-70V audio

transformers. ● **HES Electronics:** a range of products for broadcast applications featuring the new HDTB Intercom System. ● **Heyna:** range of duplication equipment. ● **HHB:** featuring the Marantz CDR-1 compact disc recorder along with a range of DAT recorders and own brand DAT tape. Also ATC SCM studio monitors, and first European showing of the Summit Audio DCL200 valve dual compressor/limiter.

I

- **Inter-Tain:** no information received.
- **Ilsemann:** range of labelling, packaging and foil wrapping machines for compact and video cassettes.
- **IRP-Knowles:** range of signal processing products.
- **ITC:** introducing two new cartridge machines the Series 2 Reproducer and Reproducer/Recorder. Also first showing of the DPR-612 Digital Program Repeater which can store/repeat up to 15 mono programs, and the DigiCenter hard disc recorder.

J/K

- **JBL:** range of speaker systems and signal processors.
- **Klark Teknik:** the recently launched DN735 Solid State Audio Recorder with new software, their full range of processing units and the unveiling of a secret product.
- **Klein and Hummel:** range of active monitor speakers and first showing of their EZ 120 PA-Centre.
- **Klotz:** will exhibiting their Oaklink system which is a fully digital audio transmission and distribution system.
- **Koch Digitaldisc:** showing new software for their existing test equipment and a modular concept for CD-quality testing.
- **Korg:** showing the latest updates to SoundLink, their hard disk production system and the A1 processor.

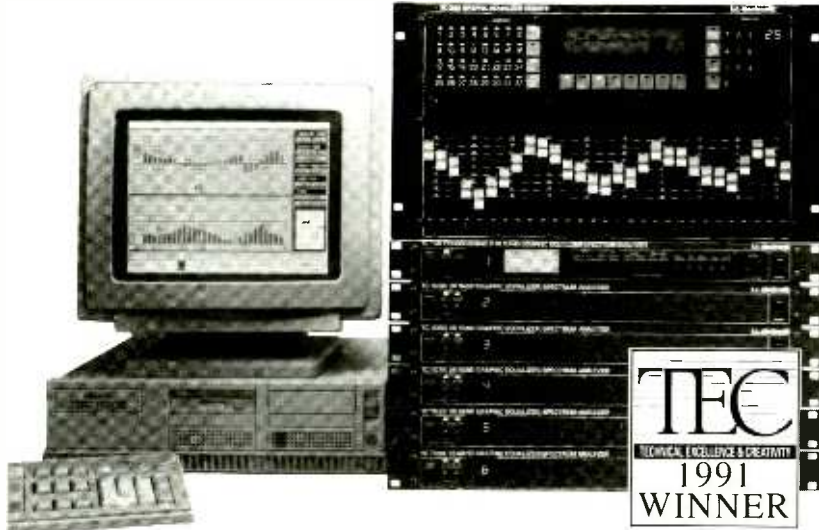
L

- **Lake People:** 20-bit A/D D/A converters amongst established products.
- **Lester Audio:** featuring their DAS 2000 fiber-optic audio transmission system.
- **Lexicon:** the latest software for the Opus and Opus/e digital audio workstation.
- **Lydkraft:** featuring the Tube Tech range of studio equipment.
- **Lyrec:** showing their complete duplication line including latest developments in DCC duplication and QC equipment. The Frida 4in recorder and the Fred portable editing tape deck.

M

- **Maycom:** showing their VAMOS (Video and Audio Manager on Optical System) range of systems designed for the management and composition of broadcast commercials.
- **MBI:** will officially launch their Series 30 top of the range broadcast production console, as well as exhibiting the Series 20 console.
- **Meyer:** will be showing their new DS-2 mid-bass loudspeaker; their new USM-1 Ultra Stage Monitor; the Meyer Studio EQ Package; and the new generation of their SIM Source Independent measurement system.
- **Microtech Gefell:** showing their range of microphones.
- **Michael Stevens & Ptnrs:** products from Artisan; Bel Digital Audio; Chromatec and Rogers, amongst others.
- **Midas:** range of live sound consoles.
- **Mitsubishi:** first European showing of the ▶

Tools not toys...



We build tools for working professionals like yourself.

The Award Winning TC6032/1128 Equalization System is the world's only motorized fader remote control. Extravagant, you say... not really. One show with the TC6032 and you'll wonder how you did it any other way.

Fixed Installation? Smaller budget? Now you can run multiple equalizers without the TC6032 using EqTALK™ software for *IBM™ or *Macintosh™ computers, laptops included. EqTALK™ permits instantaneous control of multiple TC1128 equalizers. Each Eq's 99 settings may be stored to disc for future retrieval.

The TC1128 Specs:

10Hz-100KHz Bandwidth;
>110dB Dynamic Range;
< 0.002%THD, 1KHz, 0dBm;
Max level +22dBm.

You also get remote signal verification via the Spectrum Analyzer found in each equalizer.

*IBM is a trademark of International Business Machines Inc.
*Macintosh is a trademark of Apple Computer, Inc.

OF DENMARK

t.c. electronic

Real Performance for Real Performers.

DENMARK- Phone: 45 86 26 28 00 Fax: 45 86 26 29 28

AUSTRIA (222) 601 17 ♦ FINLAND: 90-592055 ♦ FRANCE: (1) 48 47 45 26 ♦ U.K. 691-658 550
GERMANY: 05231-32972 ♦ GREECE: (01) 8837629 ♦ HOLLAND: 030-414500 ♦ ITALY: (02) 50841
NORWAY: (2) 710710 ♦ SPAIN: (93) 796 31 00 ♦ SWEDEN: (08) 735 8020 ♦ SWITZERLAND: 093 87 26 56
For countries not listed please phone or fax t.c. Denmark

FROM OUTBOARD To OPTICAL



Monitors - The big noise in monitors must currently be Dynaudio and, in particular, the M1. Popular with producers and engineers for their portability and sound quality alike, these superb speakers are on demo at Stirling with a range of recommended amplifiers including Hill's Chameleon and Adcom's 5A5.

Recorders - Analog or digital, Stirling remains the place for multitrack. With an improved specification and a return to mid-eighties pricing, Otari's MTR 90 III represents a high quality yet cost effective choice in 2" 24 track machines. From the same stable, the MNS80B now includes full remote control and Dolby HX-PRO. Akai's DD1000 optical disc recorder is now available with RS422 software providing serial control of video machines and a new "Timesqueeze" facility. With improved editing features, the DD1000 is now more than ever a logical choice of recorder for video post-production work.



Consoles - New from the USA and exclusive to Stirling is the fully automated Euphonix console. Assignable from 24 - 96 channels, this superb mixer is currently on demo in our studio alongside the very best from DDA, including the AMR-24, DMR-12 and the new Profile, and the latest from Soundcraft including the highly acclaimed Sapphire and excellent value for money Spirit.



Synchronizers - Already an industry standard, Timeline's Lynx is further enhanced by the introduction of the SSU System Supervisor and CCU Console Control Unit, facilitating integration with the host computer of consoles from SSL, Neve, etc. And new from Timeline is the Microlynx. Inclusive of remote control it can sync up to three devices - two multitracks plus video, for instance.



Cable - An after thought to many suppliers but at Stirling, we believe the cable that connects a system to be every bit as important as any single component within it. We are the UK's exclusive importers of the industry standard Mogami cable and are pleased to provide a full custom service providing high quality wiring looms to your specific requirements. The full range of Mogami cable is also available "loose".



Outboard - The reputation of Lexicon's innovative 300 effects processor grows daily. Marrying legendary Lexicon sound quality with digital I/O and the facility to automate effects to timecode, the 300 is ideal for film and video post-production applications. Along with the 480L it features in a carefully assembled list of outboard devices that includes the very best from Drawmer, Valley and



Aphex. From the latter, the Compellor compressor/leveller, Dominator zero-overshoot peak limiter, Espresso single channel compressor/limiter and Expander/Gate are of particular interest. Also check out the amazing Sonic Maximisers from BBE.

Microphones - Following the success of the C1-A1 studio microphone and the CMS-7 m/s stereo series, the latest mic from the Sanken stable to attain industry standard status is the tiny COS-11 lavalier mic.



Already chosen by The BBC and ITN, the COS-11 has also found favour in theatre sound applications with leading contractors Autograph. See the COS-11 and the full range of Sanken microphones at Stirling.

DAT - Our policy in DAT is simple - the



best machines at the best prices. We currently recommend the Panasonic SV-3700, the PCM-2700 and TCD-D10 Pro from Sony and, for working with timecode, the Fastex D-20.

Hard Disk Recording -



Having played a major role in pioneering the application of Hard Disk recording technology during the mid 1980s, we're naturally gratified to see its mass acceptance in the '90s. Alongside Digidesign's Sound Tools 2 track and Pro Tools multitrack systems, we are pleased to recommend systems from Cyberframe and DAWN. With on-board mixing, DSP and serial menu control, configuration of the former is particularly applicable to music and sound effects editing and dubbing in film. And the Macintosh based 8 track DAWN system has already found homes in over a dozen video post-production facilities in the UK, providing a reliable, familiar and cost effective system for sound-to-picture work.

 **Stirling**

The right products · The right prices

Stirling House, Kimberley Road, London NW6 7SF Telephone 071 624 6000 Facsimile 071 372 6370

X-800EX enhanced 32-track digital recorder, and featuring the PDX-8620 20 bit two track recorder. ● **Mogami**: displaying their complete line of wire and cable products. ● **Mosses and Mitchell**: range of audio and video jacks and jackfields together with a range of accessories. ● **Munro Associates**: demonstrations of their entire monitors range. ● **Musicbox**: exhibiting C-Os sonic welded, C-Os screwed, library cases, endless loop cassettes, short-time cassettes, V-O VHS cassettes, and blanks. ● **Musikon**: showing a new generation of sound booths.

N

● **Nagra**: featuring the D-4 four channel open reel digital audio recorder. ● **Neumann**: launching the KFM 100 Spherical-Surface condenser microphone, a stereo design with two pressure transducers. Also new is the Dummy Head KU100, third generation of the Neumann dummy head; and the N5000 computer controlled



Otari DTR-R7 DAT Recorder

See us at AES
Stand F72/F73

YOUR DAYS AS
AN OCTOPUS ARE
NUMBERED

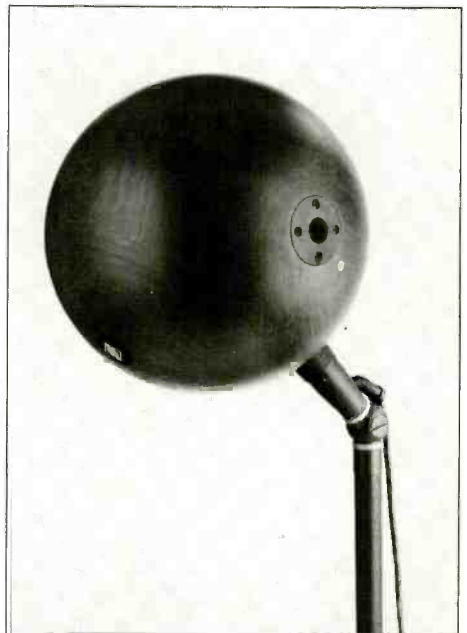


Optifile 3D is a very cost-effective and easy to use automation system you can fit to any console. With the new intelligent cue list and optional machine control you have total command over mix and machines. Call The Home Service for a brochure and discover for yourself how easy it is to use. For details of your USA dealer, contact Sascom (416) 420 0718.

OPTIFILE



Australia : Aricom - (03) 720 57 11 Belgium : EML - (011) 41 52 78 Brazil : Libor - (11) 34 83 39 Denmark : SØ Høyer (45) 3122 4434 France : AD Système - (1) 42 53 31 18 Germany : Mega Audio - (067) 21 26 36 Hong Kong : Audio Consultants (852) 351 36 28 Island: Sonic HF (1) 600 900 - Italy : Audio Palombi - (02) 254 07 21 Japan: Hoei Sangyo 03 665 31 78 Malaysia : Meteor Sound & Lighting - (03) 291 65 59 New Zealand : Protel - (04) 385 48 74 Norway : Audiotron - (02)35 20 96 Switzerland : Decibel - (021) 946 33 37 Sweden : Arva - 046- 320 370 Spain: Twin Cam Audio - (03) 675 50 11 Singapore : Swee Lee Co. - 336 78 86 Taiwan : Linfair Engineering - (2) 321 44 54/6 UK : The Home Service (081) 943 49 49 Venezuela : Acoustilab - (02) 987 48 45



New Spherical-Surface Microphone
KFM100 from Neumann

mixing system. ● **Neutrik**: displaying their entire range of audio connectors, plus introduction of the A2 Audio Test and Service System. ● **Neve**: first European showing of the VRP legend which will be fitted with *Flying Faders*. ● **New England Digital**: latest software for their range of hard disk recorder/editors. ● **NTP Elektronik**: in addition to their established range of products, a new De-esser/Limiter type 179-500 GPE, a new automated and scheduling system for routing switchers, and new fiber-optic interfaces between digital routing switchers.

O

● **OD&ME**: featuring the *Monoliner MkII*, the improved version of the Monoline technique for CD manufacture. ● **Omniphonics**: updated versions of amplifiers; new switching units and an esoteric mic pre-amplifier. ● **Optical Disc Corporation**: no information received. ● **Orban**: range of broadcast products. ● **Otari**: exhibiting a cross-section of their product range featuring the new DTR-90 and DTR-7 R-DAT recorders, the *Premiere* film console, and the *ProDisk PD-464* ▶

Drawmer



A CRAFTSMAN DESERVES
THE FINEST TOOLS

Australia Amber Technology Pty Ltd Tel (2) 975 1211 Fax (2) 975 1368 Austria Audiosales MbH Tel (2236) 26123 Fax (2236) 83223 Belgium E.M.L. Nv Tel (11) 491 660 Fax (11) 491 662 Brazil Sterling Do Brasil Tel (21) 722 0141 Fax (21) 714 2195
Canada Headwater Imports Co. Ltd Tel (519) 2562454 Fax (519) 2562522 Cyprus Radex Sound Equipment Ltd Tel (2) 466423 Fax (2) 473165 Denmark Auditorord Danmark A.s. Tel (619) 3499 Fax (861) 28259 Finland Sudotek Ky Tel (0) 592 055 Fax (0) 592 090
France Lazare Electronic Tel (1) 4010 0900 Fax (1) 4010 1810 Germany Exoptus Ltd (U.K. Office) Tel (71) 405 9665 Fax (71) 831 6017 Greece K.E.M. Electronics Oo Tel (1) 6475 659 Fax (1) 3639 234 Hong Kong Tom Lee Music Co. Ltd Tel 7301098 Fax 7303573
Italy Audio Equipment Srl Tel (39) 200711 Fax (39) 382565 Israel R.B.X. International Ltd Tel (3) 298 252 Fax (3) 296 452 Japan M.T.C. (Japan) Ltd Tel (3) 295 4731 Fax (3) 293 2454 Netherlands Audioscript Bv Tel (2155) 20400 Fax (2155) 22806
New Zealand Oceania Audio Ltd Tel (9) 893 114 Fax (9) 893 307 Philippines Audiophile Components Inc Tel (2) 583032 Fax (2) 8187577 Portugal Eduardo E. Bizarro Lda Tel (1) 575 252 Fax (1) 577 983
Singapore Team 108 Technical Services Pte Ltd Tel 7489233 Fax 747 7273 Spain Sadepra Sa Tel (1) 356 0737 Fax (1) 356 9954 South Africa Tru-Fi Electronics Pty Ltd Tel (11) 462 4256 Fax (11) 462 3303 Sweden Tonkraft Import Ab Tel (31) 134 950 Fax (31) 113 472
Switzerland Audio Systems AG Tel (1) 910 4545 Fax (1) 910 3544 Tahiti Oceanic Garage Telex 324 TRANSAIR FP Taiwan Yangs Audio Visual Laboratories Tel (2) 5110408 Fax (2) 5214346 U.S.A. Q.M.I. Tel (508) 650 9444 Fax (508) 650 9476

Drawmer Distribution, Charlotte St Business Centre, Charlotte St, Wakefield, W. Yorks, WF1 1UH, England.

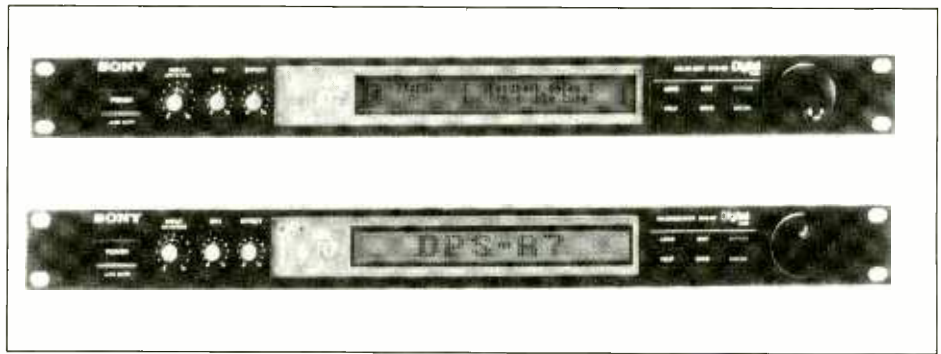
Tel: 0924 378669 Fax: 0924 290460

www.americanradiohistory.com

multichannel digital audio workstation.

P

● **Panasonic:** showing Ramsa's new range of power amps, the 1000 series, and a new range of live sound mixing consoles, the WR-S44 series.
 ● **Pastega:** showing their range of wireless microphone systems and featuring the new RMD 900 modular receiver. ● **Peavey:** wide range of recording and musical instrument products.
 ● **Penny & Giles:** first AES showing of their Endless Belt Controller with integral bargraph display. Also showing the M3000 and MRF 11 range of motorised linear and rotary faders, and the Digital 12 bit linear faders. ● **Plasmec Systems:** showing the ADAS family of hard disk recording systems, the new Mosses and Mitchell ¼in Flexipatch jackfield, DK-Audio switching and distribution products and time code equipment from Evertz. ● **Precision Devices:** showing their ranges of drivers for Turbosound and Quested



Sony's DPS-R7 digital reverb and DPS-D7 digital delay

uses. ● **Prefer:** showing mixers for A/V applications, sound recording and discos. ● **Pro-Bel:** showing their range of analogue/digital audio routing, signal processing and distribution systems. New is 5245 DA reference signal generator. ● **Publison:** latest information on their hard disks recording editing systems.

Q/R

● **QC Magnetics:** displaying a range of video and audio cassettes. ● **Quested:** range of studio monitors. ● **Rane:** featured products will include the ME 60 Stereo ½-octave graphic equaliser, the THX 44 home theatre four channel equaliser, the FPL 44 Quad Limiter, and the MAP 33 MIDI/Programmable Acoustic Instrument Processor. ● **Ranson:** demonstrating new software in conjunction with their Cartouche digital audio storage system for broadcast applications. ● **Renkus-Heinz:** showing their range of speakers including C-2, C-3 and SR-4 systems and related products. ● **RTW:** several new products including the 8800 DAT recorder remote control unit, the PLM 300 V programme level meter, and the MLT 1255 microphone/line tester.

S

● **Saje:** showing the Memory console with its latest updates. Sister company Advanced Audio Visual Systems will be showing Series 100, over 70 signal distribution and processing products; EVA, a realtime machine sequencer for playout or recording; and Onyx a microprocessor controlled routing system. ● **Saki:** their range of replacement ferrite heads for professional tape machines. ● **Sandar Electronics:** range of routing and switcher systems. ● **Sanken:** will be featuring their ceramic-cased COS-11 lavalier microphone. ● **Saturn:** showing range of 24-track analogue recorders. ● **Schneider:** showing audio C-O cassettes, audio and video reels and their video hubs. ● **Schoeps:** full range of microphones and accessories including the new miniature MS system, and the KFM 6 sphere microphone. ● **SCV Audio:** full selection of signal processing units including the new EQ231SP multi-function graphic equaliser, and the APG range of speakers. ● **Seem Audio:** showing Seelect digitally ▶



Sonifex Discart



Progressive control

Penny & Giles - 25 years as the major international force in precision controls.

Pioneers of conductive plastic technology for audio and broadcast applications.

Constantly responding to changing industry techniques and requirements.

Exploring and developing new technologies. Translating your control criteria into industrial reality.

Quality of product - our prime objective.

Linear and rotary faders and controls. Analogue, digital, manual and motorised.

1500 product variations - others by arrangement.

Please contact us for further details of our products and services.

Penny & Giles Studio Equipment Ltd,
 Blackwood, Gwent, NP2 2YD, United Kingdom
 Tel: (0495) 228000 Fax: (0495) 227243

Penny & Giles Incorporated,
 2716 Ocean Park Boulevard,
 #1005 Santa Monica California, 90405 USA
 Tel: (310) 393 0014 Fax: (310) 450 9860

Penny+Giles

YOUR PROGRESSIVE FORCE

controlled audio mixer; *Seemon*, nearfield monitor; and *Frigg* their new generation of broadcast consoles. ● **Sellmark**: showing its full range of components including conductive plastic and carbon faders, potentiometers switches and sockets. ● **Sennheiser**: range of microphones, headphones and accessories. ● **Shure**: showing their new range of microphone and mic accessories. ● **Siemens**: range of communication systems. ● **Sig Tech**: their first product *AEC1000* is an Acoustic Environment Correction System, and resolves to correct sound colouration problems in listening areas. ● **Solid State Logic**: European debut of the *SL 8000* multi-format console, and new features for *ScreenSound*. ● **Sonifex**: showing *DISCART* digital audio storage on a 3.5in disk now with AES/EBU and RS232 interface; *HDX* hard disk audio storage system; and *SDX* screen terminal. ● **Sonosax**: showing three new products with a new design approach, includes new mic pre-amplifier, power amplifier and active monitor. ● **Sony**: featured products will include *DASH* multitrack recorders, the *VSP-8000* 16-channel digital console, the new *DAF-4000* 20 bit ADC and DAC rack, the *C-800* and *C-800G* tube microphones, and the new *DPS-M7* digital modulator effects processor. ● **Soundcraft**: launching *Vienna* PA console; an addition to the *Spirit* console range and a new small mixer. ● **Soundtracs**: launching two low cost desks, the *Solo Live* PA console and the *Solo MIDI* recording version. Also demonstrating the updated *Tracmix 2*. ● **Spectral Synthesis**: will be showing their *Audio Engine* digital audio workstations complete with recent software enhancements. ● **Stage Accompany**: range of sound reinforcement system. ● **Steenbeck**: film related audio products. ● **Studer**: will introduce *Dyaxis II* featuring real-time EQ and mixdown. For the first time the newly acquired Digitec and Numisys product lines will be displayed. Also the new *927* in-line multitrack recording console, the *A 823* studio monitor, the *D 780* R-DAT recorder, *DS-M 6000* digital audio switcher and the *INNSTAMAD*. ● **Sunkyong Magnetics**: showing their complete range of audio cassette duplicator tape. ● **Switchcraft**: line of audio connectors, adapters, patch panels and accessories. ● **Symetrix**: featuring the *DPR-100* and *DPR-44* recording and editing workstations. Range of studio signal processing equipment.

T

● **Tandberg**: showing the latest development of their digital audio storage systems. ● **Tapematic**: new duplication products will include the *5000 ST-31* realtime spectrum analyser, the *5050* switching system, and the *5200 DUPcentre* compact master and two slave combination in one machine. ● **TC Electronic**: launching the *M5000* digital audio mainframe using DARC — Digital Audio Reverb Co-processor. ● **TEAC/Tascam**: showing their range of tape machines, console and a mock-up of a new eight-track digital recording machine. ● **TFT**: highlighting the Synchronous FM Booster/Exciter. ● **Timeline**: showing their range of synchronisation products. ● **TOA**: showing their live sound console and the signal processing unit *SAORI*. ● **Trident**: featuring the fully automated *Vector 432* console. ● **Turbo Sound**: range of sound reinforcement speaker systems including their new wedge monitors and established *Flashlight* system.

V/W/Y/Z

● **VDB**: exhibiting a complete range of carbon and glassfibre microphone boom poles. ● **WaveFrame**: new software for disk-based production systems include Realtime time compression and expansion and interface for Yamaha CDR machine. ● **Westlake**: range of studio monitors. ● **Wheatstone**: new products include *TV-600S* audio console amongst other established products. ● **Yamaha**: new for the show will be the *RC24* Remote control unit which will enhance the flexibility of the *DRU8*; also new is the *DMC1000* Project Manager enabling software control of the *DMC1000*. ● **YelloTec**: showing their new *System 4* mixing console automation. ● **Zonal**: showing their entire range of recording media.

The latest issues of *Studio Sound* will be found on our stand along with sister publication *One To One*. Editorial and advertisement staff look



Yamaha *DEQ5* Digital Equaliser

forward to seeing you on the stand or around the exhibition.

All information has been supplied with details available at the time of writing.

FLEXI PATCH

Takes all the hard work out of hard wiring

If you need quality, ready to use jackfields, and you need them today, there's only one manufacturer you should turn to — Mosses and Mitchell.

The new and totally unique **Flexi Patch** range of jackfields from Mosses and Mitchell can be configured to meet customer requirements in just 15 minutes.

Flexi Patch jackfields don't require hard wiring. Instead, they feature special pop-on pods which allow the jackfield to be 'wired' in any standard configuration, including normalled, half-normalled or paralleled. Should your requirements change in the future, **Flexi Patch** jackfields can be reconfigured to meet them, simply by switching over pods.





EDAC connectors are supplied as standard on 1/4" models, and miniature versions can be supplied with connections to any standard ribbon connector, including Cannon D and DIN 41612

Flexi Patch jackfields are manufactured with all the precision you'd expect from Mosses and Mitchell, Europe's leading manufacturers of quality jackfield products.

Mosses and Mitchell are part of Plasmech Systems, one of the U.K.'s foremost suppliers of equipment for broadcast and studio applications.



For more information, please contact

Plasmech Systems Ltd, Weydon Lane, Farnham, Surrey GU9 8QL Tel: (0252) 721236 Fax: (0252) 712718

A member of PLASMEC Plc.



With 50 years' experience in the design and manufacture of several hundred thousand transformers we can supply:

AUDIO FREQUENCY TRANSFORMERS OF EVERY TYPE

YOU NAME IT! WE MAKE IT!

OUR RANGE INCLUDES:

Microphone transformers (all types). Microphone Splitter/Combiner transformers. Input and Output transformers. Direct Injection transformers for Guitars. Multi-Secondary output transformers. Bridging transformers. Line transformers. Line transformers to B.T. Isolating Test Specification. Tapped impedance matching transformers. Gramophone Pickup transformers. Audio Mixing Desk transformers (all types). Miniature transformers. Microminiature transformers for PCB mounting. Experimental transformers. Ultra low frequency transformers. Ultra linear and other transformers for Valve Amplifiers up to 500 watts. Inductive Loop transformers. Smoothing Chokes. Filter Inductors. Amplifiers to 100 volt line transformers (from a few watts up to 1,000 watts). 100 volt line transformers to speakers. Speaker matching transformers (all powers). Column Loud-speaker transformers up to 300 watts or more.

We can design for RECORDING QUALITY, STUDIO QUALITY, HI-FI QUALITY OR P.A. QUALITY. OUR PRICES ARE HIGHLY COMPETITIVE AND WE SUPPLY LARGE OR SMALL QUANTITIES AND EVEN SINGLE TRANSFORMERS. Many standard types are in stock and normal dispatch times are short and sensible.

OUR CLIENTS COVER A LARGE NUMBER OF BROADCASTING AUTHORITIES, MIXING DESK MANUFACTURERS, RECORDING STUDIOS, HI-FI ENTHUSIASTS, BAND GROUPS AND PUBLIC ADDRESS FIRMS. Export is a speciality and we have overseas clients in the COMMONWEALTH, E.E.C. USA, MIDDLE EAST, etc.

Send for our questionnaire which, when completed, enables us to post quotations by return.



PO Box 36, Ipswich IP1 2EL, England.
Phone: 0473 252794 & 0473 219390 –
Telex: 987703G Fax: 0473 236188

MONITOR LOUDSPEAKERS FOR NEARFIELD & CONTROL ROOMS

BNS
PROFESSIONAL



FOR MORE INFORMATION CONTACT:

PROFENEX
VANDEBERGHE PROFENEX B.V.

De Hoogt 8
5157 AX Loon op Zand
The Netherlands.
Phone (31)(0) 4166-3965
Fax (31)(0) 4166-3885

EUROPEAN TOP QUALITY

SEE US IN VIENNA ROOM F98

May 29-31, 1992 – Portland, Oregon

AES

CONFERENCE ON TEST & MEASUREMENT

If you design, manufacture, maintain or test audio equipment, you will want to attend the AES Conference on audio test & measurement.

Explore solutions for analog and digital audio test & measurement through invited and submitted papers. A featured session will highlight testing and evaluation of low

bit rate audio compression systems. Special workshops for audio converter designs and loudspeaker measurements are also included.

Take this opportunity to visit the spectacular Pacific Northwest. The Columbia River Gorge, Mt. Hood, Mt. St. Helens and the rest of the Cascades are a short drive from Portland... not to mention the spectacular Oregon coast!

For further information on the conference, write:

Portland T&M Conference Information

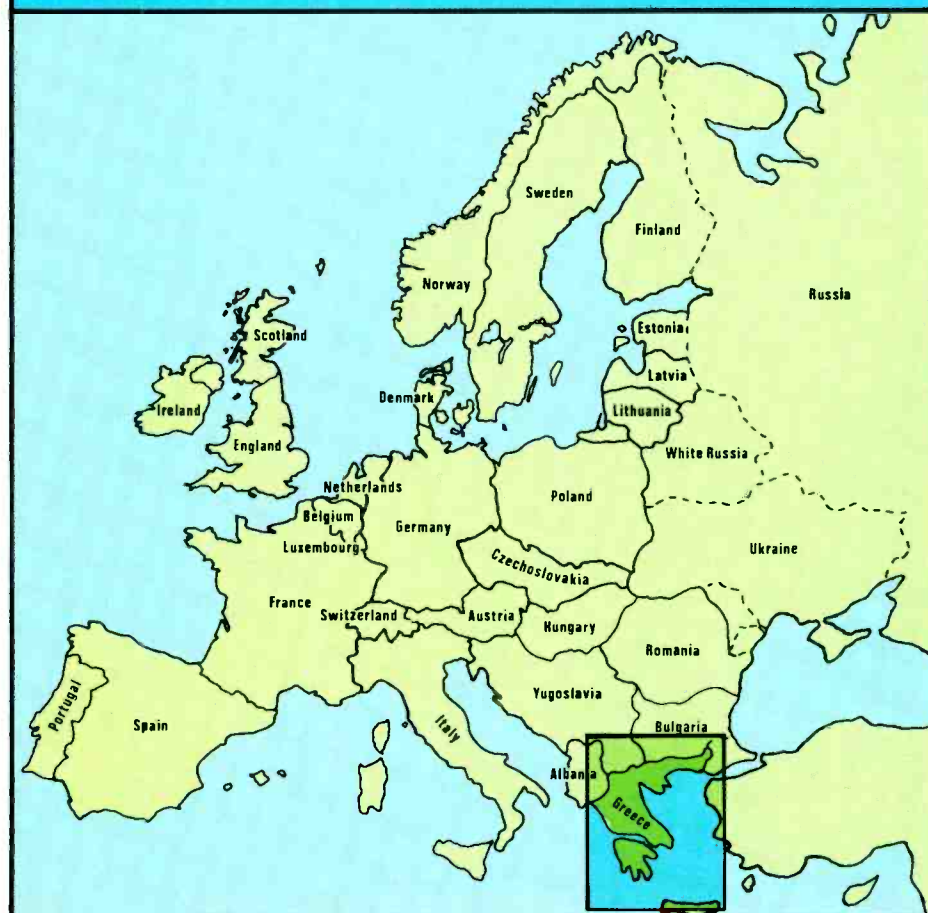
AES Headquarters Office
60 East 42nd Street
New York, N.Y. 10165
USA

Tel: (212) 661-8528
Fax: (212) 682-0477



GREEK ODYSSEY

There are a number of professional recording studios in Greece, although these are mostly concentrated in Athens. Report by Athanassia Duma & Mike Collins.



The Greek peninsula, covering an area of 131,944 Km² and containing a population of 9,000,000, consists of mainland Greece and various islands. Corfu and the Ionian islands lie off the western shores, and there are several more in the Aegean Sea, such as Crete to the south, Lesbos to the east, Thassos and Samothraki to the north. Another group of islands, called the Cyclades, includes Mykonos and Santorini, and a smaller group, the Sporades, including Skopelos and Skyros, lie off the eastern shores of mainland Greece. The Dodecanese group includes twelve major islands, including Rhodes and Kalymnos, and, finally, the Saronic Gulf contains a further group of small islands, including Poros and Hydra. The coastline is very extended, with sea on three sides of the mainland, and a heavily-indented shoreline. There are high mountains and mountain ranges such as the Pindos range and Mount Olympus (with the Pantheon at its summit), and the mountains of Macedonia and Thrace — intersected here and there by a few valleys through which relatively small rivers flow.

Athens is the largest city in Greece, with a population of around 3 million. It has a large international port called Piraeus, and has a major international airport. The city is situated in a valley ringed by mountains, except on one side ▶

which looks out into a large bay. It is quite similar in character to other large European cities, so, yes, you can get McDonald's! Thessaloniki is the second largest city in Greece with a population of around 1 million. This is a large modern coastal city in the north of Greece, with a university and many places of historical interest, although not much in the way of recording studios. Patras is the third largest city with a population of just 142,000 people. It is situated in the Western Peloponnese and is the largest communication centre in western Greece, and again has a busy port.

Climate

The climate varies according to the geographical variations, as you might expect, and there are distinct seasons throughout the year. The winters are normally mild, although it was colder in northern Greece last December than it was in London, and there was snow in the northern mountainous parts. Athens was a little colder than London at this time, but was quite pleasant in the afternoons with the sun shining brightly — although this served to show up the smog in the main city streets in a very bad light! Athens is infamous for its high levels of pollution, which might be a problem for asthma sufferers, although Londoners used to walking through the West End on a busy traffic day would probably feel used to it. The long, warm, sub-tropical summers can reach 100°C and are cooled by seasonal breezes, with plenty of sunshine throughout the year.

International Access

Two airlines offer regular flights to Greece from Heathrow airport — Olympic, and British Airways. In addition, there are often charter flights available — so check with your travel agent. The two main international destinations are Athens and Thessaloniki, although BA's flights only go to Athens.

Internal Travel

Olympic Airways operate an extensive, reasonably-priced service within Greece and between the islands. If you like sea travel, ferry services are cheap and easy, with all the islands connected to the mainland by regular, mostly daily ferry services. The majority of the islands are connected via Piraeus, the port of Athens, and ferry services also provide links between the islands. For those on a budget, there is an extensive bus network throughout Greece, even to isolated parts. Greece is also linked to Europe by International Bus Services to Austria, Bulgaria, Germany, Yugoslavia, Turkey, France, Belgium, and the UK, with regular services, especially during the summer. If you prefer to drive, there are plenty of car hire agencies in Greece, although an International Driving Licence is required — which can be obtained from the Greek Automobile and Touring Club (ELPA).



There is quite a healthy and active recording scene in Athens

There is a Metro service in Athens, and there are plenty of taxis! However, the taxi-drivers sometimes have a mind of their own about where they will drop you off, and taxi-sharing is common — so don't be surprised if the driver stops to pick someone else up en route, and drops you a couple of streets away from where you really want to go!

Working in Greece

What about the language? Well, a fair number of Greeks speak at least some English, or another European language such as French, Italian, or Spanish, so not too many problems there.

Do you need a customs carnet to bring recording and musical equipment in and out of Greece? Yes, you do, and you can apply to the Greek Consulate, which is situated at 1A Holland Park, West London, near the tube. You can also take a car or other vehicle with a suitable customs carnet, or by special arrangement with Greek customs.

Do you need a work permit or visa to go and record in Greece? For stays up to three months, no work permit or visa is required. After three months a residence permit is required which can be obtained from the local police. This regulation applies to all EEC countries, USA, Japan and Canada. It also applies to all British passport holders, and to a few other smaller countries. There are tighter restrictions for some countries — such as Hong Kong (one month), South America and several African countries (two months) — so check with the Greek Embassy or Consulate if you are not sure.

If you need cash in Athens there are branches of American Express, Barclays, Midland, NatWest, Royal Bank of Scotland, Societe General, Citibank, Chase Manhattan, and many others. And the Pound is worth more in Greece, so you might find some bargains while you are there!

The Greek currency is called the Drachma, and the exchange rate is currently about 320 Drachmas for one English Pound. You are allowed to bring in currency up to 100,000 Drachmas, with unlimited Foreign Travellers Cheques or letters of credit — as long as these are in the traveller's name. You can take out 20,000 Drachmas, plus foreign currencies to a value of 10,000 US dollars. Higher amounts are permitted depending on the visitor's import declaration on arrival.

What mains voltage and AC power frequency is used in Greece, and what type of sockets are commonly used? In Athens, and most other places they use 220 volts, 50 Hz, with 2-Pin sockets, although there are just a few 110 volt supplies still running in certain districts. Is there a Musician's Union in Greece? Yes!

The Recording Industry

Where are the studios located? There are about 50 in Athens. What about elsewhere, on the islands perhaps? Nothing of note.

Sierra Studios

Sierra Studios in Athens has two studios with ►

The Most Widely Used Headphones.

As a broadcast professional, you need to listen to the audio—not the headphones. You want to feel the emotion and excitement exactly the way your audience does. That's why so

many broadcast professionals rely on AKG headphones.

It's no wonder that the 1990 and 1991 *Billboard* surveys of U.S. studios found that AKG headphones are the "#1 Most Widely Used Studio Headphones."

Made in Vienna, AKG headphones are the product of Austria's musical heritage. Our engineers have designed their pure love of music into the best headphones in the pro market.

If you're not using our headphones now, try a pair on—and you'll hear why we're #1.



A Hit.



STUDIO SPOTLIGHT

Sound Studios Athens SA

184 Messogion Street
Holargos
155 61 Athens
Tel: +(30) 1 6544645

Bookings: Mr Despotidis

Studio 1/2/3/4

Acoustic designs — Eastlake; Consoles — Neve V series, Soundcraft; Recorders — MTR90s/MTR20/MTR12; Studio 3 is used for dubbing TV and film; studio 4 is a small voiceover studio for broadcast work.

Normal hours of recording are from 8.30am 'til 6pm every day for film and TV, with pop music recording from 10am 'til 10pm.

associated programming and pre-production rooms. Studio A was designed by Tom Hidley, and Studio B by Lakeside. Elias Achladiotis is a co-owner of Sierra Studios, and also works there as a MIDI programmer. I asked how busy things were, and whether the rise of home studios was affecting their business. Elias explained 'the larger studios are not affected much by home recording studios, but the smaller ones are definitely feeling the pinch! Bookings are going well for us, though — we have plenty of work at the moment.'

Some producers may want to record digitally, or to use their favourite outboard gear, so I asked Elias to comment: 'We can hire just about everything that might be needed, except the *Synclavier* — all the popular outboard gear, synthesizers, and so forth. We often hire the latest equipment directly from the main distributors, such as Roland and Yamaha, for instance. I know that digital tape-recorders are increasingly popular in the UK and the USA, but they have not gained much acceptance in Greece — as yet. We do master to DAT, and our engineers all speak both English & French — so communications are pretty straightforward.'

What about record companies? 'All the big companies, Sony, BMG, EMI, and WEA, are represented in Greece. We also have Lire records and Minos records which are large local companies with extensive catalogues including all the usual categories such as pop, folk, jazz and classical. Vangelis is still recording actively, and we have several Greek pop artists, such as 'Farandure', who are very popular at the moment.'

'Every Greek artist has to do a new record every year, and we have many artists so they are making records all the time. At present, Greek music sells more than international stuff. We also

have many TV stations, more than 20, all over Greece. And there are a large number of video studios doing work for TV and film.'

Poly Sound Studios

Studio-owner of Poly Sound Studios Mr Pandgis: 'We have two studios here at Poly Sound. Studio 1 features an MCI 38/24 desk, and Otari *MTR90*, and Yamaha *NS10/JBL 4333* monitoring. Studio 2 has an MCI 28/24 console with an MCI 24-track machine, and JBL *4133/NS10* monitors. We are intending to upgrade this control room soon, with an *MTR90* and a new desk.'

'We are also in the process of building a mobile studio with a Soundcraft 44/24 Series 6000 desk, and two multitrack tape machines. We will take the MCI from Studio 2, and buy a new Lyrec. The Lyrec and the MCI will be 'paralleled' in the mobile so that we can record concerts without losing music while changing tapes.'

'We have many live concerts here in Greece, quite a number of which have to be recorded for TV broadcast. The only mobile studio currently available in Greece belongs to Sierra Studios, so we are aiming to provide the second — and there is definitely more than enough work for two mobiles!'

'Business is generally good, and we are 90% full most of the time. We have not felt any effect from home studios. We mostly record acoustic instruments, but Studio 2 is also a MIDI studio. In the MIDI studio we use two *Macintosh* computers (a compact model and a larger model) and an Atari *Mega ST4* computer. As far as synthesizers are concerned, we have Roland *D550*, *Proteus 1 & 2*, Korg *MIR*, Yamaha *TG77*, Roland *S750*, Akai *SI1000*, *Emulator II*, with a Cheetah Master Keyboard.'

Digital Studio, Athens

'We have been operating for about three years now, and we have one recording studio and one CD-mastering studio. Both rooms are Eastlake designed and constructed', says Studio Manager, Mr Ioanidis. 'We use the Sony 3324 multitrack, with a 36 input Sony *MXB 3036* mixing console, and we have all the usual outboard gear. We master to a 2-track Mitsubishi *X86*, and we also use the Sony *PCM 2500* DAT machine.'

'The studio is quite busy, mostly with Greek artists. We work closely with all the major record companies in Greece, including Sony Music, Minos-EMI, Warner Music and Polygram. Recent clients include "Stamatis Kraounamis" and "Dionysis Savopoulos", both of whom are popular singer/songwriters over here. We have also been recording several popular singers including "Lefteris" and "Pandazis", and "Angela Dimitriou".'

'All our engineers all speak English, so there should be no problems communicating with most international clients. Also, our hourly rate for recording is 10,000 Drachmas, which is about £30 per hour, and for CD-Mastering with digital editing is 15,000 D or £45 per hour. These rates, which are similar to the other top studios here in Athens, are extremely competitive when compared with rates in London, for instance!'

'We have the only CD-mastering room on Greece. This is based around a Sony *DAE3000* editor, and we can transfer from any source to the CD format. As it happens, the company which owns this studio is called Digital Press Hellas, and they also own the only CD pressing plant in Greece. That is why we specialise in digital recording here.'

Summary

So, it looks like there is quite a healthy and active recording scene in Athens, with half a dozen top studios, and quite a number of lesser ones. The top studios can offer facilities on a par with those to be found in other countries, and seem to be well booked-up recording albums for several popular Greek artists. Home recording is starting to flourish here as elsewhere, but is not affecting the major studios yet. Most popular musical and recording equipment is available to buy or hire, although there is not as much choice as in London or New York.

Unfortunately, no-one has yet thought of siting a residential studio to cater for international clients on any of the many Greek islands, or in any other part of the country. I am sure that if there were such a studio in one of the more remote parts, there would be no shortage of clients wishing to get away from the hurly-burly of city life to make music in a climate of sunshine and fresh air! ■

USEFUL CONTACTS AND INFORMATION

Greek Embassy, Tel: 071 734 5997 Tourist info. 071 727 8040 Cultural Ministry: 247 ext.

UK Customs & Excise, Berkeley House, 304 Regent's Park Road, N3. Tel: 081 346 1144, 081 366 6666.

Piraeus Port Authority, Tel: +30 (1) 451 1411 info about ferry services.

The Greek Automobile & Touring Club (ELPA), can issue International Driving Licences — Tel: +30 (1) 779 1615. ELPA also offer 24-hour Road Assistance — Tel: 104.

British Airways, Flights: BA 632 London/Athens, BA 227 London/Athens. Info: 081 759 2525.

Olympic Airways, Flights: OA 260 London/Athens, OA 262

London/Thessaloniki/Athens. Commonwealth House, 2 Chalkhill Road, London W6 8SB.

Tel: Admin, 081 846 9966. Reserv, 081 846 9080. Fax: 081 846 9709.

Ticket Office: 164/5 Picadilly, London W1V 9DE. Tel: 071 493 3965/081 846 9966.

Music Information Centre (Megaron Moysikhs Athinon) Tel: +30 (1) 722 5511, +30 (1) 722 1164

General Secretariat of Press and Information (Public Relations Department) Tel: +30 (1) 361 1249

Sierra Studios: Tel: +30 (1) 693 0393

Poly Sound: Tel: +30 (1) 821 7426

Digital Studio: Tel: +30 (1) 647 4042

Drake - sound ideas with an eye to the future

Take our 9000 series. A unique frame design enables an extensive range of audio, video and digital audio Eurocards to be freely combined to suit individual requirements.

For off the shelf solutions to audio monitoring, signal error and interfacing problems, the 5000 series now includes the Automatic Stereo Corrector and the latest 20 bit A to D and D to A Converters.



Then there's our 6000 series. Its highly developed software and flexibility of expansion add up to the most powerful communications system available.



The 2000 series Broadcast Consoles combine technical excellence with simple operation to suit the most demanding productions.

To complete the picture, Drake Broadcast Systems will manage the design and implementation of an entire facility - professionally.

So for a single module, or the whole installation, Drake provide solutions to meet your needs.



Philip Drake Electronics Ltd.,

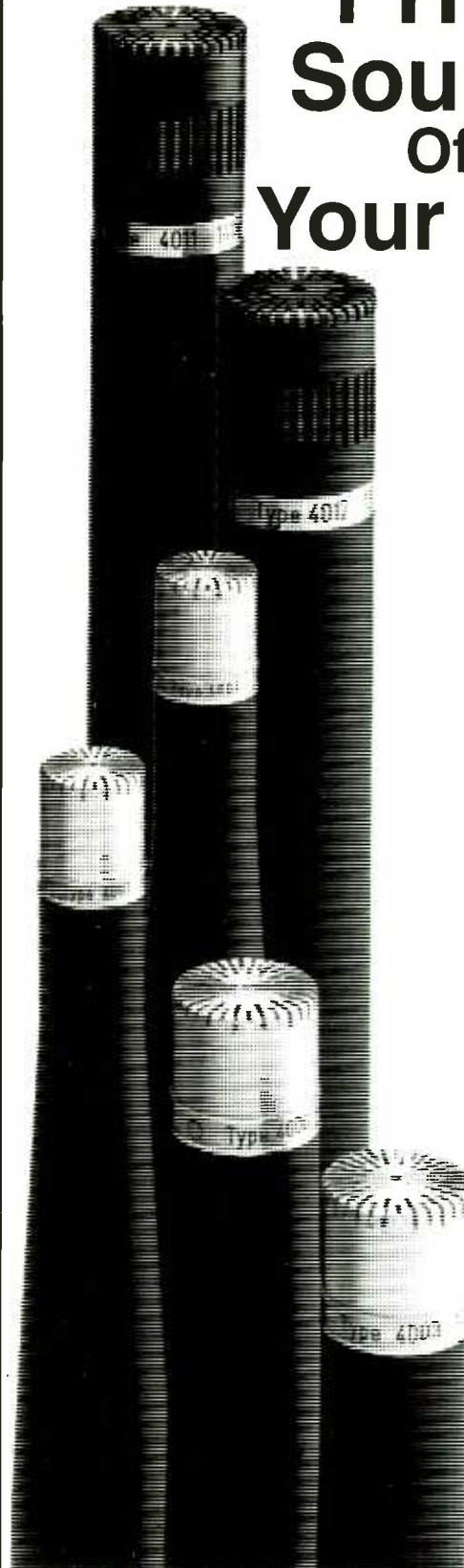
The Hydeway, Welwyn Garden City,
Hertfordshire AL7 3UQ, England.

Telephone: (0707) 333866.

Telex: 25415 DRAKE G.

Fax: (0707) 371266.

THE Sound Of Your Life



FOR DETAILED
INFORMATION
FILL COUPON &
RETURN TO:

Brüel & Kjær
Pro Audio (UK)
Harrow Weald Lodge,
92 Uxbridge Road,
Harrow,
MIDDX HA3 6BZ.
Tel: 081-954 2366

Brüel & Kjær
Pro Audio
Skodsbrovej 307
2850 Nærum,
Denmark
Tel: + 45 42 80 0500

Series 4000 Microphones

Name _____

Address _____

S/S



TOTAL AU

A Cool, Compact Control Surface

means always mixing from the center of the stereo image. 'Big console' headaches like acoustic interference and heat generation are greatly minimized. 72 faders can be reached in a space less than 5 ft. wide by 2 1/2 ft. deep, with a Mix Controller that measures 7" from the top of the meter bridge to the bottom of the chassis. All signal processing is contained in a remote audio rack.

A User Definable Signal Path

lets one familiar control surface act like many different consoles. All faders can be mono or stereo. Channel strips include 2 universal input amplifiers, 4 line amps, 2 four-band EQs, 4 sends to 8 aux busses, and 2 full-throw faders. Backlit LED displays show signal flow at a glance, even when the room lights are dimmed.

MixView™ Screens

show precise EQ curves, console setups, track sheets, and other important information through high-resolution color graphics. The ability to 'see' what you're hearing ensures that complicated sessions run smoothly.

The Crescendo System II

The Crescendo System II combines the wide dynamic range and smooth frequency response of analog signal processing with the power and flexibility of digital control. The result is a studio control center that helps to produce superior projects quickly and efficiently. If you're looking for a system that provides Total Automation™ and the highest sound quality available, consider the CSII from Euphonix.

TOMATION.™

Snapshot Recall™

reconfigures the entire system in less than 1/30th of a second. Dramatically different mixes can be compared instantly with the press of a button. Console setup time is no longer an issue when changing sessions.

Dynamic Mix Automation™

records all control changes with reference to time code including faders, mutes, EQ, aux sends, preamps, routing, and effect inserts. Let the console remember your mixes, pass after pass, project after project.

Modular 'Building Blocks'

allow systems to be configured in groups of 8 faders. System sizes range from 8 to 96 faders. Adding more inputs is as simple as plugging in more modules.



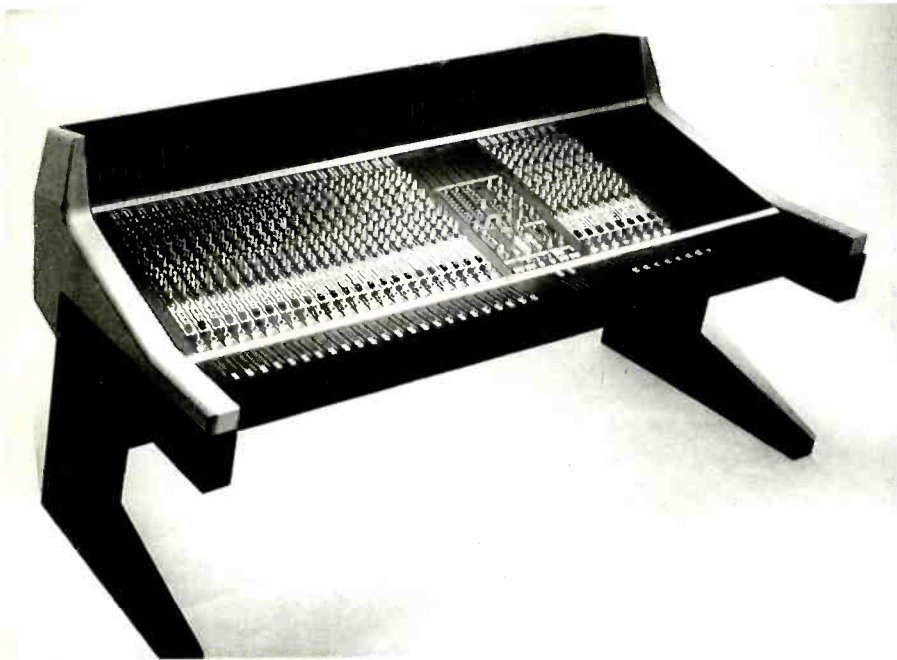
Euphonix

Digitally Controlled Studio Systems

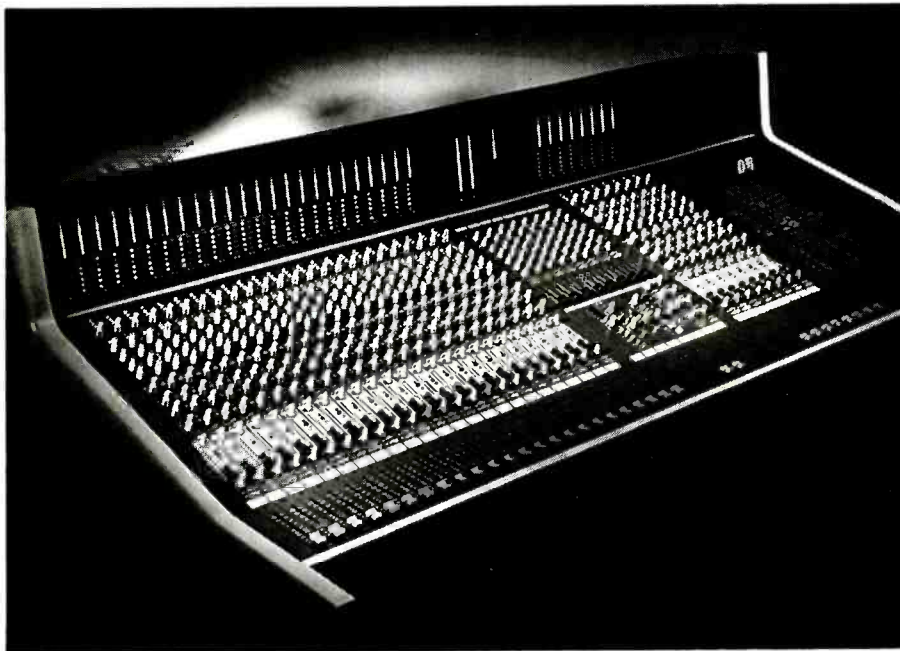
220 Portage Avenue
Palo Alto, California 94306
(415) 855-3400 Fax: (415) 855-0410

© Euphonix 1991 Patents applied for.

AVALON SERIES



MARILON SERIES



TRITON SERIES



*Take it
from
the Top!*

The 'Avalon', 'Marilon', and 'Triton' consoles offer features, functions, specs and sound quality for less cost to you than any other console manufacturer in the world.

With the minimum of audio path, the circuitry not only provides tremendous headroom and crystal clear sound, but noise and distortion so low that it almost matches the quality of a straight wire.

No matter what your requirements, space, amount of inputs, specs, or functions, D&R can customize a console for you.

Call or fax the D&R Customer Support Department and get your free colour brochures now!

D&R Electronica b.v.
Rijnkade 15B
1382GS Weesp
The Netherlands
Phone: (00)31-2940-18014*,
Fax: (00)31-2940-16987.



EVERY SOUND UNDER CONTROL.

No one could forget their first visit to the old Amazon Studios some eight miles from the centre of Liverpool, out beyond Everton, Anfield, Fazakerley and Kirkby, towards Skelmersdale. Arriving at the address in Stopgate Lane you would initially see nothing but open farm land and a lumber yard in the distance. Then you might notice a squat brick building which could have been an old army guard house. This was Amazon. Like Dr Who's Tardis it was much bigger inside.

The original structure seems to have been a wartime ammunition store with 18in thick blastproof walls, solid concrete floor and roof. In the 1970s it was occupied by a security firm, apart from one corner which housed a little 8-track demo studio. Amazon began here in September 1974 when Jeremy Lewis, who played guitar in local bands, sold his car and bought the assets of 'the only studio for 100 miles around', including a 'steam-driven' 8-track full of glowing tubes.

Gradually Amazon expanded, took over the whole building and added extensions, becoming an APRS member in 1980. By 1990 there was a good-sized Neve tracking room, an SSL mixdown room and a demo room for the newer bands, along with a small canteen, lounge and offices for an in-house record label and music publishing company.

The move to the centre of Liverpool had been planned for several years and part of the plan was to have any new equipment in operation at the old studios so it would be tried and tested before the move, avoiding weeks of debugging and training at the new location. £320,000 (\$550,000) was spent in 1990 on upgrading the three studios and installing a 'penthouse' MIDI suite with Digidesign *Sound Tools* digital editing in the room housing the water tank on the roof.

Amazon attracted a lot of long-term album bookings which meant finding somewhere for the band and all to stay, so it was obviously a good idea to go residential. There was the possibility of adding a storey on the flat roof of the old building but new premises would offer the opportunity to develop 'a studio for the '90s'.

For Jeremy Lewis this meant moving into Liverpool: 'I feel that country studios will always have their place but the new concept is the residential studio in the city. And if you look at the international implications, it doesn't really matter where that city is, ultimately. The world is shrinking very rapidly. The clients that we're going after would just as likely come to us in Liverpool as they would go to London or anywhere else.'

Liverpool had the advantage that there were development grants available and construction costs were low, so the whole enterprise, including the equipment upgrades, cost around £1m (\$1.72M), around one quarter of a similar facility in London. Financial backing came from solid sources such as pension funds and was arranged on a sound footing so that the value of the property will more than cover the debts.

'When you consider that there's been a downward pressure on rates, partly because technology is getting a lot cheaper, together with



THE AMAZON

Amazon Studios in Liverpool, has grown to become one of the largest studio complexes in Britain. Tim Smith explores

overcapacity, I don't think it's possible to build a multi-studio complex in London and make money. If you spend £4.5M (\$7.5M) putting a three-studio complex together, inclusive of freehold, then you should be charging between £2,500 (\$4,300) and £3,000 (\$5,100) a day per studio. If you can do it for a lot less you can charge a lot less, you become more attractive, your occupancy goes up and you make money by charging less.'

The ideal building had to have a lot of mass to prevent acoustic transmission, a lot of floor space with good headroom on the ground floor for the

main studios and several storeys for other facilities, offices and accommodation. One of the first buildings they looked at was a printing works from the late 1930s in Art-Deco style; a four storey steel-framed structure with solid concrete floors which offered almost exactly what was wanted, including its own parking lot. This seemed too good to be true, so the search continued for several months before they realised they had already found the right building.

The new Amazon at Parr Street is right in the heart of the city, looking out over streets of 19th



Studio 1

century terraced housing, surrounded by clubs, pubs and restaurants, just a few minutes walk from the landmark Royal Liver Building, Pier Head for the ferry 'cross the Mersey and the revitalised Albert Dock full of shops, restaurants and the northern Tate Gallery. (Albert Dock is the second most successful tourist attraction in Europe with 6 million visitors a year, surpassed only by the Pleasure Beach at Blackpool a few miles up the coast.)

Any member of a band who is not needed in the studio for a few hours, or a few days, will find something of interest for them in Liverpool, rather than being bored by a pretty country scene and going home.

Studio style

Double doors set in a curved 15 ft (4.5 m) high glass block wall lead into a stylish ground floor reception area. Jeremy Lewis has an interest in antiques and bought up a large quantity of Victorian pitch pine flooring. A striking feature is the central mezzanine lounge deck, built above a storage room for flight cases. Beyond the reception are toilets, a copy room, maintenance and Amazon's offices.

On either side are the two main studios which are about the same size, each having a 900 ft² (85m²) control room and a 2,000ft² (185 m²) studio with space for an orchestra of up to 60 players and 20 ft (6 m) high ceiling. Behind each control room is a private suite comprising production office with phone and FAX, lounge with catering facilities and satellite tv, shower room and toilet, all included in the price of the studio.

Jeremy Lewis has very clear views on studio and control room design — he did the acoustic design for The Windings near Wrexham in north Wales (*Studio Sound* March 1990) — so the new studio project was handled in-house by Amazon Audio Developments (AAD) with Roger Qusted as consultant. Amazon also acted as main contractor to have direct control over the various sub-contractors who carried out the work.

Studio One on the left of reception is a tracking and mixdown room with an SSL desk. The original Amazon remix room had to have a studio added

because, 'contrary to popular belief,' people wanted to track on the SSL desk, so the new studio is designed for both functions. Studio and control room are built as completely separate structures on the solid concrete floor. Any links to the steel framework of the building are via rubber suspensions to provide acoustic isolation.

The studio floor looks superb with 100-year-old blocks of very hard-wearing *iroko* teak laid in herring-bone pattern. Large areas of the walls are covered with sloping slats of American ash in a random pattern of different widths and thicknesses to form a diffuser. Other areas are covered with rough Yorkshire stone: 'Not only is it attractive but it's a very good diffuse surface.' Windows high up on the front wall of the building let daylight into the studio through quadruple glazing — two sealed double glazing units about 4in (100 mm) apart.

The ceiling consists of absorbent wood-wool panels made from long wood shavings mixed with cement, as used in airport buildings for noise reduction. 'It forms a natural attenuator and it has a great sound,' Lewis enthuses. 'The idea being that the actual attenuation is all done in the ceiling and you can then vary the acoustic of the room by other means such as carpets and screens. If you have a live room you can always calm it down but if you have a room that's too dead, too boring, it's a devil of a business to try to liven it up. So we've gone for spaces which are big, airy, daylight and fairly lively.'

There are two small isolation booths for loud instruments and two rooms with special treatment, a stone room of Yorkshire stone and a 'dead room' for vocals, acoustic guitars, etc.

The control room has an expansion ceiling which begins low over the window and rises to about 14 ft (4 m) at the back. The increasing volume of air avoids the need for bass traps over the console. 'It sounds much more natural and if you've got the height you can have a lot of surface area at the back of your bass trapping.' The idea being to create an impression of open air behind the mixing position.

The slightly concave rear wall is covered with an acoustically transparent fabric which conceals a range of diaphragmatic bass traps. These consist of wide strips of Revac hanging loosely about 600 mm in front of the rear wall. Fibreglass insulation material is attached to the Revac to prevent reflections from the surface. The traps can be tuned by altering the length and therefore the weight of each strip, and by positioning them closer to, or further from, the rear wall to alter the air gap behind them.

'With this system you can plan for the high Q standing wave problems associated with the dimensions of the room and also produce a smooth wide bass absorption which is very pleasant. So we can use all that surface area at the back to tune the room to the monitors for an ideal listening position and it takes only a few days to get it right.'

Main monitors are Qusted *HM415c* active four-way systems with four 15in (375 mm) bass drivers, a 7in (177 mm) rigid dome lower mid, 3in (75mm) soft dome upper mid and 1½ in (28 mm) soft dome top. These were set up on-site by Roger Qusted

and a spectrum analyser was used to tune the control room to work with the monitors. The speakers are mounted on a vertical axis with the mid-range units firing horizontally at ear level. This avoids early reflections caused by top and mid units being close to the ceiling and by monitors being angled down towards the surface of the mixing console. Nearfield monitors are Yamaha *NS10* and Studio *AR18LS*.

The mixing desk is an SSL *SL 4000E Total Recall* fitted with 64 channels and the SSL *G Series* computer. The usual SSL Wien bridge filter equalisers on the channels have been replaced by AAD state variable equalisers which have proved very popular with users (see *Studio Sound* December 1991).

A raised platform behind the sound desk has two MIDI tables with outboard gear built into the front panel, including additional foldback mixers for headphone feeds to the studio.

The machine room houses two Studer *A827* 24-tracks with 48 channels of Dolby *SR* and Dolby *A* also available, a Studer ½ in mastering machine, Tascam *DA-30* DAT, Sony DAT and *PCM-F1*. Digital multitracks can be hired in, Mitsubishi *X-880* 32-track being favourite. 'The main reason we haven't got a digital multitrack is that we simply don't get asked for it. If we get asked for it we will certainly provide it, but we find that people are more than happy to use Dolby *SR* because they know it is so good.' Which is why Amazon has 72 channels of *SR*, more than any other studio in Britain.

Studio Two is the main Neve tracking room in a single storey extension with a ridged roof to the right of the main building. Acoustic treatment is similar to Studio One with ash slats and mellow Yorkshire stone on the walls and a floor of reclaimed *iroko* teak blocks on a solid concrete base. Lots of daylight comes into the studio through quadruple glazing in the front wall and in the wood-wool panel ceiling which is ridged to follow the ridges of the roof. The lively acoustic has a nice crisp snap without ringing or flutter.

This studio has one isolation booth and three rooms with special treatment, wired for use as acoustic chambers on remix: a stone room of Yorkshire stone, a wood room with pitch pine blocks and a lounge room with carpet to sound ▶



Studio 2



STAND No.
A17



SOME ACHIEVE GREATNESS

With the Megas Studio console we've achieved what others merely aspire to; exceptional audio quality and an unparalleled range of facilities at a cost that even the not so well-heeled can afford.

The Studio is a 'split' console that can be specified in either 16 or 24 group buss formats. Four different frame sizes can

accommodate a combination of mono or stereo input modules plus up to twelve dual group modules, a comprehensive master module and an optional patchbay.

Standard features include MIDI controlled muting which can be interfaced with a sequencer to provide automated mutes, full metering which is housed within an integral

meterbridge, and a remarkable new switching type power supply that operates at low temperatures for higher efficiency and greater reliability.

The name Megas literally means 'great'. And greatness is precisely the result that the Megas Studio is intended to achieve.

MEGAS
STUDIO

SOUNDTRACS INC

91 EWELL ROAD, SURBITON, SURREY KT6 6AH, ENGLAND. TELEPHONE: ++44 (0)81 399 3392 FAX: ++44 (0)81 399 6821

like a domestic living room.

The control room has a Neve V3 with 36 channels in a 48 frame and there is a possibility that automation will be added for mixdown. 'At the moment people seem to like to record on the Neve and mix on our particular SSL, which gives them something other than "an SSL sound",' Lewis observes.

Second storey

Stairs from reception, or an elevator capable of carrying $\frac{3}{4}$ of a ton, give access to the next floor for Studio Three, the MIDI suite, lounge, restaurant and bar.

Studio Three is a smaller modest-priced tracking room or up-market demo room. 'This has always been a core business, not for financial reasons but because we're interested in new talent.' The L-shaped studio has quadruple glazed windows for daylight and is wrapped round a compact control room. Equipment includes an Allen & Heath *Saber 36/16/24* desk; compressors, limiters and gates by Drawmer and Urei; reverb and delay by Alesis, Lexicon, Roland and Yamaha; MIDI gear such as Akai *S1000* sampler with 8 Mb memory, Atari *1040 ST* computer, SRC *XR300* MIDI synchroniser and synths by Korg, Roland and Yamaha.

For recording there is a Tascam *MSR-24* 24-track 1in machine with built-in dbx noise reduction and *MS-16* 16-track 1in; 24 channels of dbx noise reduction; Studer 2-track; Tascam *DA-30* DAT and cassette; plus the option of bringing in a Studer *A827* 24-track. Monitoring is by Quedsted *Q210c* with Yamaha *NS10M* nearfield.

The MIDI room is another small control room with daylight windows and recording options similar to Studio Three. Equipment includes an Allen & Heath *Saber 36/12/24* desk, a range of outboard gear and Quedsted self-powered *Q108s*. There is a booth for vocals or acoustic instruments and an ash shelf around the walls carries a wide range of MIDI gear including an Akai *S1000* 8 Mb sampler, Alesis *Data Disk*, Atari *Mega4* computer, DAC 44 Mb hard disk, EMU *Proteus 1*, *Macintosh 2CX* computer, SRC *XR300* MIDI synchroniser, Tascam *CD-401* CD player with digital outputs, Waldorf *Microwave* and synths by Korg, Roland and Yamaha.

Sound Tools digital editing is available on a *Macintosh 2CX* computer with a video card, Digidesign *Sound Accelerator*, *Sound Designer II* and *Analogue Interface*, and DAC 780 Mb hard disk for over one hour of stereo storage. This is based in the MIDI room but it is charged separately and can be moved out if necessary. In fact with demand increasing and people often booking several ten-hour days for digital editing it may have to move into an office on the top floor as a separate facility. 'Although we've got some fabulous recording spaces, we are quite firmly going in the direction of post.'

A Studer *D740* Compact Disc recorder will provide one-off CDs as up-market demo pressings. 'If you've just spent £12,000 mixing in one of the top mixing rooms in Europe, are you going to quibble at £200 to have CDs for the members of

the band?' CD is also a convenient medium for radio station jingles and idents. 'We've had somebody going round the radio stations and virtually all of them are interested in using this facility.'

There is a spacious lounge with custom made furniture, satellite tv, pool tables, games machines, a bar and a restaurant area looking out over the back streets with food from a local catering firm.

A spiral staircase behind a push-button security-locked door leads up to the residential accommodation. A security key is also required to take the elevator to this floor. There are 12 large rooms with custom made furniture, each having one double and one single bed and its own bathroom with bath and shower, hand basin, bidet and toilet. The combination of two large studios, two smaller studios, 12 bathrooms and 24 beds means that Amazon is probably the largest residential studio complex in the world.

Booking in a band of six people for two months with full board and 48-track recording would total about £850 (\$1,400) per day, which is around 40% less than anything comparable. 'When you look at

the studios and the facilities here, I don't think there is anything comparable anyway.'

The top floor has eight offices which are being let to businesses connected with Amazon and the media in some way; such as the architect who worked on the new premises, a record promoter, a film company. As with the accommodation floor, access is restricted to key holders and there is an entry phone system to allow visitors in via the back stairs.

Some top producers were invited to try the new Amazon facilities for free on the assumption that any favourable comments they make will carry considerable weight. But even while the studios were being built there were visits from prospective clients and keen interest from existing Amazon clients as far afield as Japan, so the future looks good for the wider Amazon. 'We shall try to get as much business as we can from outside of the country, but I think there's a lot more business than people realise over here for the right facilities. Don't forget, a lot of people are going abroad from this country.' ■

Quested monitoring systems

Installed in both control rooms 1 and 2 at Amazon are Quedsted *HM415C* monitoring systems. These are the first fully integrated four-way systems to be manufactured by Quedsted.

They are designed to meet the growing demand for control rooms that are large enough to function comfortably as programming suites, and commensurately large monitoring systems that can adequately handle the wide and often brutal range of sounds produced by synthetic sources at high SPLs.

When dealing with this kind of power and response range, it's more important than ever that the room and monitors are built as an integrated whole. Thus, Roger Quedsted acted as acoustic consultant for the two control rooms at Amazon, ensuring that the structures were massive enough to house the monitors without resonances. In traditional Quedsted style, the prototypes were installed in Studio One, and fine-tuned in situ to ensure optimum working performance. Once refined, the first production pair were made and installed in Studio Two.

Each cabinet measures 555 mm deep, 1060 mm wide and 1260 mm high, and contains four 15 in cone-based drivers plus three dome radiators for the lower mid, upper mid and top frequency ranges. Built of heavily damped 40 mm and 25 mm MDF, each *HM415* weighs a substantial 258 Kg.

The four 15 in drivers are each contained within their own separate ported enclosures around the central sub-baffle which carries the three dome radiators, each a sealed unit in itself. *S200F* Omniphonics-based amps are used to power the upper mid and top ranges; the newly released Hill Chameleon drives the lower mid, while a specially designed mono version of the Chameleon drives the bass — the only amp and configuration they could find capable of delivering the power,

transient response and damping factor needed.

The 15 in driver used is a brand new radial chassis design from Volt. Headroom was a major consideration in the development of the *HM416*, and while each driver is capable of a 28 mm excursion, none is ever asked to go beyond 10 mm even at maximum rating.

The lower midrange driver is a brand new 7 in dome with 4 $\frac{1}{2}$ in voice coil, designed by Roger Quedsted in cooperation with Community Light and Sound in Philadelphia. The dome is unique in being made from polyurethane foam. After extensive R&D with a wide range of materials, the foam was chosen because, though certainly rigid, it's somewhere between soft and hard in terms of the acoustic properties of its surface. Thus it helps create a smooth bridge between the soft upper midrange dome and the doped paper bass drivers. It's also very light and efficient, with an unusually fast transient response.

The upper midrange of the *HM415* uses a later version of the 75 mm soft dome manufactured for Quedsted by Precision Devices (also now under the AKG umbrella). In its original form it has been used for the midrange of the largest Quedsted three-way system operating between 450 Hz and 4.5 kHz. In the *HM415s* it runs from 2 kHz to 5.5 kHz, thus greatly reducing its work load. The HF unit is a 28 mm Morel soft dome used and well proven in other Quedsted designs.

For those interested in the concept but not needing quite the might of the *HM415s*, there are also the *HM412s* — the same sub-baffle assembly with the four 15 in drivers being replaced by four 12 in units.

Further flexibility has been achieved by designing the central sub-baffle to be able to take different HF and upper mid drivers, allowing a range of configurations to suite different applications such as clubs or viewing theatres. ■



DENON

The Compact Disc has won many fans over recent years, especially in the studio. The Denon DN-950FA CD Cartridge player (shown above) made the CD particularly easy to use by combining cartridge convenience with CD quality.

Now Denon has introduced the DN-970FA Cartridge Player (shown left) which offers operational alternatives to the DN-950.

The DN-970 features a sloping front panel which drops down giving access for set-up and servicing.

Features of the DN-970FA include:

- Digital and Analogue Output
- In-built varispeed $\pm 10\%$
- Sophisticated search and cue functions by track & index
- Display of elapsed or remaining track time
- Simple monitor cueing
- Preset fade-in/fade-out times
- Front mounted headphone socket and level control
- Serial and parallel remote control
- 3 memory repeat mode
- 0 sec start
- External sync capability

For more information and a demonstration of the DN-970FA/DN-950FA contact: Hayden Pro-Audio.

THE QUALITY- AUDIO CART MACHINE

Hayden
Pro-Audio

HAYDEN HOUSE
CHILTERN HILL
CHALFONT ST. PETER
BUCKS SL9 9UG
TEL: (0753) 888447
FAX: (0753) 880109

AIR MOVEMENTS 3

The continuing story of the construction of the new AIR Studios. David Mellor follows developments as work continues.

Some months have passed since I last visited Lyndhurst Hall, the future home of Air Studios. The first stage of demolition work has now come to an end and the reconstruction of the former North London meeting place (and missionary school) of the United Reformed Church as a recording studio of the first rank, has begun. I spoke to Dave Harries and Angus Macpherson about progress to date and found that a major talking point was the acquisition of a new piece of high technology equipment — a Sun SPARCstation computer running CAD (Computer Aided Design) software that, together with everything else it can do, has the ability to transform bare plans and elevations into marvellous perspective images showing to the ordinary, non-architecturally trained, mortal what the new studio might look like. The plotted image shown here is good, but you could almost walk into

the pictures on the screen of the computer itself and shake hands with the wire frame human figures!

Angus Macpherson explains how he came out from behind his drawing board and became the CAD equivalent of a recording producer:

‘You can imagine the problems of putting a high-tech business into such a low-tech building, and some time ago we brought up the subject of putting the design work onto CAD with the possibility of speeding it up and cutting down on some of the consultants’ fees. If we could put our work onto CAD and everyone else based their work on that, everything could be quicker and more precise. At the steering committee meeting they thought it would be a very good idea, but no one was particularly *au fait* with driving the equipment, so I suggested that we should employ someone for possibly six months and during that



The restoration of the roof cost over £300,000 in just eradicating the rot, but has given Air room to improve the acoustic performance of the ceiling

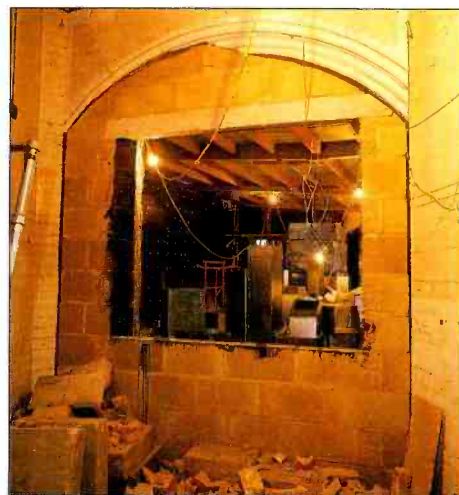




time they might be able to teach me how to use it. It hasn't quite transpired that way, I can sit and work at it but not actually operate it.'

So Angus directs the work of his new assistant and CAD operator, Martyn Hempsted, in much the same way as a producer working alongside an engineer.

At the level of desk top personal computing there are three very well known routes towards getting a system up and running, IBM compatible, Apple *Macintosh* and, particularly for musical applications, Atari. But serious CAD applications stretch the limits of the fastest and most powerful of these.



High density concrete blockwork for control rooms

There are various software packages but the one the acousticians recommended we use is AutoCAD. It's an industry standard and in theory we could send them disks to insert into their computers. I don't know why but they prefer the prints so that's what we send them. The choice was between an IBM style computer such as a Compaq that uses the MSDOS operating system, and a Sun SPARCstation that runs on Unix. Unix is a multifunctional language so that while you're plotting, you can still use the computer, and it's very fast on that machine, much faster than the Compaq, and time is money.

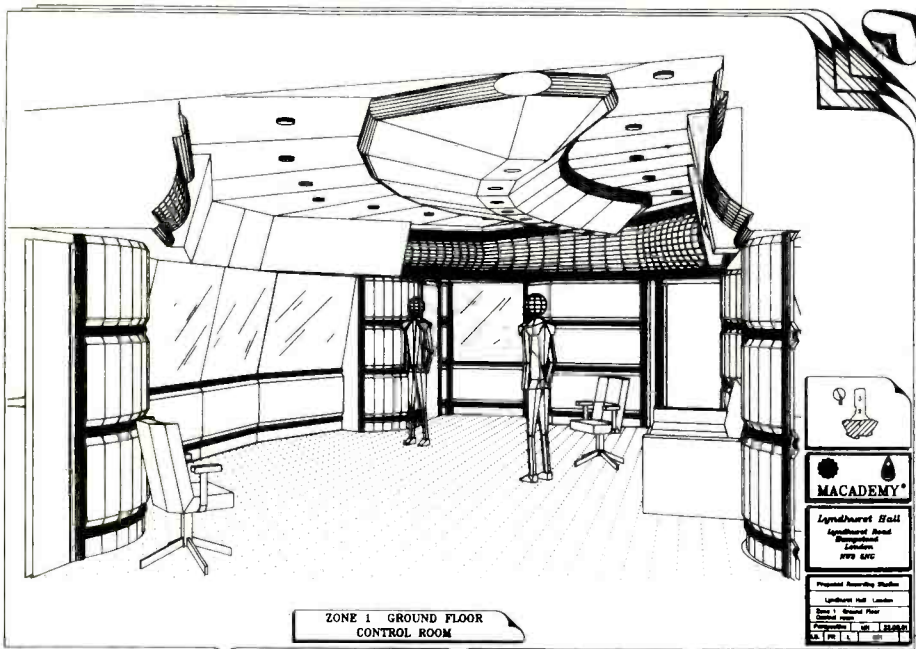
It is an interesting thought that while we are fairly well used to having what we consider as state-of-the-art personal computers and software around us, this type of equipment steps up a league in terms of its price bracket. The AutoCAD software, for instance, sells for around £2500 — at least five times as much as anything else that comes on floppy disks for use on a computer in the control room or in the office!

The main advantage of the computer is that it can deal with a great volume of drawings, and revisions, with incredible accuracy. The current practice at Lyndhurst is to send off a drawing to one of the consultants who will make notes on it that are then entered back into the computer as a revision. This can all take place within a very short period of time and the drawing can then be issued to the builders.

State Of Play

As I looked round the interior of Lyndhurst Hall I was impressed, among other things, by the giant three-pronged blowtorch used to dry out the concrete in the basement. Dave Harries sums up the other events since my last visit:

'We have completed the construction of the ►



CAD image from Air's Sun SPARCstation computer

walls of the basement, including all the underpinning and the damp proofing, and we are now digging out the lift shaft. The basement is 5m deep and the lift shaft will be 7m. Today saw them placing the steels for the roof slab of the basement which supports Control Room number 1 on Tico Pads. 2 and 3 will be above that so we are slowly building up from the basement. The basement will contain the second electrical switch room to contain facilities for TV lighting plus most of the air conditioning plant. The two heads in there are both capable of 500 A although they are fused at 300 A, so there are three phases of 300 A available to run the building and three phases of 300 A for any future film and television lighting which may be needed in the main hall.

The control room floor has been excavated to a depth of 450mm and a new slab poured in there.

On top of that, the walls to support the speakers and the various doorways have been completed with high density concrete blockwork.

The galleries above the main recording area in the hall of the old church are supported on wooden beams which have been warped and distorted over the years due to the weight of the congregation up there, so they have had to be straightened and strengthened. These beams, incidentally, are about a foot square and 30ft long. They must have brought a tree into the room and sawn it up there. It was pitch pine too, you cannot obtain that timber now. We have removed the old Victorian cladding from them, straightened the beams and screwed and glued high-performance plywood in its place. The flooring above is due to be replaced and the pews will, eventually, also be replaced. Parts of the gallery will be levelled off to provide

space to put extra musicians or TV cameras, lights or whatever we want to install. Below in the control room area the main ceiling will support all the air conditioning ducts and provide sound isolation from the church. There's also chicken wire to form a Faraday cage around the whole of the control room so we don't get taxi and ambulance radio interference. Unfortunately, as we have had to shield our immediate neighbours from high volume monitoring, we have covered some windows with blockwork. We do not want to disturb the neighbourhood.

Building can be a messy job and it may pay to watch where you tread:

'John Burgess and George Martin were situated in the penthouse flat on the top floor, it is on stilts with a walkway to their office. They have now moved to a cabin at the front of the building, but, during excavation for the lift shaft, their toilet waste-pipe became damaged and there are funny stories about men working in the lift shaft whilst visitors inadvertently used the loo above!'

Dry Rot

Rust never sleeps, according to an old album title, and dry rot is seldom known to take a rest either. Dave Harries is now something of an expert in this subject:

'The dry rot in the main church roof was more extensive than we first realised. You never notice these things till you start taking parts of the building down and you can reveal how far it has travelled. Dry rot is a fungus and to seek moisture it can travel behind plaster and you obviously don't know the extent of it unless you remove the plaster. A lot of the roof timbers needed to be replaced, and in order to get a guarantee from the company who spray and treat the timber we had to be sure that it was completely eradicated throughout the building. In the process of surveying the main building fully the church roof had to be removed and more of the dry rot became evident.

The restoration of the church roof cost us over £300,000 in just eradicating the dry rot, but at the same time it gave us the opportunity to improve ►



David Harries, the new APRS Chairman



The basement is 5m deep, the lift shaft 7m

All you'll ever
need in a tape.

And then
some.



ENGINEERED TO EXCEED all expectations, Ampex 499 Grand Master[®] Gold delivers low print through and the lowest noise, lowest distortion, and highest output of any high-performance analog mastering tape. Not to mention superior mechanical characteristics to ensure problem-free tape handling on today's high-end transports.

ALL WITH THE legendary consistency you've come to expect from Ampex Grand Master[®] 456. And all backed by the industry's most highly acclaimed service and support.

SO IF WHAT you really need is performance, and then some, go with Ampex. Grand Master 456 and 499 Grand Master Gold.

AMPEX

A MASTER OF ENGINEERING

Ampex Recording Media International Acrc Road Reading, Berkshire RG2 0QR, England (44) 0734 875200 © 1991 Ampex Corporation

SCHOEPS



SCHOEPS
STUDIO
CONDENSER
MICROPHONES

A M B I E N C E

state of the art among stereo microphones today

CONTACTE

AUS dB audio
Junction Terrace,
16 Princess St.
Kew, Victoria, Australia, 3101
Tel.: (03) 862 1070

A Sluder Revoz Wien
Ges. m. b. H., Ludwiggasse 4,
1160 Wien, Tel.: (02 22) 47 33 09

B Heynen Audio Video N.V.
De Koelan 6, 3530 Houthalen,
Tel. 011-52 57 57

CDN Elnova Ltd.
325, Rue Clement Ouest,
Lasalle, Quebec H8R 4B4,
Tel.: (001) 514-364 2118

DK PSS, Gørttelvej 4,
2400 København NV,
Tel. 01-35 82 15 82

SF Lounamaa Electronics Oy,
Hollantilalantie 32,
00331 Helsinki,
Tel. 90-35 80 48 81 33

F Eino S. A., 18-20, rue du
Val Notre Dame, 95100 Argen-
teuil, Tel.: (1) 39.98.44.44

HK Audio Consultants Co., Ltd.
21/F, 8 Luk Hop Str., San Po Kong
Kowloon, Hong Kong,
Tel. 852-3 51 36 28

I TDS - Tecniche del Suono
S.r.l., Via Dei Cignoli 9,
20151 Milano, Tel.: 33.40.03.50

IL Kelliner Ltd., 18 Ha'arba'a
Street, Tel-Aviv, Tel.: 03-5 61 01 52-4

J Imal & Company Ltd.
1-6 Tomhisacho, Shinjuku Tokyo,
Tel. (03) 357-0401

NL Heynen B.V.,
P.O. Box 10, 6590 AA Gennep,
Tel.: 08551-96111

N Siv. Ing. Benum A/S,
Boks 145 Vinderen, 0319 Oslo 3,
Tel.: 472-14 54 60

P G. E. R. Lda., Av. Estados
Unidos da América, 51-5°, Dto
1700 Lisboa, Tel.: (01) 80 46 77

E Singleton Productions,
Via Augusta, 59, Desp. 804
Edif. Mercurio,
08006 Barcelona, Tel.: 2 37 70 80

S els ljud/RMS ab
Hantverkargatan 16,
76130 Norrtelje,
Tel.: 46(0)176-146 50

CH dB Decibel S.A.
Rue de Chardonne,
1604 Puidoux,
Tel.: (021) 946 33 37

GB Scenic Sounds Equipment
Marketing Ltd., 10 William Rd,
London NW1 3 EN,
Tel.: 071-3871262

USA Posthorn Recordings,
142 West 26th Street, 10th Floor,
New York City, N.Y. 10001,
Tel.: (212) 242-3737

Schalltechnik Dr.-Ing. Schoeps GmbH

P.O. B. 410970 · Fax: (07 21) 49 57 50
7500 Karlsruhe · TX, 7826 902 · Tel.: (07 21) 9 43 20-0



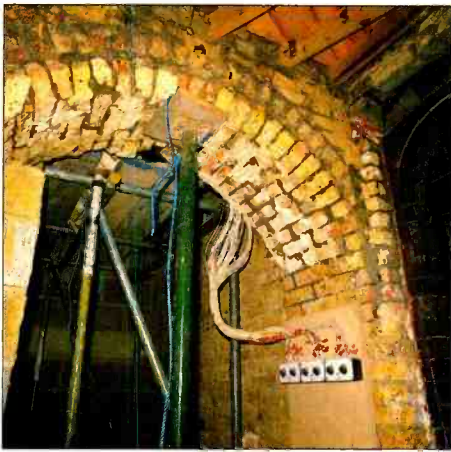
Chicken wire forms a Faraday cage

the acoustic performance of the ceiling which obviously covers a large area. Since we need a very low background noise level in the studio it's essential that the roof is made as good as the walls in terms of isolation. Richard Galbraith of Sandy Brown Associates specified a new structure that has been incorporated into the rebuilding of the roof, using a similar amount of mass but using it in a way very different to the construction of the original dome. About two-thirds of the plaster of the dome had to be removed in order to complete the dry rot treatment. Whilst doing so, the contractors removed the whole lot including the decorative solid plaster ribs which weighed tons. With the permission of English Heritage, these have been replaced with fibrous plaster copies moulded from the originals, together with decorative roses at the cross-pieces of the ribs. The fibrous plaster moulding people were able to fabricate exact copies that were much much lighter than the originals and therefore saved us a fair bit of mass so that plasterboard could be installed into the actual structure of the dome giving added mass for acoustic isolation. At lower levels where the inner dome comes closest to the outside roof it has been necessary to install up to seven layers of plasterboard, whereas in the centre of the dome, where there's a large void to the roof, it has been reduced to two layers. It's therefore given us an advantage, acoustically, to reconstruct the roof in such a way.

'Dry rot eradication is a very difficult job, for although all the treatments are applied and all the suspect timbers replaced, given damp conditions it can easily return. With an enclosed roof space condensation can occur and without adequate ventilation this can cause a build-up of moisture and subsequent danger of rot. As our new roof needed to be acoustically sealed, ventilation became a problem. In order to achieve an adequate air flow throughout the roof our architect, Bernard Parker, designed some attenuated ventilators of plasterboard and fibreglass construction. The outside grilles have had to be stained with a mixture of soot and glue to match the existing roof colour! Our electrician, Ricky Parker, has also installed 66 separate moisture detectors into the timber ends which will enable us to continually monitor the situation in future.'

Air Conditioning

To maintain a pleasant environment in the control rooms and studios Air have opted for an unusual system of air-conditioning. I never knew there was



Electrical switch room will be in the basement

more than one type! Dave Harries:

'The air conditioning system that we are proposing throughout the building is to be an air displacement system as opposed to the normal air dilution system. The air dilution method pours in lots of cold air at high levels that then runs down in the room, mixes with the warmer air and is extracted at floor level. This, logically, seems the wrong way to carry out air conditioning when you think that hot air is always rising to the top of a room. It has an advantage in that less space is taken up in the room because most of the grilles

are around the ceiling and the floor, but the disadvantage is that cold spots are created. Therefore we decided that it might be better to use an air displacement system throughout.

'Air displacement seems the more logical way to air condition a room because the hot air is taken out at the top of the room and the conditioned fresh air is put in at a lower level, so a thermal gradient is created from the floor to the ceiling throughout the room. But it does mean that large ducts are needed because you are injecting into the room a large volume of air at a very low velocity, and for that you need large ducts and large grilles. Conditioned air is similar in temperature (one degree less) to the ambient temperature that is required in the room so in theory you don't notice that the room is air conditioned — you don't feel any air movement and you don't have any cold draughts. It should be just like being in a room that's not air conditioned. The difference between the two systems is that air displacement is like pouring warm, not cold, milk into a hot cup of tea. You need more of it to cool the tea down.'

Next?

The next stage of development will involve starting the construction of the post-production areas at the rear of the building and also preparations for the construction of the video facilities needed for the Pioneer laser disc suite. ■

George Martin On Air Studios, Lyndhurst Hall

Interviewed by David Mellor

'AIR Studios have been located at Oxford Circus since it opened in 1969, and now, because the whole Peter Robinson site is due for redevelopment, the lease cannot be renewed. So the old AIR Studios, as we have known it, is moving to the end of its existence. This comes at a time when downtown studios are becoming something of an anachronism anyway, with everyone moving further and further out. Olympic Studios in Barnes used to be considered to be in the sticks. Now it is Virgin's town studio!

'The move to Lyndhurst Hall Hampstead was a very bold step to take, but in my opinion it was the only logical choice. One has the option of either going forward or backward. When we saw the potential in this lovely old listed Grade II building, we knew how much had to be done, and just how expensive it was going to be. It was too much of an investment for Chrysalis alone, and Pioneer of Japan were most enthusiastic about the scheme. They are now joint partners in our development, and have been most supportive of our effort.

'Because modern recording technology is now within the reach of everyone — even a home studio has facilities which would have amazed us all a few years back — the top professional recording complex has to offer so much more. All this means not only superb acoustics and matchless facilities, it means space and versatility, with the ability to cope with virtually any requirement. When Studio 1 was constructed at AIR in 1969, it was considered to be large for a rock room, but it had a great ambience and quickly became popular with the likes of Elton John, Dire Straits, Paul McCartney and other superstars. For our new beginning I realised that

this had to be the minimum size for a good tracking room. The second facility at Lyndhurst does in fact fit this specification beautifully, while the music hall is very spacious indeed. This hall will undoubtedly be the most versatile studio in the country — if not the world. The commanding control room overlooks the main hexagonal hall with five other connecting areas that can also be used. There is a sound booth on either side of the control room, and beyond that there are two further rooms, bigger than many studios, that connect with the main hall through sliding partitions. You could put a group in one room and have a symphony orchestra in the main hall. In addition there is at the rear an artistes 'drawing room' which can be hooked up as well.

'While recording is of primary importance, this hall will be capable of film scoring and television shows (there is room for an audience of 400 on the mezzanine floor). Conferences could be held here too, as all those requirements will be met. On other floors you will find two more mix rooms with overdub facilities, and Pioneer will have one floor for the mastering of their brilliant laser disc system. And to cap it all, on top of the complex there are apartments where visiting bands can stay. A residential town studio, if you please!

'There are many fine studios around run by dedicated people, one of the best being my old workshop Abbey Road. Ken Townsend has done wonders in leading Abbey Road into the forefront of the studio art. We shall give them competition as we always have, but I believe we shall also be supportive of each other to ensure that this country remains the best place for making records. I earnestly hope the Government and the Unions will realise the importance of making life easier for foreign artists to make their albums here, and film companies to record their soundtracks here. It is the best place, it should not be the most expensive. We should give encouragement to our musicians and the studio industry, for it can only be for the good of our country.' ■

THE Art DIFFUSOR™
 "The Ultimate
 Mix of
 Technology
 with Art"

Performance
 Tested

 Quality
 Materials

 Superior
 Value
 . . .

Sound Architecture

INTERNATIONAL SALES
 Pan Technical Sales & Marketing
 London, U.K. 44-71-247-6101
 FAX 44-71-247-6104

sdc For Orders and Free
 Application Assistance Call
 Systems Development Group
1-800-221-8975

Sony is planning to launch Mini Disc this October, at the Japanese audio and electronics shows, to coincide with the tenth anniversary of the launch of CD in Japan. Philips is planning to launch DCC worldwide in September.

The industry buzzes with rumours that Sony will have difficulty making Mini Disc record compressed code on erasable blanks, at competitive cost and without loss of audio quality. Could the fact that Philips and Sony have done a pool deal on patents pave the way to a common standard on compression coding for the two systems?

Sony has promised that MD will use ATRAC (adaptive transform acoustic coding) which reduces the code to one fifth the data needed for CD's 16 bit linear PCM. For DCC, Philips uses PASC, (precision adaptive sub-band coding), which reduces the code to a quarter that needed for linear PCM. Both systems derive from the compression coding used for DAB, digital audio broadcasting. By March 1992, Sony had still not demonstrated Mini Disc recording on magneto-optical blanks, or proved that the tiny 64mm disc can contain the claimed 74 minutes.

If the pooling of patents does mean that MD and DCC end up using the same compression system, this will surely be PASC. The Decca Recording Centre in West Hampstead has been putting PASC through golden ears tests for the last two years and the latest results suggest that PASC can match 18 bit PCM for dynamic range.

'We can say with certainty that DCC has a better dynamic range than CD', says Tony Griffiths, General Manager at the Decca Recording Centre.

'You said that, not me', is all Griffiths will say when asked the obvious question: will DCC be better than CD?

Gerry Wirtz of Philips in Eindhoven acknowledged early on the help which the golden ears at Polygram/Decca had given on the development of PASC. One of Decca's listening panel, balance engineer Jonathan Stokes, was also involved in the two long series of tests on DAB coding held in Sweden.

Stokes recalls that a lot of the DAB coding systems under test were obviously poor. So were the first versions of PASC. In the early days the Decca panel could hear PASC working seven or eight times out of ten, when comparing the original signal with that same signal fed through a PASC encoder and then decoder.

'Now', says Tony Griffiths, 'we have reached the stage where we only think we can hear something some of the time, but we can't identify what it is and statistically our tests prove nothing. Someone like Jonathan will hear something on one piece of music. But over a hundred tests there will be no statistical evidence that anything is audible'.

Decca have done two main types of test. One is to take a digital master tape, reduce the level by 48 dB and then replay it with the gain wound up to expose added noise and distortion. A switched bypass path across the PASC coder-decoder gives direct comparison of any noise in the original signal with noise added by the codec. Decca also loops the output of the codec to the input through an 18 second delay, so that the effect is to copy,

Barry Fox

Philips' DCC and Sony's MD are launched soon, are they ready?

recode and decode the signal over and over again. The compression system holds up surprisingly well, even after more than a hundred copy generations.

Decca started 16-bit digital recording with 18-bit-capable PCM recorders way back in 1978 and switched to 18 bit working in June 1991. So the Centre has plenty of reliable 18 bit source material available to feed into the PASC system input. The D/A converter at the output was 20 bit. This test has shown that DCC has a better dynamic range than 16 bit CD.

Decca's latest advice to Philips is that there may be room for further improvement if the programme-related quantisation noise can be turned into random hiss or dither.

'We suspect filtering could be improved', says Griffiths, 'because if you are going to have noise it is better to have decent-sounding noise'.

Tony Griffiths envisages a future scenario where the cheaper DCC players will have 16 bit D/A converters and top end players have 18 bit D/A converters.

'And if somebody makes a 20 bit D/A chip, then we know the arithmetic inside the PASC coder is 24 bit, so eventually we could have a 20 bit DCC system'.

'Don't stop, PASC is now very good . . .'

Decca is now thinking about possible professional applications for PASC. Low budget operators currently using DAT, might find DCC a better mastering medium; or PASC might turn a stereo recorder into an eight track machine; perhaps a 24 or 32 track machine becomes a 64 track machine, with some tracks using linear PCM and some PASC.

'We have said to Philips, don't stop', says Griffiths. 'PASC is now very good, but put some more science in. You can do even better than this. Turn quantisation noise into hiss. Whether the ear will notice the improvement, we don't know. But it is well worth continuing development to find out'.

Under the circumstances it is hard to see why Sony should want to press ahead with Mini Disc, and, perhaps, a different coding system, six months after Philips launches DCC with PASC — unless, of course, Philips or Polygram fluffs the DCC launch.

Here, Sony may well be remembering how Polygram handicapped the launch of CD, by providing inadequate software backup in the early days. There are already warning signs that something comparable may happen with DCC.

Philips have sold the idea of DCC on a price structure which puts prerecorded DCC cassettes half-way between conventional analogue music cassettes and premium CDs. But in November 1991, Polygram's Commercial Director in the UK, Dieter Radecki, caused shock waves by announcing that prerecorded DCCs will cost the same as a 'premium-priced compact disc'.

I called Radecki to double check on what he had said. Radecki has since confirmed that he indeed would like to charge the same for DCCs as premium CDs, which on the face of things looks like a pretty good way to handicap the new format and make Sony very happy.

'We are talking about the launch' stressed Radecki. 'We hope they will get cheaper after that, as CDs did'.

This is *not* how I nor anyone else I know, remember the launch of CD in Europe.

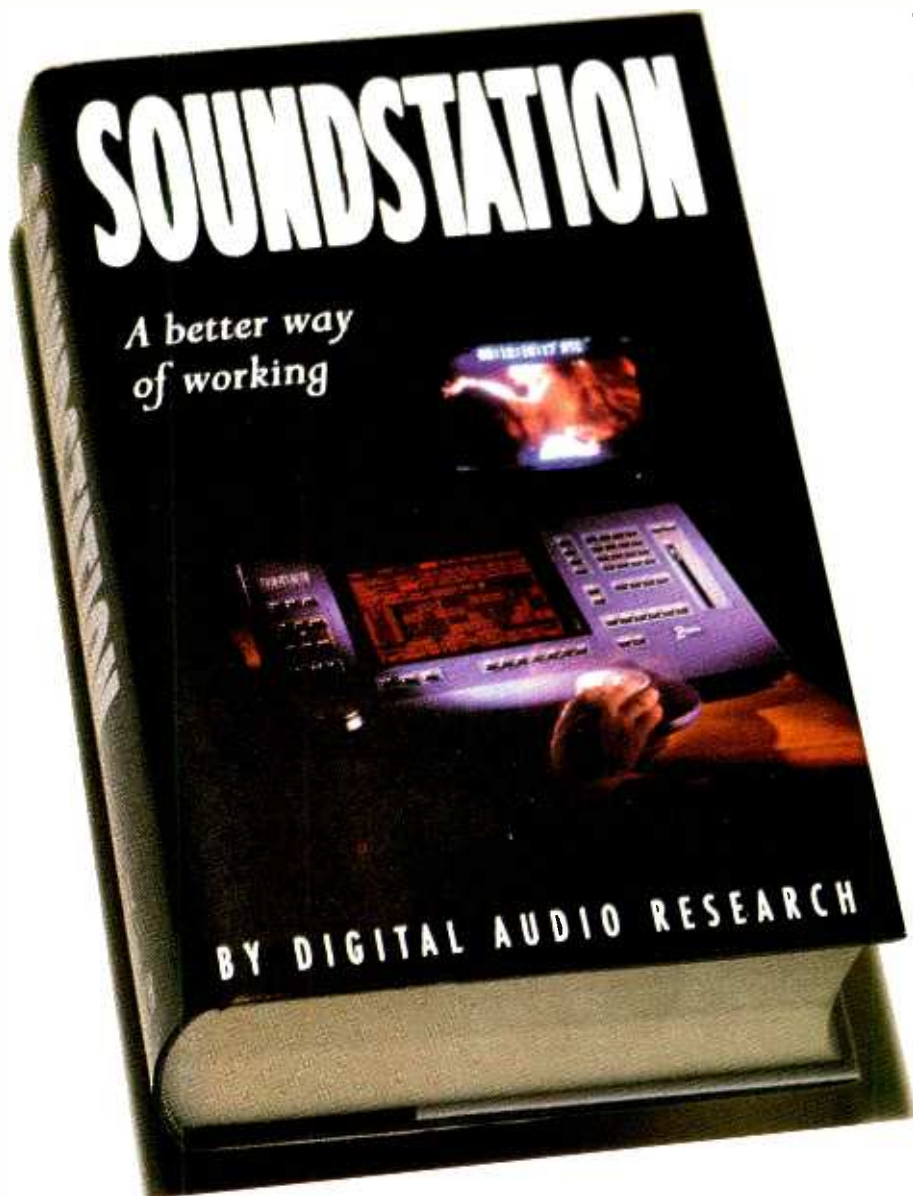
I went back to my files and checked. Just a few months before CD was launched, the target price for discs was around £8. This was because Jan Timmer, then boss of Polygram and now boss of Philips, wanted CDs to be as close in price to vinyl LPs as possible.

When CD went on sale, shop prices for compact discs were £9.99 (and players £500). Although player prices soon fell, disc shortages and demand soon pushed the price up to £11.49 and £11.99 including VAT. Different record companies charged different trade prices ranging from £5.25 plus VAT (Polygram) to £7.29 plus VAT (CBS). By the end of 1985 trade prices ranged from £6.70 to £7.29 plus VAT. The trade price for Polygram's classical CDs rose from £5.75 to £6.25 and then to £6.79, and popular CDs rose from £5.25 to £5.75 and then to £6.79.

The strategy on DCC pricing hinges on Philip's wish to steer the format away from the budget image created by too much talk of digital audio compression. If DCC costs less than CD, the image is confirmed.

Also there will be at least seven DCC duplicating plants on stream by the end of this year, to support the launch. All are majors. Cinram of Canada will produce in the USA and JVC in Japan. Sonopress and Polygram will cover Europe, with at least three other major players soon to be announced. This contrasts with CD, where launch support by the majors was slow. So even with minimum production capacity in each plant there will initially be over capacity, again contrasting with the launch of CD ten years ago. So the launch of the budget DCC labels, for example re-issued and repackaged material, should be much faster than the launch of budget CDs in the 80s.

'I am in favour of equal pricing DCCs and premium CDs' says Radecki. 'But that is not necessarily the company's view. No final decision has been taken yet. The question of royalty rates has not yet been settled and that will affect price'. Radecki is still firm on the promise of a catalogue of 500 titles to support the launch. ■



"We chose the DAR because of its dedicated control surface, its fast learning curve, and the familiar way the system presents itself to experienced professionals."

"Doc" Goldstein, Chief Engineer,
Universal Studios, Hollywood.

"SOUNDSTATION gives more editing facility than any other system at any price."

Ken Morrison, General Manager,
The Ocean Group, Vancouver.

"The choice came down decidedly in favour of SOUNDSTATION as we reviewed other systems and talked to people in the industry."

David Langridge, Senior Sound
Supervisor, Channel 4, London.

TODAY'S BEST SELLER

The reviews are in. While other workstations were resting on their laurels, there's been a quiet explosion in SOUNDSTATION sales. Since the beginning of 1990, SOUNDSTATION sales have grown faster than any other digital audio workstation offering 8 and 16 channels. In fact, SOUNDSTATION is the hottest 8/16 channel workstation on the market today.

Why are film and video post production facilities, recording studios, TV and radio broadcasters turning to SOUNDSTATION in record numbers?

It's simply the best thought-out design. So although SOUNDSTATION offers more power and versatility than other systems, it's also the easiest to learn and fastest to operate.

Just touch the screen to execute routine editing functions or harness all the power of SOUNDSTATION's exclusive features: Advanced DSP functions like Audio Segment-based EQ, Stereo TimeWarp™ and WordFit™ for automatic dialogue synchronisation.

Whatever your requirements or budget, SOUNDSTATION offers a 4, 8 or 16 channel model tailored to your needs. Be sure to enquire about our newest and hottest selling product, the full featured SOUNDSTATION SIGMA, which delivers maximum power and optimum value.

Learn why today's best seller is your best choice. Contact DAR and we'll put you in touch with your local SOUNDSTATION representative for full information or to arrange for a hands-on demonstration.

DIGITAL AUDIO RESEARCH



DIGITAL AUDIO RESEARCH LIMITED
2 Silverglade Business Park, Leatherhead Road,
Chessington Surrey KT9 2QL, England.
Tel. 0372 742848 Fax. 0372 743532

Nobody asked me, but in the name of all that is logical (Wow, I sound like SPOCK) how is anyone in the audio business supposed to afford the cost of attending AES (Audio Engineering Society) meetings around the world? The current 1992 site is in Vienna. Anybody checked out the prices in Vienna recently — mit or mitout Schlagg?! The following year the Society will meet in Berlin. Aside from not exactly being the garden spot of Europe in early Spring, the pricing is more suitable for members of the 'Jet Set'. Check it out. The next thing I expect is for AES European meetings to be held in Gstaad or Monte Carlo. You know, smiling pictures of the current, and incoming, AES President with Prince Rainier and all of that. Declaring an official 'Audio Week'. Little charming bistros selling compact disc-shaped grilled sandwiches, precisely made in specialized Croque Monsieur irons exact to the specifications in the 'Red Book'. 'I'd like a 44.1 kHz Gruyere and Country Ham melt, please. Hold the Dijon mustard!'

Lest anyone think that I am displaying an occasional burst of misanthropy towards our own well loved institution, the AES, consider this. The pronounced reason for siting the meetings back-to-back in Vienna and then Berlin was to create access to the marketplace occasioned by the freeing of the Eastern bloc. Access for the newly empowered citizens of the East and access to the East for those from the West. Good intentions certainly but not terribly realistic to the economies of scale that dominate 'presence' at conventions by members and exhibitors alike. Aside from the spectre of economic collapse that will haunt any buyers from the East, the cost of moving goods to a 'Mittel-Europa' exhibition site is not 'petite pommes de terre'. Trust me that the costs for exhibiting in Vienna and Berlin will not be 'small potatoes' to the audio manufacturers who have to truck, and train, and fly their wares from the four corners of the globe.

Most other audio, or audio-related, technology exhibitions held in Europe have a permanent venue. One always knows that the Paris Festival of Sound is not held in London. It is equally assured that the Montreux TV Festival is not held in Irkutsk. The new NAB (National Association of Broadcasters) Radio Show will also be held in Montreux (Switzerland). The world renowned Photokina has a permanent home in Cologne, Germany. The IBC (International Broadcasting Convention) has indeed moved from Brighton, England to a more truly European venue in Amsterdam — but the new home will be every bit as permanent as Brighton was! And the APRS (Association of Professional Recording Services) show takes place in one place and one place only — Doctor Samuel Johnson's favourite town.

Perhaps it is time to consider that a permanent European AES show site would be more in keeping with the needs of the industry and, incidentally, acknowledge the reality already learned by the promoters of other shows. Success means providing the most accessible and affordable site to the geographic confluence of the largest number of potential attendees. The largest number of audio practitioners in Europe are found in England and

Martin Polon

Our US columnist talks exhibitions, AIDS, Grey markets, new talent and banks

France, with a majority living within a circle drawn around London and Paris.

With the imminent opening of the 'Chunnel' train service added to the already overwhelming range of transportation modes across the Channel, this venue is projected to contain better than 50 percent of all European audio activity by the year 1996. Let's have the AES show where the greatest number of local attendees are — thus eliminating the need for costly transportation and housing for the bulk of the show goers. That essentially suggests stabilising AES show activity in London or Paris — or, perhaps, do a Paris-London rotation similar to the Society's L.A.-New York show circuit. One fact is certain — increasing competition and travel costs in the future will not allow for the keeping of the current peripatetic AES 'status quo'.

Nobody asked me but, isn't it time for those of us in the audio hardware game to join our brethren in the software media side and provide more than lip service in the fight against AIDS? You know who we are. We are the audio eng-in-eers. We wear plastic pocket protectors in our shirts to collect the free pens we get at the AES convention. A Hewlett-Packard calculator is somewhere near us at all times and matching our socks let alone the regular use of deodorant remains an optional exercise. You know who gets AIDS. It's those 'creative' types over in the record community. That's why record stars and record companies do so much in terms of benefits and other charitable

Isn't it time for those of us in the audio hardware game to join our brethren in the software media side in the fight against AIDS

acts. Really believe that, do you, Huh?

Well, friends, do I have a surprise for you. Audio practitioners are getting AIDS and audio practitioners are dying from it. Every day, every month and every year. Do as I did and scan the obituary column in entertainment industry publications for a year and then try to convince yourself that it doesn't happen to us. It only happens to them. Right, and if you believe that I have a lovely bridge that I would like to sell you between Brooklyn and Manhattan. By now, the whole world knows of the infection of Magic Johnson by the HIV virus. There are others in our community who have gotten the virus with much less publicity. It is time that we accept that the disease is out there and that it must be stopped at all costs.

How many talented individuals we all knew in high school and college have been denied the fulfillment of their lives, and you and I the pleasure of their company? Curiously, an old audio friend remarked recently that in his age group (he is approaching 50), there have been more deaths from AIDS than from enforced attendance in the Viet Nam War. He should know, being a charter member of the Cam Ranh Bay Surf Club. Lest we forget, our industry has been and remains a potent power to raise money for the right causes. We do it for high blood pressure and we do it for audio education. It is time to do it for AIDS research so our children will not have to live in fear of this dread killer. AIDS strikes music makers on both sides of the recording console.

Nobody asked me but can you imagine a world lacking any colour? A world defined only by the variation of shades between black and white. Not a very appealing option, is it? Yet many of us in the recording business find ourselves using 'grey' products again and again. Worse still, we frequently suffer for the experience. The term 'grey' refers to name branded products bought outside of the usual marketing loop for conventional retail distribution and almost always counterfeit, or produced legally for distribution in other world regions. These products, most commonly, are expendable supplies such as batteries, film, recording tape on cassette or open reel and sometimes photo gear and electronics.

The concept of 'grey' market products is no surprise to price shopping denizens of the recording world used to the areas around New York's 47th Street or London's Tottenham Court Road. These mostly successful ventures into the wonderful world of 'grey' involve branded goods from major Japanese consumer electronic makers, made to be sold in some other parts of the world. For example, Sushi Electronics makes a smashing DSP (digital signal processing) portable CD player favoured for playback in-studio with a multi-voltage power supply and available for £400 in London through legitimate retail channels. That identical unit can be purchased in New York for about \$350.00, with a North American power supply. The machine will be obtained by the dealer from the United States subsidiary, Sushi America. In the same way, the unit in London ended up in the dealer's hands directly from Sushi UK. The ►



*The Star
is
born!*

Professional sound recordists
have dreamed about owning a
digital NAGRA.
Now it's available.

4 channel digital recorder
reliable open reel 1/4" tape
extra headroom with full 24 bits
per sample

NAGRA-D.

From the company which has
always set the industry standard
in audio recording. And which
made the name **NAGRA** original
and famous.

NAGRA

KUDELSKI S.A., CH-1033 Cheseaux, Switzerland, Tel. 021/731 21 21, Fax 021/731 41 55

same unit can be bought in New York as 'grey' merchandise, originating from Sushi of Panama for about \$300.00 with the world power supply. All of the units are made by the parent Sushi Corporation in Osaka, Japan. All are identical except for some nomenclature.

Sushi America may not honour the warranty, especially if there is a difference in the unit's model number or if there are instructions in Japanese. Still, the price is right and many people do rather well on this portion of the 'grey' market. The legitimate dealers hate this trade since it undercuts their pricing and the US subsidiary of the Japanese multi-national loses the sale as well. This sort of thing happens less in the European Community because of the stringent efforts at collecting VAT. But it does happen and it is a fact of life in camera and electronics retailing. Loss of warranty remains the greatest peril in this situation.

A great deal more risk is attendant with the purchase of so-called 'grey' expendable supplies. The phrase 'so-called' is used because frequently the product in question trades on the 'grey' status of similar expendable goods but is in fact absolutely counterfeit. The whole point of the charisma of 'grey' market products is that the item is the identical unit bought through legitimate channels, but with a substantial discount. Many studios have bought batteries and tape thinking they were getting a swell price break but instead got very much what they had paid for — junk!! With any 'grey' product, the retail ambiance is a dead give-away as to the product's status. Tape and batteries bought at street markets, flea markets, on street corners or from so-called bargain stores almost always represents either 'grey' goods from other countries or outright copies. Legitimate retailers will almost never carry such expendables — the risk to them of prosecution is too great.

There are several pitfalls in buying 'grey' expendables. With batteries, the products could be legitimate or illegitimate but still be marginal in both cases. Let's say that a franchisee of a major battery maker produces AA alkaline cells in a third world country for local consumption. The product standard is maintained and when new, the batteries are excellent. The local economy being what it is, the cells are significantly underpriced compared to London or New York. The cells are brought into Great Britain or the United States via a number of different routes and ruses. All of these involve time consuming voyages and time spent on docks or in warehouses. That means aging of the cells and frequently high heat and humidity. The bargain battery you buy is usually anything but by the time it reaches your favourite street corner vendor. And, enterprising entrepreneurs/pirates in certain countries make cheap copies of branded batteries. The usual ploy is to package lead-acid cells as though they were alkaline. So the unwary buyer's 'discount' turns out to be a high price indeed for potentially leaky conventional batteries.

'Grey' photographic film is rarely counterfeit but is subject to the same heat, humidity and time problems as batteries and is just as susceptible to such damage. Audio tape is a somewhat different

For many labels, catalogue reissue now accounts for as much as half of all record sales.

story. We all have heard about the resale of used quarter inch audio tape in new boxes. What we haven't heard about is the Asian pirates who buy up used half and full inch computer tape — place it onto audio type reels or hubs — package it with extreme fastidiousness as new and sell it to unsuspecting multi-track studio users. Add to this those who buy good branded tape in countries with a price and currency exchange differential and ship it as for the batteries above, so heat and humidity can work their magic with the tape. Although you would think that most studios would be too savvy to fall for such scams, as P.T. Barnum once said, 'There is a sucker born every minute'. Add to that those studios that buy counterfeit audio cassettes to save a buck or a pound or two.

The only sure way to avoid battery and tape failure is to purchase these expendables from legitimate dealers. Always check the notice of place of manufacture, to be sure that the product is not coming from a foreign factory of a major domestic supplier. Look for information on the product in a foreign language. Also check for the 'pull' date on batteries and film. Inspect product codes on large orders of audio tape. These should usually match up in sequence on the same shipment or relatively so. If you are suspicious about a branded shipment, call the manufacturer. They will assist you and will bring in the proper authorities to deal with the fraud because that is exactly what it is.

Nobody asked me, but the huge record contracts offered to Michael Jackson, Madonna, Janet Jackson, Aerosmith and others foreshadow a continuation of the present record industry practice of re-issuing catalogue and banking on proven talent. The one thing that everyone in the recording studio industry agrees on is that the calamitous drop in new album projects is a direct result of these practices. We all know that the numbers have shifted in the last fifteen years with the amount of major league studio business involving album projects bottoming out at about 25 percent as opposed to the former 80 percent. The record industry argues that only about one new act, out of 40 or so signed will succeed in a major way. They view that as a tremendous risk in investment. Far safer, they say, to re-issue catalogue especially with the graying population crying out for more of its musical past. Industry insiders point out that for many labels, catalogue re-issue now accounts

for as much as half of all record sales. Other industry insiders say that the size of the Michael Jackson contract would pay for as many as 50 to 100 new albums being released by other groups if that funding had been redirected by the label. A curious conundrum.

Nobody asked me, but don't look for the current drop in interest rates being experienced in the United States, the United Kingdom and elsewhere to materially change the availability of loan money for studio investment — either in technical equipment or physical plant. The problem is that while in theory, the rate drop should be reflected in lower rates being charged to potential loan applicants in the recording field, in actual practice the recording studio client is still generally suffering discrimination at the loan window.

There are several reasons for this funding shortfall. First, the banks are not passing on the falling interest rates to any but their best customers. The banking industry, on both sides of the Atlantic, has had a decade of ill-chosen and poorly conceived real estate investments to digest during the last 18 months. These have cost the banks dearly. Now, the drop in interest rates charged to the banks by the government central bank is being used as a profit source. None of the loan customers are receiving the full benefit of the recent rate decrease. The banks have evolved a two-tiered system of loan availability. Those companies judged to be the most worthy of the granting of credit are serviced. The rest of the business community is either frozen out altogether or charged rates so exorbitant as to question the rationale for the banks being in the loan business in the first place.

Even the promise of being able to refinance a real estate mortgage at a lower rate is frequently a carrot dangled before a hungry horse and then removed. The problem with refinancing at many studios is the need to prepare new business worth evaluations and get new appraisals for the property. These evaluations and appraisals become a double-edged sword all pointed at the studio owner. It is not unusual for these estimates to come in lower in 1992 than the first set of figures used to grant the original loan, however many years ago. Banks frown on this perceived drop in values and in many cases the value of the old mortgage exceeds the current estimate and cannot be refinanced.

The answer to the question of how to obtain funds to continue to 'grow' a studio business is that nothing has changed and everything has changed. The conventional wisdom of maintaining a personal and profitable relationship with a local bank is still valid. This, of course, assumes that the local bank still has some control of its own destiny and has not been either swallowed up by a megabank or cowed by government regulators. Also valid is the concept of financing growth out of revenues. Should both these dictums fail, then all any studio owner can do is to wait for financial conditions to improve in 1992; hopefully loosening up credit availability. ■

One stereotype you can't ignore.



MS Stereo from Sennheiser

A superb combination from Sennheiser. That is both versatile and effective.

The MKH 30 is a pressure gradient mic with figure of eight directivity, optimising wide frequency response, lateral sound rejection and extremely low inherent noise. Matched with the remarkable directivity and sensitivity of the MKH 60 supercardioid microphone.

And to enhance the stereo image, low frequency ambience and vibration pick-up is minimised by highly efficient roll-off filters.

So everything you record sounds natural, with an accuracy no other method can achieve.



For operational flexibility, using a Y connecting cable means only one multiway cable is necessary.

Of course, when MS stereo isn't required, each mic can be used independently.

Important, when you consider the variety of tasks that you have to face in the field.

Sennheiser have produced an informative brochure by Manfred Hibbing on MS and XY stereo recording techniques which is available free.

For this and details of other great MS 'stereotypes' from the Sennheiser range phone (0628) 850811.



SENNHEISER UK LTD, FREEPOST, LOUDWATER,
HIGH WYCOMBE, BUCKS HP10 8BR

DESIGNED BY BROADCASTERS FOR BROADCASTERS



MBI designs, installs and commissions radio studio systems and manufactures a range of broadcast mixers and ancillary equipment.



See
the New Series 20 Mixer
at APRS

Broadcasters who have MBI Equipment and/or systems designed, installed and commissioned on a turnkey basis by MBI:-
 Refurbishment of BBC Broadcasting House, London
 BBC World Service Bush House, London
 BBC Aberdeen Scotland
 BBC Inverness, Scotland
 BBC Broadcasting House, Glasgow, Scotland
 BBC South West Region, Bristol
 BBC Radio Solent, Southampton
 BBC Radio Production, Epsom
 BBC Staff Training, Evesham
 BBC Staff Training, Grafton House, London
 BBC News (Moscow, Paris, Tokyo, Brussels)
 BBC Westminster, London
 BBC Wolverhampton, England
 BBC Edinburgh, Scotland
 Capital Radio, London
 Capital Gold, London
 LBC Newsradio, London
 Leicester

Sound, England
 Red Dragon Radio, Wales
 Radio Wyvern, England
 Southern Sound, England
 Invicta Radio, England
 Broadland, England
 Plymouth Sound, England
 Picoadilly Radio, England
 Key 103, England
 Ocean Sound, England
 Ocean Gold AM, England
 Ocean Power FM, England
 Ocean The Light FM, England
 Radio Trent, England
 Radio Tees, England
 Royal Navy, England
 Bradford City Radio, England
 Sunset Radio, Manchester, England
 Falmouth School of Art & Design, Cornwall, England
 Hospital Radio Truro, Cornwall, England
 Hospital Radio General, Warrington, England
 BHBN Hospital Radio, Birmingham, England
 Hospital Radio Lion, Guildford, England
 Hospital Radio Wycombe, England
 Woodwich Hospital Radio, England
 National Broadcasting



School, England
 Swansea Sound, Wales
 Hospital Radio Clywd, Wales
 Rookwood Sound, Cardiff, Wales
 Radio Vest, Stavanger, Norway
 Radio Zursee, Switzerland
 Radio Thurgau, Switzerland
 Radio Rheintal, Switzerland
 Radio Pilatus, Switzerland
 Radio 24, Switzerland
 Radio Sonnenschein, Switzerland
 Radio Gorzen, Switzerland
 Radio Munot, Switzerland
 Radio Bern, Switzerland
 Radio Uptown, Denmark
 Radio Horsholm, Denmark
 The Voice, Denmark
 Radio Downtown, Denmark
 Radio Fredencia, Denmark
 Arto, Denmark
 Aslborg Nærradio, Denmark
 Radio Viborg, Denmark
 Rikisutvarpid, Iceland
 Sjaman FM 102.2, Iceland
 Icelandic Television Service, Iceland
 Bygjan Reykjavik, Iceland
 Zimbabwe Broadcasting Corporation, Zimbabwe
 Sri Lanka Broadcasting Corporation, Sri Lanka

Radio New Zealand
 Radio Uganda
 Uganda TV
 Chinese People's Radio, China
 Dailin People's Radio, China
 Guangdong Radio, China
 Beijing People's Radio, China
 Kwunming People's Radio, China
 Radio Malmohus, Sweden
 I.R.E.C., France
 Radio Tahiti
 Radio Botswana, Gaborone
 Voice of Kenya
 Nederlandse Omroep Stichting, Holland
 Radio Vara, Holland
 Radio Veronica, Holland
 Radio Tros, Holland
 Radio Zeeland, Holland
 Radio Telefis Eireann, Ireland

H A division of Harman International Industries

69 Ship Street, Brighton, BN1 1AE, ENGLAND · Tel: 0273 24928 I.D.D. +44 273 24298 · Fax 0273 821767 I.D.D. +44 273 821767 · Telex 878235 MBI G

RE make Digital Audio work for you

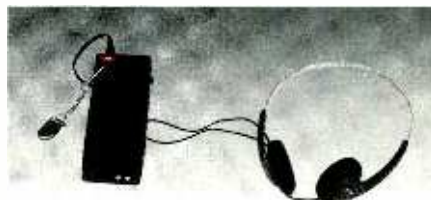
The right tools make serial digital audio as easy to use as the familiar analogue format it replaces:

- The d920 Reference Generator supplies multiple station-locked AES/EBU reference signals, with time code, to synchronise all your digital audio equipment.
- The d930 Interface Analyser provides a comprehensive analysis of AES/EBU digital audio interfaces. With its simple controls, you can monitor or modify data bit activity.
- The d940 Digital Headphones make serial data streams as convenient to trace as analogue feeds. The light clip-on unit lets you listen to the source and check the validity and robustness of the data.

For more information and demonstrations, please contact:

RE BROADCAST LTD.

Alberto House · Hogwood Lane · Finchampstead · Berkshire RG11 4RF · United Kingdom
 Telephone +44 734 731119 · Telefax +44 734 731190



EXPLORING EQUALISERS

Part 2 of Ben Duncan's look at the engineering and design factors that govern analogue equaliser's sonic quality

Two-band equalisers are just the beginning. You can only boost the mid by cutting both ends hard, and beyond a choice of two or three LF and HF turnover frequencies, there is little selectivity. To deal with midrange frequencies, we need a third band. It's possible to fit a third, mid-band control network to the Baxandall circuit. For least interaction, it almost certainly has to be centred on or close to 1 kHz. The mid control's bandpass can be defined with two capacitors (CM1, CM2 in Fig. 1) but the Q (see sidebar) is so low that the mid effect spreads rather wide. This and the impedance interaction means it's badly affected by the LF and HF settings; you'd have to adjust the knobs repeatedly to make changes without upsetting where you've got to already. The resonant inductor-capacitor combination (Fig. 2) yields a higher Q, giving a steeper, slimmer midrange set (Fig. 3), which can squeeze between the LF and HF and is reasonably interaction-free. A gyrator circuit (discussed later) can be used in place of the inductor.

The overriding limitation with 3-band Baxandall EQs is that the frequency 'area' isn't adjustable or sweepable. Boost and cut centred on 1 kHz is not the answer to all requirements. If frequency has to be fixed, we really need a fourth band to perform subtle surgery. That's because the musical scale is no monolith. Like 'bass' and 'treble', midrange is an arbitrary construct and mid frequencies break down into a kaleidoscope of different tone colours. Rainbows within rainbows, if you prefer. At the very least, we should divide it into two. There are soft sounds in the lower mids (LM), and harder sounds in the higher mids (HM). Having midrange EQ isn't much of an improvement over a 2-band equaliser if you're unable to adjust these two poles separately. You can do one or other with a 3-band EQ with a sweepable mid control but with a fixed 4-band EQ, you have independent control over both the low and high mids. Fig. 4 shows a classic arrangement adopted by UK console makers in the mid '70s and adopted for op-amps by the author¹⁰, using two Baxandall circuits in series. Interaction is avoided as far as possible by staggering the frequency ranges covered by each stage, pairing LF-HM, then LM-HF, so the ranges in each section

have little overlap.

Movable peaks and dips

Between the LF and HF 'shelving' knobs of a modern console, selective, sweepable EQ is the mainstay. Principally it covers midrange frequencies, with two or more overlapping bands but the lowest and highest ranges can (and often do) make excursions in the territory already covered less selectively by the LF and HF 'shelving' controls (Fig. 5). Intermediate consoles' mid EQ sections have two controls per band: boost/cut (gain) and frequency. Marketing people, who should know better, regularly misuse the word 'parametric' to puff-up such affairs, when in fact they are strictly 'Sweep(able frequency) equalisers'.

Fig. 6 shows the general scheme for sweep EQ, based on the framework of the Baxandall topology. Some kind of bandpass device is hung from the wiper of a boost/cut control and fed into the op-amp's positive input. In most commercial designs, series/shunt R.C networks provide the bandpass response. A dual pot (the R element) shifts the bandpass area but needs an anti-log law for a smooth change of frequency with rotation. This can be grasped by observing the accelerating spacing in Fig. 5, where a linear pot has been simulated. Looking now at real console circuits, in Fig. 7, taken from a budget Japanese mixer, the network is purely passive. The varying source impedance coming off the boost/cut control at point A makes the EQ inconsistent. The different capacitor values don't help. Overall, this EQ's centre frequency shifts upwards by 1/4-octave as maximum cut and boost are approached. In Fig. 8, a UK maker has tidied up by adding active buffering upfront (A1). Fig. 9 makes the bandpass active instead, using the Wein configuration. Note the lower arm resistor (RQ), which applies positive feedback to set the optimum Q. Whether a given EQ of this type sounds good or works well depends to a great extent on who made the

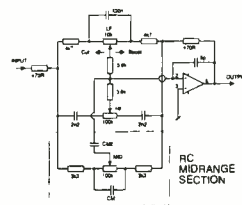


Fig. 1 3-band Baxandall EQ, RC type
Development of definitive 2 band version

Fig. 1: 3-band Baxandall EQ, RC type

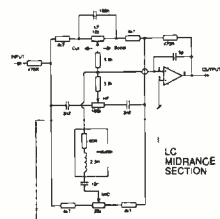


Fig. 2 3-band Baxandall EQ, RLC type
Development of definitive 2 band version

Fig. 2: 3-band Baxandall EQ, RLC type

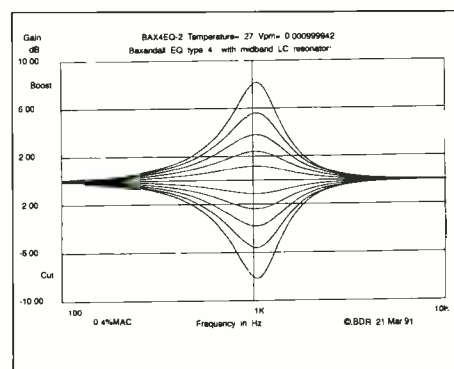


Fig. 3: With midband LC resonator

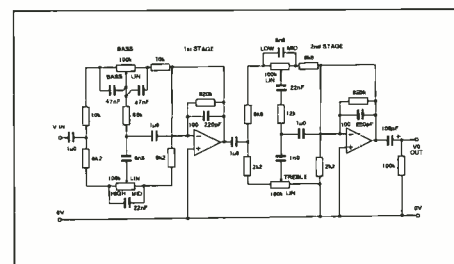


Fig. 4: Mid 70s classic EQ design

decisions on component values that govern Q as well as change of Q with setting. 'Optimum' Q depends on what you're trying to achieve, the frequency areas being covered and the musical sounds you're dealing with. So a fixed Q is far more of a compromise with a single midrange equaliser than with ones having three or more overlapping bands each with different Q values. The mixers in which Figs. 7 to 9 appear all employ two such sections in cascade, that is two independently sweepable midbands.

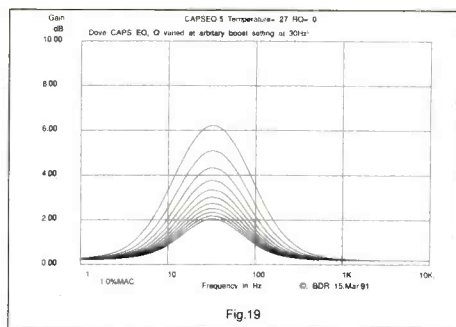


Fig. 5

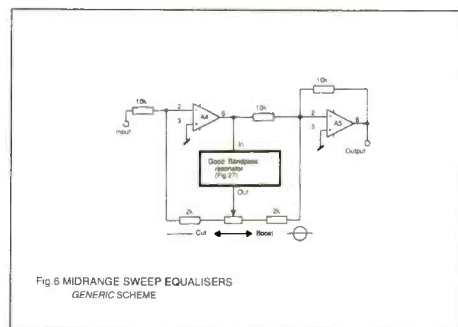


Fig. 6: General scheme for sweep EQ

Flexure

The term parametric can only be fairly used when a third control is added to vary the Q, width or sharpness of the selectively boosted (or cut) frequency area (Fig. 10). As can be seen, Q interacts with gain and is a dangerous playing in the wrong hands. Even in skilled hands, it begs time consuming tweaking. On the other hand, with a sweep EQ (no Q knob remember!) one has to pray at the point of buying a new console, that the salesman is telling the truth when he assures us that the designers have worked hard to balance selectivity with musically acceptable and useful results. In use, it may take some time to find out.

There are at least five common circuit topologies capable of providing peak/dip (or 'Bell', or 'bandpass/band-reject') curves with variable Q. ▶

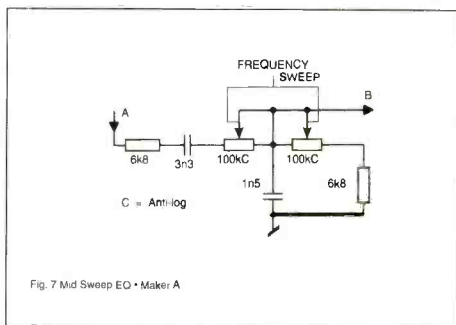


Fig. 7: Budget Japanese mixer

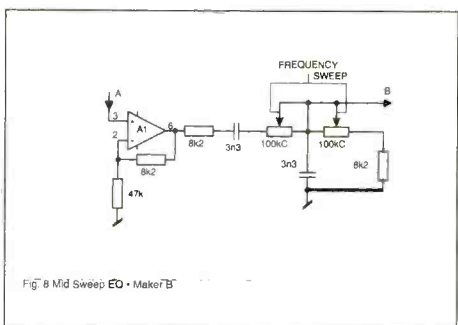


Fig. 8: Added active buffering

Engineering psychology primer

In the discussion that follows, readers who are more musically minded will find that a little inside knowledge will make it easier to understand why, out of countless possible ways of creating tonal change, a minority of circuits are favoured. This is influenced by the number of parts, and component values, they require.

● Capacitors and inductors, together or used singly but always in conjunction with a resistor, are the heart of all 'frequency conscious' networks in analogue audio. The product of the two components' values determines the operating, turnover or resonating frequency. Out of infinite combinations, the optimum pair of component values are down to impedance, avoiding loading, distortion and control interaction (too low), without incurring noise and crosstalk/sidetalk/backtalk (too high). With Inductor-Capacitor (LC) combinations, there is no noise but the LC value ratios define both Q and frequency so just one unique pair of values gives the desired result.

● Resistors are cheap, even with close tolerance matching (0.5%). Over 600 regularly spaced ohmic values are readily available spanning a range in excess of 10,000,000:1. The value chosen has no influence on physical size (which is small) and little effect on price, over the most common

values ranging over 10R to 1M.

● Capacitors (excepting electrolytics, not used as FDCs in equalisers) are mass produced in over 150 standard values, spanning 1,000,000:1. Audio-grade capacitors made with plastic films ('poly-various') are cheap in small values, becoming disproportionately expensive above 100 nF (0.1 μF). Their size expands, too, but at a lesser rate than price, eventually reaching the size of a Tippex bottle at around 10 μF. Ceramic types are much smaller but should not be used for audio, excepting low-k types, whose values are too low to be useful as FDCs.

● Inductors for audio have to be custom made. They are often larger than the capacitors they're paired with (1 Henry ≡ 1 Farad). They end up heavier, are more costly than other parts, and then demand heavy and costly shielding to properly guard them. Otherwise, mains hum or signal will be picked up from nearby transformers. In this open bandit territory there are no standard values and shapes. Still, there is nothing to prevent the maker actually using them if he/she can see enough benefit(s) to outweigh the hassle; the EEC haven't outlawed them — yet.

● Pots are the cheapest and most transparent means of adjusting an equaliser. Switches make their appearance when definite values of change are preferred, and whenever capacitor and inductor values must be changed. Variable inductors and capacitors do not exist in the large values needed for audio work.

● Linear potentiometers giving an equal change

of resistance per degree are cheap and readily available. Pots having non-linear logarithmic (log) or related control laws (eg anti-log, semi-log) are more trouble and close matching is rare. Selection by hand is possible but who will want the skips (truck-loaded refuse containers) loaded with the 95% that get rejected? Depending on the circuit topology, either type may be needed to get the perceived EQ effect to occur linearly, ie in audibly consistent intervals, as the control is wound up and down.

● Symmetry and simplicity are beautiful.

Q

'Q' stands for Quality; the term was borrowed from radio technology, where the quality of a tuning circuit is its sharpness, hence ability to reject adjacent stations. All selective circuits rely on the interplay between a capacitor and inductor (or gyrator) placed in series or parallel. In a series-resonant circuit, the impedances of the two devices mutually cancel at the resonant frequency. In a parallel circuit, the impedance goes to infinity. Any resistance in the circuit curtails the ultimate effect, reducing Q.

For audio, 'width' is a better, more general term. With a low Q, the resonant frequency area is spread wide. Higher Qs are more selective but exhibit increasingly non-musical effects, to be illustrated later in the series. ■



Just a few lines

The expanding range of versatile and flexible loudspeaker systems from Pro' Monitors not only sport an impressive technical specification they sound good too.

The worlds first transmission line Studio Monitoring system the **BB5** has been joined by the worlds smallest transmission line the **LBI** and there are more to come.

But contrary to what you may think its not just LF response we like to boast about but neutrality, horizontal and vertical stereo imaging and power handling.

If you mix music, balance speech or drama for broadcast then take a listen because it takes just a few lines to show you what you're missing.



THE PROFESSIONAL MONITOR COMPANY

27 The Avenue, Highams Park, London E4 9LB. Tel: 081 531 5308 Fax: 0582 579278



Dynamic Processing Has Reached A New Peak.

The name Klark-Teknik has always been synonymous with audio technology at its highest level. Innovative engineering combined with quality components ensure products of outstanding musical purity and durability.

Now, that same commitment has been brought to dynamic processing. With the new Series 500.

The DN500 is the only two-channel compressor/limiter/expander that lets you use its processing functions in any combination — with full function variable knee compression, independent peak limiting and clipping. Plus a variable ratio expander/gate for total dynamic control.

Most importantly, it delivers all the clean, quiet sound quality and reliability you'd expect from Klark-Teknik.

The same high standards are common to all Series 500 products — from the compact DN504 Quad Compressor/Limiter, to the flexible DN510 Dual MIDI Noise Gate and DN514 Quad Auto Gate.

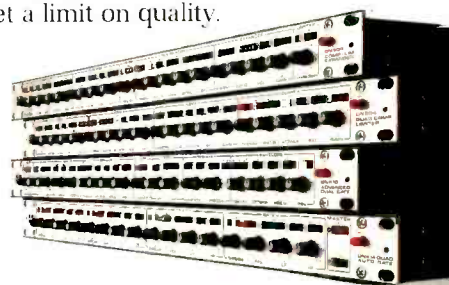
If you're looking for the ultimate in dynamic processing, visit your local Klark-Teknik dealer and find out more about the Series 500. Because at Klark-Teknik, we never set a limit on quality.



Klark-Teknik Research Ltd
Klark Industrial Park, Walter Nash Road
Kidderminster, Worcs. DY11 7HJ
Tel: 0562 741515 Fax: 0562 745371

Klark-Teknik Electronics Inc
200 Sea Lane, Farmingdale, NY 11735, USA
Tel: 516 249 3660 Fax: 516 420 1863

Klark-Teknik (Singapore) Pte Ltd
7500A Beach Road, 04-308 The Plaza, Singapore 0719
Tel: 293 9736 Fax: 293 9738



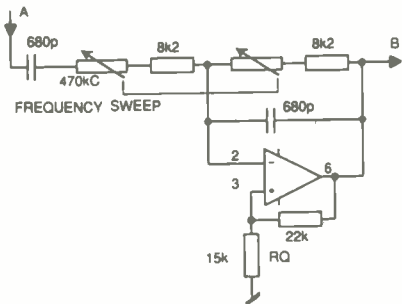


Fig. 9 Mid Sweep EQ - Maker C

Fig. 9: Wein EQ configuration

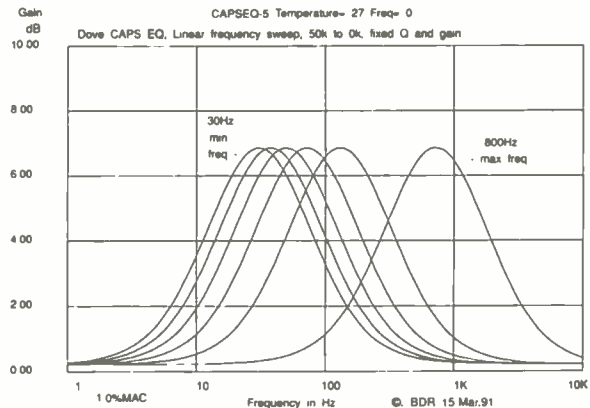


Fig.24

Fig. 10: Parametric EQ

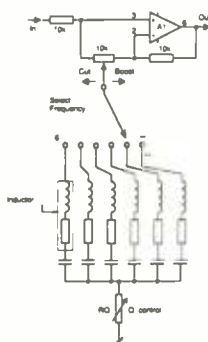


Fig. 11 Switchable passive resonator

Fig. 11: Switchable passive resonator

The Wein EQ of Fig. 9 can be used, by making RQ a variable resistor but the positive feedback needed for high Q significantly increases distortion, while the higher Q settings are unduly critical, bringing the circuit dangerously close to turning into a close relative, the Wein-bridge oscillator. The passive resonator EQ (Fig. 11) with a rostra of LC networks hung from a 'swinging input' type of boost/cut stage is another possibility,

although frequency 'sweep' is reduced to discrete switched steps. A high enough Q is preset by selecting a suitable ratio of inductance to capacitance, always assuming that each inductor has a low winding resistance, as depicted by the associated resistors. Q can be varied downwards (but not very linearly) by adjusting the external damping resistor, RQ.

The gyrator resonator EQ (Fig. 12) synthesises

the behaviour of the RLC network, obviating the need for the inductor while exchanging the problems of real inductors for others. To simulate an inductor accurately and with low distortion at high frequencies, while developing high enough Q, the IC op-amp doing the business in Fig. 12b has to have a very wide GBWP, preferably 10 times greater than the bandwidth of the TL071 (or similar) op-amps commonly employed in many equalisers. The primitive one-transistor variant (Fig. 12a) seen in a junior Japanese mixer shouldn't really be used above bass frequencies. Although pictured hung from the swinging input boost/cut circuit, the same gyrator can go anywhere an inductor would be used. The only caveat is that true, bilateral gyrator topologies are needed to cope with circuit positions (in Fig. 2 for example) where both sides of the inductor are above ground. The circuits in Fig. 12 closely resembles a single pole Sallen & Key filter. Two pole variants (with an added R.C) give a steeper, higher Q response, covering about 1/3-octave.

The so-called 'state-variable' network in Fig. 13 comprises a ring of three op-amps, which can give low- and highpass as well as bandpass outputs, depending on how it's connected. The LP and HP ►

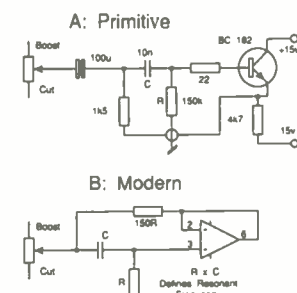
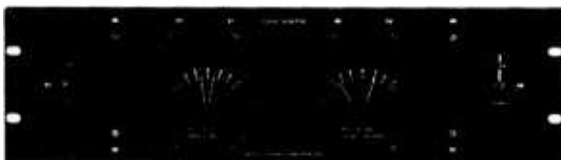


Fig. 12: Gyrator Implementation

Fig. 12: Gyrator resonator EQ

TWIN TWIN PPM



Two TWIN movements and two PPM9 boards give simultaneous monitoring of A/B on red and green and M/S on white and yellow pointers. Under licence from the BBC.

Also PPM10: IN-VISION PPM RGB outputs, or superimposed on PAL pictures. PPM10 takes stereo audio inputs and generates a high definition colour video display emulating the well known coaxial twin movements, long regarded as a most satisfactory way of monitoring stereo levels and mono compatibility. The eye can judge the level displayed, at a glance, from the angle of pointers, without needing to refer to scale markings.

SURREY ELECTRONICS LTD, The Forge, Lucks Green, Cranleigh, Surrey GU6 7BG
Tel: 0483 275997 * Fax 0483 276477

Examine your Options

The complexity of today's studio environment demands an operational flexibility not available in a single console, until now! The VECTOR 432 from Trident.

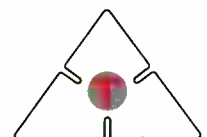
Equally comfortable in Music or Post Production and built to Broadcast standards, the VECTOR is truly the console of choice. All this and Trident sonics at an affordable price.

Examine our competition and then investigate the VECTOR. We are sure you will find your options are few.



TRIDENT VECTOR AT MIXERS LAB, TOKYO

- ▲ 32 balanced multitrack routing buses.
- ▲ A/B/C/D balanced stereo buses with mix matrix and Main Output Bus compressor.
- ▲ Grouping and automation of 12 switches per module via SMPTE or MIDI.
- ▲ P & G faders. Sealed conductive plastic pots throughout.
- ▲ Four band Parametric equaliser splittable between both Channel and Monitor with individual bypass switches.



TRIDENT

The VECTOR 432 is available with a wide range of options including:-

- ▲ LCRS Film, Stereo Input, Effects return & 4 way Dynamics modules. VCA grouping, VU or bargraph meters.
- ▲ Single VCA (channel), Dual VCA (channel & monitor), or Moving fader automation systems, any of which may be integrated with the Trident Machine Control, enabling sophisticated cue list management, cycles and 'drop in' of master, slave and MIDI (virtual) transports.

TRIDENT AUDIO DEVELOPMENTS LTD. Trident House, Rodd Estate, Govett Avenue, Shepperton, Middlesex TW17 8AQ, England. Phone 0932-224665 Fax 0932-226721

TRIDENT AUDIO USA 2720 Monterey Street, Suite 403 Torrance California 90503, USA Phone 213-533-8900 Fax 213-533-7072

TASCAM

European Distributors

Hi-Fi Stereo Center Kain
Muenchner Bundesstrasse 42,
5013 Salzburg,
AUSTRIA.
Tel: (0662) 37701

Teac Belgium NV/SA,
Woluwelau 14 3C,
1831 Diegem,
BELGIUM.
Tel: +32 27256555

So and Hoyem A/S,
Bulowsgarden,
Bulowvej 3,
1870 Frederiksberg C,
DENMARK.
Tel: (031) 22 44 34

Studiovox Oy,
Hoylaamotie 8,
SF-00381 Helsinki,
FINLAND.
Tel: 0506 1311

Teac France Sa,
17 Rue Alexis de Torqueville,
92182 Antony,
FRANCE.
Tel: (01) 4237 0102

Teac Deutschland GmbH
Bahnstrasse 12,
6200 Wiesbaden-Erbenheim,
GERMANY.
Tel: (06121) 71580

Elina SA,
59/59A Tritis Septemvriou St.,
Athens 103,
GREECE.
Tel: (01) 8220 037

Greenlands Radio Centre,
PO Box 119,
3900 Godthab,
GREENLAND.
Tel: 299 21347

GBC Italiana spa,
Viale Matteotti, 66,
Cinisello Balsamo, Milan,
ITALY.
Tel: (02) 618 1801

Hjodriti — Hot Ice,
PO Box 138,
Hafnarfirdi,
ICELAND.
Tel: (01) 53776

AEG Nederland NV,
Aletta Jacobslaan 7,
1066 BP Amsterdam,
NETHERLANDS.
Tel: (020) 5105 473

Audiotron A/S,
Seilduksgt, 25,
PO Box 2068 Grunerlokka,
0505 Oslo 6,
NORWAY.
Tel: (02) 352 096

Goncalves,
Avenida 5 de Outubro, 53, 1,
Lisboa 1,
PORTUGAL.
Tel: (01) 544029

Audio Professional SA,
Francisco Tarrega, 11,
08027 Barcelona,
SPAIN.
Tel: (93) 340 2504

Erato Audio Video AB,
Asogatan 115,
116 24 Stockholm,
SWEDEN.
Tel: (08) 743 0750

Telion AG,
Rutistrasse 26,
CH. 8010 Zurich,
SWITZERLAND.
Tel: (01) 732 1511

TASCAM

readily produces Qs up to 100 (20x more than is healthy for ordinary audio EQ but useful for deep notching) is tame and easily tuned. Q, gain and frequency are all adjustable without interaction. It should come as no surprise that this topology is the mainstay of many up-market sweep and parametric EQs. As such, it's commonly seen connected in a feedback-feedforward loop, between the virtual earths of two cascaded, inverting op-amp stages (Fig. 14); this approach was popularised by the prolific UK designer Barry Porter¹¹, who pioneered the technique in 1975.

The CAPS network (Fig. 15) is familiar to readers who followed Steve Dove's console designing series appearing in these pages a decade ago¹². 'CAPS' stands for Constant Amplitude Phase Shift; it could also be called a second order all-pass network. The circuit looks fleetingly similar to the state-variable and the related bi-quad, and is connected in the same way — but note the capacitors used to create frequency selectivity are located in series with the op-amps' positive inputs, acting passively outside of the local feedback loop. The individual stages are the same circuit used *en masse* for all-pass signal delay compensation in refined speaker systems. The CAPS circuit is inherently stable (provided UGS op-amps are used and its input is always connected to a finite source impedance and not left open, to disable the EQ, for instance), and has a well-behaved Q adjustment. ■

TECHNICAL TERMS

UGS: Unity Gain Stable; an op-amp that requires no compensation for VHF stability, regardless of the circuit it's plugged into

References

- 10 Ben Duncan, 'Equalisation', *Electronics & Music Maker*, Oct 1981
- 11 Barry Porter, 'Tone control', *Wireless World*, Jan 1984
- 12 Steve Dove, 'Designing a professional mixing console, Pt 8, Equalisers 2', *Studio Sound*, May 1981

Further Reading

- Steve Dove, 'Designing a professional mixing console, Pts 7 & 9, Equalisers 1 & 3', *Studio Sound*, Apr & Jun, 1981
- Ben Duncan, 'Equaliser Sonics', *Home & Studio Recording*, Sep & Nov 1988
- J N Ellis, 'High quality tone control', *Wireless World*, Aug 1973
- Ted Fletcher, 'Time, the equaliser and Alice', letter to the editor, *Home & Studio Recording*, Dec 1988
- E F Good and F E J Girling, 'Active Filters', *Wireless World* (14 parts), Aug 1969 to Dec 1970
- D Johnson & J Hilburn, *Rapid practical design of active filters*, Wiley, 1975
- J L Lindsey Hood, 'Audio preamplifier design', *Wireless World*, Jul 1990
- Walter G Jung, *Audio IC op-amp applications*, Sams, 3rd edition 1986; ch 5
- *National semiconductor audio & radio handbook*, 1982, pp 2:46 to 2:49

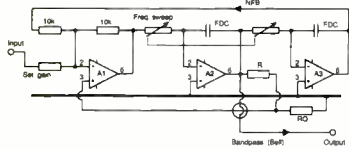


Fig.13 A State-Variable or Good resonator
(after E F Good)

Fig. 13: State-variable network

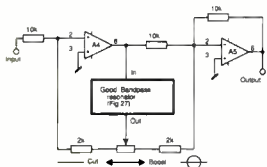


Fig.14 Feedback/feedforward topology
Application of Good resonator

Fig. 14: Feedback/feed forward topology

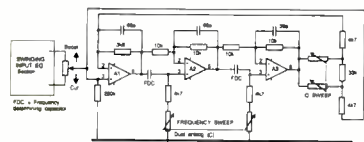


Fig 15 CAPS EQ section

Fig. 15: CAPS network

outputs are the stuff of active crossovers. The name state-variable is 'NASAese'. It has to be. Sounding as if the network is uncertain about its status, this American name (actually deriving from Bell Telephone Labs' theory of signal flow graphs, part of their historic system of active filter design) is really meant to imply that this class of filter is very flexible. Outside of audio, the circuit is commonly called a 'two-integrator loop' or 'ring of three' but it is really the Good circuit, since it was originated by the late E F Good, Baxandall's colleague at the RSRE, in 1955.

Good's topology has the advantage that the op-amps do not need exceptional gain bandwidth for an accurate response and low distortion: the open loop gain need only be larger than 3x (10 dB greater) than the Q at the resonant frequency. For a maximum Q of 5, this signifies an open loop gain of just 24 dB, easily attained at 20 kHz, even with a TL074 op-amp or a pentode tube. . . By comparison, a Sallen & Key bandpass filter (not covered here) requires an open-loop gain of at least 90Q², or 67 dB, for the same Q! Good's circuit



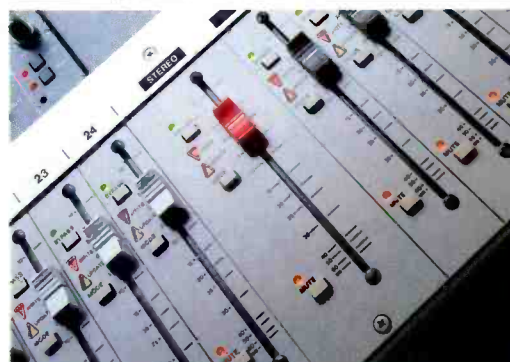
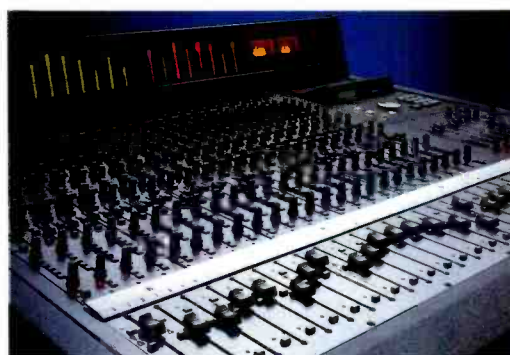
LIFE WILL NEVER BE THE SAME AGAIN

From our first 3-head, 3-motor stereo recorder through 4, 8, 16 to 24 track, from open-reel to cassette, from analogue to digital our commitment to Research & Development has created audio milestones which have changed forever the way in which music is recorded.

The worldwide success of our recorders has to some degree overshadowed the fact that TASCAM are also one of the world's largest manufacturers of mixing consoles with an unparalleled reputation for reliability and sonic integrity.

The recent M-2500, M-3500 and M-700 have led a quiet revolution in console design which continues with the release of the automated M-3700 series.

Imagine a console that remembers every fader



movement and every automated switch movement in either realtime or snapshot mode.

Imagine a console which stores mixes onboard for instant access in theatre, concert, post production or recording situations.

Imagine a console which affords you the luxury of being able to experiment endlessly or fine-tune any mix without losing the inspiration of the original.

Imagine never again having to re-do an entire mix because of one mistake.

Imagine really being in total control.

Imagine the reality of the M-3700.

Sample one right now - your life will never be the same again.

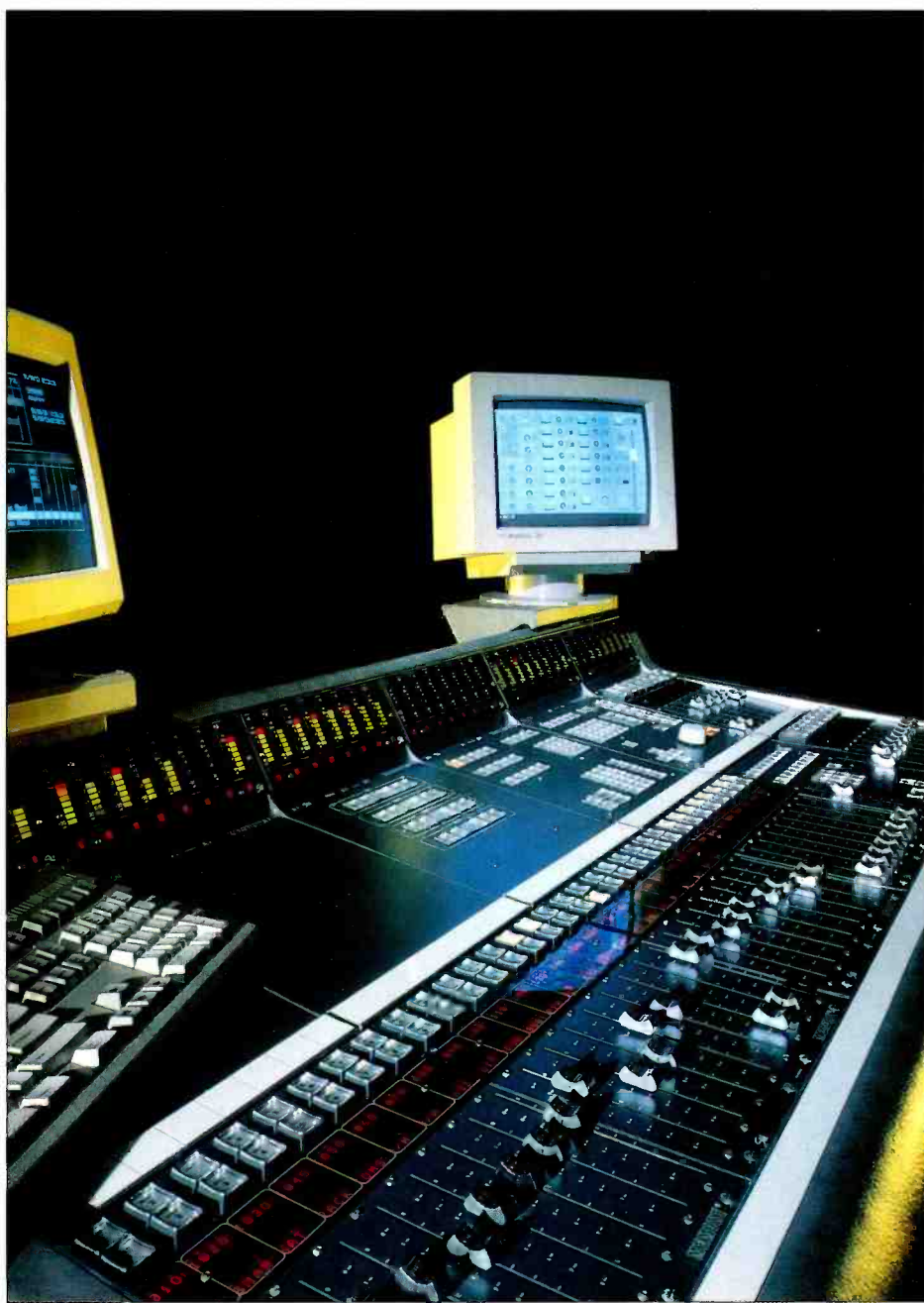
TASCAM

the right track

TEAC UK Limited. 5 Marlin House, The Croxley Centre, Watford, Herts. WD1 8YA. Tel: 0923 225235. Fax: 0923 36290
M-3700 £8750.00, M-3700-32 £9750.00 (All prices exclude VAT and are correct at time of going to press).

LICENCE TO MEMORISE

An operational view of the SAJE Memory console by Terry Nelson



It is surprising to note that the Saje Memory console is often conspicuous by its absence in many articles about the current state of live sound mixing consoles.

The situation is all the more surprising as the Saje Memory brings to live sound the majority of features that would be on the 'wish list' of many experienced live sound engineers.

The principle has already been covered in *Studio Sound* and it is now time to move on to the operational side of the console.

At this stage it will be useful to note that the *Memory* has three years of operational experience behind it, and has been used in fixed installations, broadcast applications, and major European tours with French artists. It is a working console and not a prototype full of 'vapourware' (or whatever term happens to be fashionable).

To give a brief recap, the *Memory* is a true virtual console (its function is defined by its video graphic) and consists of a control surface — or console — housing the CPU, together with a video graphics monitor and terminal, and remote racks that contain all of the audio circuitry.

The console is connected to the racks by two coaxial cables in a balanced configuration for all control signals and a multicable for connections between the audio modules and the meter bridge. The console remains operational should one of the coaxial cables be cut or disconnected and the system will work perfectly satisfactorily over a distance of 100 metres.

The mains power supply to the remote racks is also taken from the console to ensure proper earthing (or grounding).

All audio connections are made to the remote racks. The input module contains three XLR inputs (A-B-C), a direct XLR output and three TT minijack insert points. The stereo output module contains two XLR outputs (A-B) per channel, two TT minijack insert points and two stereo returns on TT minijacks.

As many engineers will know to their time and cost, the term 'computer-controlled' is not necessarily synonymous with 'ease-of-use' and Saje have concentrated a large part of their efforts into making the user interface as easy — and as familiar — as possible, starting with the console and the computer graphics.

After having passed a considerable amount of time with the *Memory* (*Studio Sound* has followed the console since its beginnings), it is clear that two main points emerge from an operational point of view:

- 1) The method of working follows the same thought processes and actions as those associated with a conventional console.
- 2) That 'what you see is what you get' as the console will always reflect true status and never requires the return to null points for any updates.

In their literature, Saje say that one of their aims with the console was that 'the sound engineer would at no time regret not using his former console', which means that access and operation would be, to all intents and purposes, the same.

Rather than give a step-by-step description of operation, it will be more useful to look at the basics and see where the similarities occur.

Starting-up the console is probably the only really computer-orientated part of operation as this requires some simple command and text entries via the terminal keyboard — nothing too complicated here. The screen prompts are easy to understand and give the user access to the console and test routines.

First-time users will have to 'log-on' to the console by entering a personal 4-digit code and this will be asked for when you are starting to ▶

When people are starting to get nostalgic about their old CDs...



...Sony CD Mastering Systems will still be digitally mastering.

Since the launch of CDs in the early eighties, Sony Systems have been *the* standard for CD mastering worldwide.

To maintain this standard, we are continually enhancing and developing the systems that will take digital audio mastering into the future and pave the way for Mini Disc.

It is with the future in mind that we now announce two new enhancements to our range of mastering equipment. The DAE-3000 editor has a new interface which allows the input of DAT material. The SDP-1000 digital effector has many new features including snapshot automation, which enables pre-determined

effects to be recalled at any time.

In the near future, further enhancements will mean that existing equipment can be used for mastering Mini Disc.

As with all Sony products the systems are backed by a total product service and support operation that won't leave you reaching for the tissues.

So, in years to come, when you're reminiscing about your old CDs, you'll have the comfort of knowing that Sony systems are still mastering digital sound.

Sony - the past, present and future of digital audio mastering.

A sound choice!

SONY®

For further information contact
 Amsterdam 020 6581911 Athens 01 2818273 Basingstoke UK 0256 483666
 Brussels 02-7241711 Cologne 0221 59660 Copenhagen 042 995100 Dubai 04 373472
 Helsinki 0 50291 Jeddah 02 6440837 Lisbon 01 859 4269 Madrid 091 536 5700
 Milan 02 618381 Oslo 02 303530 Paris 01 4945 4000 Rome 06 5920 801 Stockholm 08 7336100
 Vienna 0222 61051 Zurich (Schlieren) 01 733 3511 Czechoslovakia Hungary Poland
 Romania - Vienna 0222 554 606 East Central Europe (others), UK 0256 55011
 Middle East, Geneva 022 7336350 Africa, UK 0256 55011

Sony Broadcast & Communications 

USERS (F2 : MODIFY) (F3 : INSERT) (F5 : DELETE) (F8 : CODE) (F9 : MISC)				TIM: DATE TIME
USERS-LIST				
NR	ORIGIN	UPDATE	NAME	INFORMATION
0	DATE	DATE TIME	SAJE	NAME

Fig. 1: Users List

SHOWS (F2 : MODIFY) (F3 : INSERT) (F4 : COPY) (F5 : DELETE) (F9 : FLOPPY)				TIM: DATE TIME	USR: NAME	ORG: DATE TIME	UPD: DATE TIME	
SHOWS-LIST								
NR	ORIGIN	UPDATE	TITLE	PLACE	TC	AUX	CUE	MEM
00	DATE	DATE	NAME	NAME	25	008	001	001

Fig. 2: Shows List

PERFORMANCE (F1 : GOTO) (F3 : MEM-INSERT) (F6 : MEM-OVWRITE) (F10 : CUE-EDITION) (F11 : MEM-EDITION) (F12 : LABELS)		MEM-LIST NBR MEM NAME 000 000 RESET.....		TIM: DATE TIME	TTL: NAME	PLC: NAME	ORG: DATE TIME	UPD: DATE TIME			
CUE-LIST											
CUE	MEM	TIME	CODE	LNK	DYN	NAME	MID	TP1	TP2	TP3	TP4
000	000					RESET.....					

Fig. 3: Performance Menu

set-up a Show or wish to access existing Shows. This year should also see Saje issuing 'La Carte' or *Memory Card* to qualified users of the *Memory* console, thus avoiding operation by unqualified personnel.

The console layout includes motorised input and output faders — which can also be assigned to other functions as required — and various keyboards used for console commands. However, at this stage it is perhaps important to note that an engineer will always be doing what he is used to doing, that is pushing faders, turning knobs and pressing on/off switches. The actual movements may be centralised but the action is the same.

Upon powering-up, the graphics screen will show a channel input strip (usually channel 1) and the first-time user will immediately recognise all of the facilities found on standard consoles, input amp filters and EQ, aux sends (eight on powering-up), groups, etc.

Once you have logged-on to the console via the Users List (Fig.1), the next screen on the terminal monitor is the Shows List (Fig.2). This will display the list of the Shows already entered, a show can either be retrieved or the console can be configured for a new Show.

Reference to the above diagram of the screen will show that it is very straightforward and displays when the show was put into memory, and subsequent updates, the name of the show and where it is memorised.

The right-hand columns are more operation-oriented and display time code (TC), frame rate (25 or 30 fps), the number of auxiliary sends selected (AUX), the number of Cues in the Show List and the number of Memories in the Memories List.

Starting-up a Show allows you to define how you want to work and in what configuration you want to use the console. If, for example, you will be using time code to trigger cues and need to change the frame rate, just position the cursor in the TC column, press F2 (Modify) and type in the rate required.

You may also wish to change the number of auxiliary sends for the show in question to 10. Again, the F2 key allows the necessary modification.

At this point, it is a good idea to refresh memories concerning routing and outputs. The *Memory* contains 16 buses, with (at present) 15 and 16 being dedicated left and right outputs. The remaining 14 buses can be configured in pairs as auxiliary sends or groups, thus with 10 aux. sends, the console will have 10 auxes — two stereo groups — main outputs.

In addition to the audio groups, there are also eight Remote Groups that work like VCA's but use a mixture of DCA/VCA technology.

Having configured the console for the new show, pressing RETURN brings the Show Mode — or Performance — menu to the screen (Fig.3).

At this stage the console is ready to go to work so a few words about connections etc., are in order.

The *Memory* has a maximum of 48 input channels. However, each channel features three inputs and these can be selected, as required, as either microphone inputs with 48V phantom or as line inputs. This means that the *Memory* has an input capacity of 144 feeds.

Large numbers of inputs are not uncommon in live sound today but they are almost never used simultaneously, meaning that a considerable part of the console, or consoles, is lying idle for much of the time. The *Memory* permits a much neater way of working by allowing you to define the maximum number of channels needed at one time, during the performance, and call up the others, as required, ►

Technology and Culture



Audio and Music



AES in Wien



If you are interested in attending the Wien Convention, please complete the coupon below and return to:

Gisèle R. Clark

92nd AES Wien Convention

BIRP — Rue d'Astorg 25 — F-75008 Paris (France)

Fax: +33-1-47.42.42.75.68 (Tél: +33-1-47.42.20.21)

Please, send me the 92nd AES Convention Information kit: Exhibitor Visitor

Name or Company:

Address:

Post Code: Town:

Country:

Telephone: Fax:

as memorised cues.

Once the console is plugged-up, the first thing, most live engineers do then is label the console and here the computer terminal is definitely friend, not foe. You can now leave those nasty bits of sticky tape in the box, press F12 (Labels) and type in nice four-letter words for each input and output channel, insert point, etc. The labels will be displayed by red pinpoint LEDs on the console and on the input or output channel currently displayed on the graphics monitor.

(Though the labelling will be part of a Show — or specific console set-up — any Show can be used as the basis for a new one, thus saving time.)

The movements to access the various functions of the console have been previously covered but a quick recap will be in order.

Each input channel features a motorised fader, two push switches for Solo and Mute and LED meter (VU/Peak) for signal level. Pressing the SOLO switch of a channel brings it to the animated graphics screen and any modifications necessary can be made (this is just the same as going to a channel strip and working on it). The screen cursor can be moved to the 'knobs' and 'switches' via the 4-way key pad and 'turned' by the large rotary knob or switched by the On/Off switch. Certain functions, such as input selection or 48V, also have dedicated switches.

At this point, the console could be operated virtually like a conventional console without any difficulty. However, once we get into the position of assigning functions to controls and using commands — or syntaxes — to control multiple tasks, then things really get interesting.

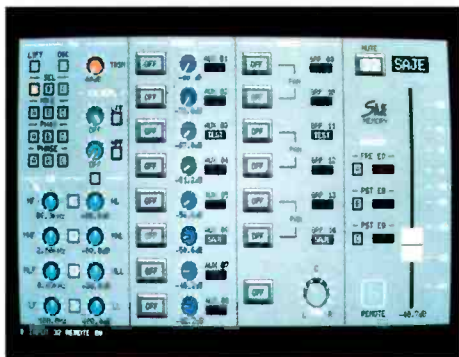
The main assignable control is the motorised channel fader and this can be assigned to channel fader, input trim, pan and the auxiliary sends. For example, pressing TRIM on the keypad assigns all the channel faders to the trim control, allowing input gains to be set up in a flash. Cycling through FADER and TRIM will show that the faders move virtually instantaneously to their respective settings.

It will be easy to see that Channel and auxiliary mixes can be created very quickly, recalled as required and modified. Mixes can also be copied very easily by using the COPY TO button.

Suppose that the main mix needs to be copied to auxiliary send 4: press FADER for the main mix (normal operational status) followed by COPY TO and then AUX 4. The mix is now duplicated.

The use of the various syntaxes allows general commands, the swapping of settings and even of modules, stereo linking and — all in all — makes life a lot easier!

To be blunt about it, anybody who knows what a console is and what it is supposed to do, will



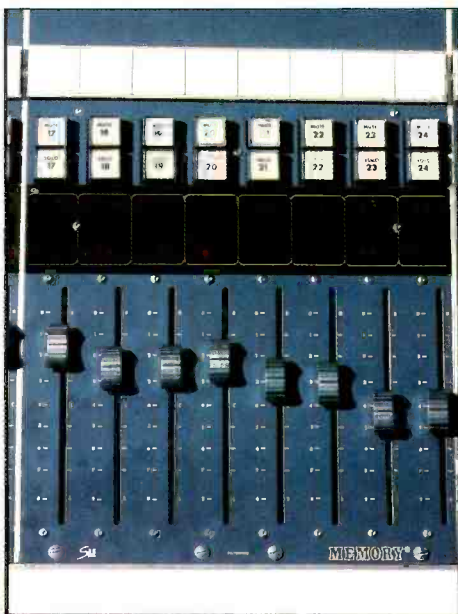
Input screen memory size



Output screen memory size



One of the control panels



Fader block memory

have no problem at all with the *Memory* and they will soon find themselves doing all those things that they wished they could do but could not!

Apart from the flexibility offered for set-up and operation, the other attraction is repeatability and the ability to program console changes and cues that before would have required five pairs of hands and three different consoles.

Returning to the Performance screen, you will notice an upper column — Mem List — and a lower column — Cue List.

The Mem List shows the different set-ups — or memories — stored while the Cue List shows the order in which the memories will be selected sequentially. However, cues can be skipped either by using the cursor or the GOTO function.

Modifying memories and cues is done by using the MEM and CUE EDITION functions.

Moving onto the output section, there are 16 motorised faders that can be thought of as corresponding to the 16 output buses. However, as with the input channels, the faders are assignable and can be assigned to the eight stereo aux returns and eight stereo access returns — as well as their balance controls — and the eight remote groups.

An output channel is brought up to the screen the same way as an input channel, that is by pressing the SOLO button of the output required.

A recent software addition has been brought about by the use of the *Memory* for stage monitoring. ▶



Just the ticket.

Dire Straits fly Flashlight on their current world tour.

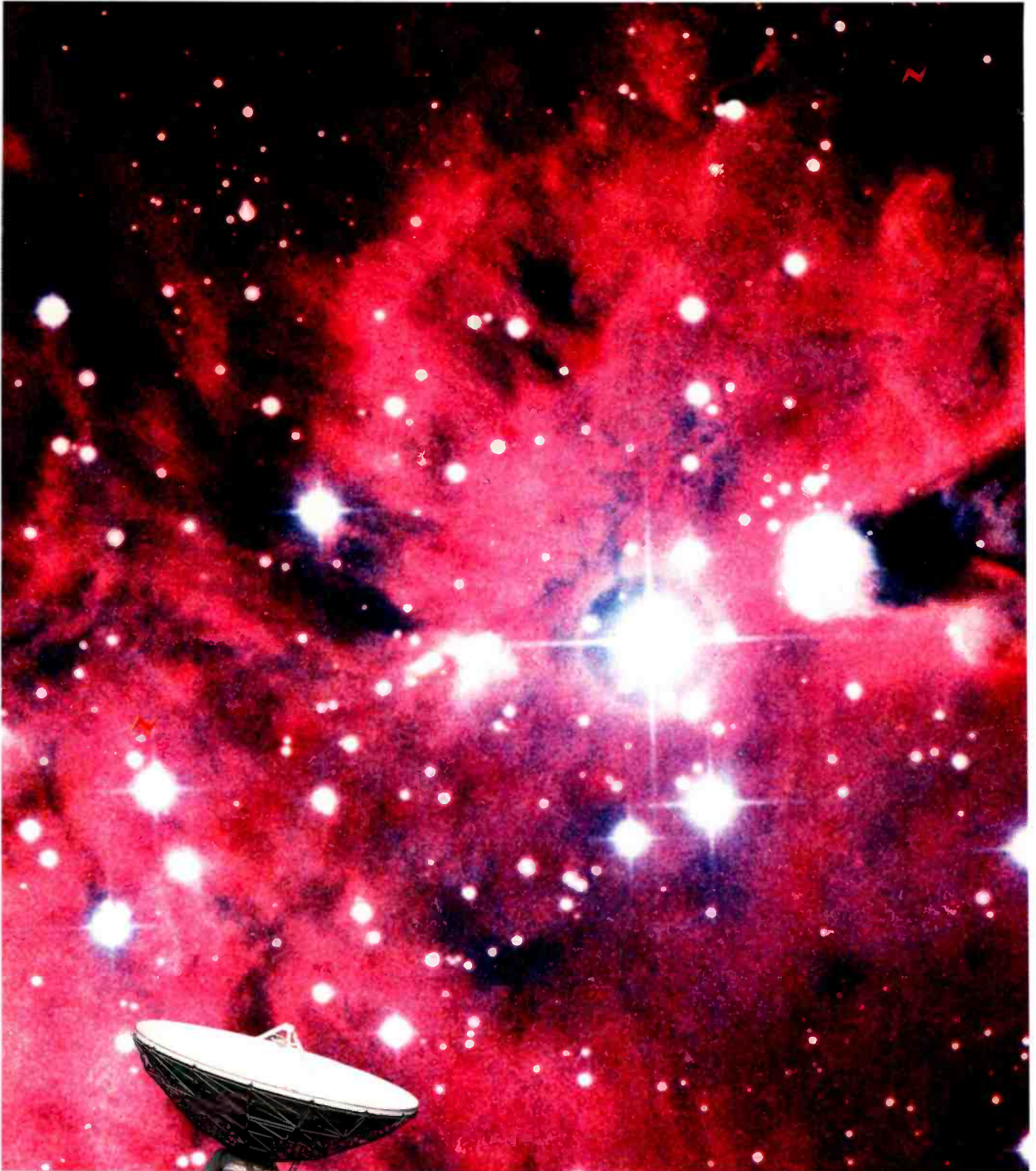
Turbosound

Thanks to Dire Straits for using Turbosound Flashlight for their current world tour. System supplied by Britannia Row.

Turbosound Ltd. Star Road, Partridge Green, W. Sussex RH13 5EZ. Tel: (0403) 711447 Fax: (0403) 710155 Telex: 878723 TURBO G

An ABS group company


STAR GAZING?



Wondering about the future of Digital Recording?

After April 6th you won't be.

After April 6th the picture will be clear.

On April 6th  Neve will bring the future of digital recording into sharp focus.

Prepare to witness the birth of a new star.

In normal practice, the different mix outputs will be soloed to the local wedge(s) to check and modify a particular mix. A new Monitor Follow function gives the added facility of the channel faders going to the send levels for the mix output that has been soloed. This gives an immediate visual indication of the mix and an 'at a glance' check to see if something is not as it should be.

Each output bus has two switchable outputs and these can be used singly or together.

In situations requiring multiple sends, such as stage monitoring, the same philosophy concerning the inputs can usually be applied, i.e. how many sends at any one time? The fact that the monitor console is running 22 mixes may mean in reality 11 basic mixes (already good going) plus situations such as 20 seconds of vocal in front of the palm tree with 13 seconds of acoustic guitar.

A press of the LOAD button gives 32 outputs to choose from and will easily cover the 11 special situations without tying up a very large and complicated console. It goes without saying that it also opens up the possibilities for more freedom in staging.

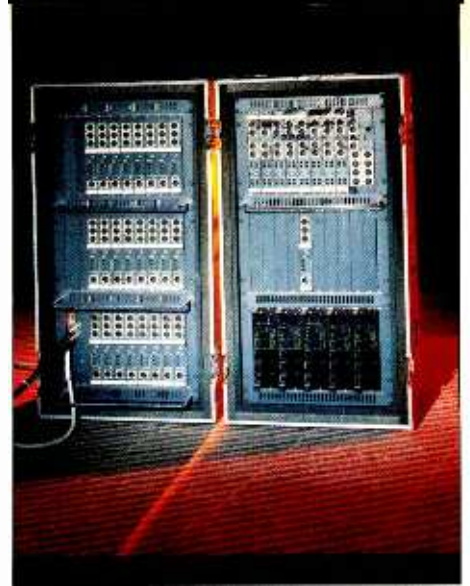
At this point you may be thinking: 'OK, I can do a lot of things but if I am following a Cue List through the show, can I update without problems?' All controls are open to manual control and override, with the motorised faders being touch sensitive.

'Aha!' you say, 'but if I make updates to a memory they will all be lost when I load the next cue'. Not if you use the Load With Update feature, they won't.

This button is probably one of the most useful on the console as it allows changes to be made to a memory, for example the drum sound, and then carried through to all succeeding memories. You can then make the choice between saving them permanently or deciding that it was only for that one performance.

The *Memory* can be supplied with a number of options and these include time code reader/generator, MIDI (receives and sends MIDI change commands) and four programmable machine remotes.

The outputs can also be fitted with a 14-band 1/2-octave graphic and these can be assigned to the



Audio racks

output faders for additional control.

For those really wishing to go to town, there is also a Matrix option with up to 32 outputs. However, this is more in the form of broadcast crosspoint switcher and a new software version is in preparation providing a mixable 16 x 14 matrix from the output buses.

A certain degree of 'automation' of cues can be achieved by linking cues together dynamically, where they will crossfade at a pre-determined rate. However, even this can be manually overridden as required.

Each *Memory* console has the software support for the maximum configuration presently available, that is 48 input channels, 16 output channels and optional matrix outputs (up to 32). Thus a partially filled console will only need the necessary hardware to bring it up to full configuration.

It also follows that a small console, for example 24 channels, can control 48 channels of audio rack, the channels being called up to the console as required.

This review, although brief, should give an idea of the flexibility of the *Saje Memory* and demonstrates that, in this instance, the world of live sound definitely has the edge on the studio world!

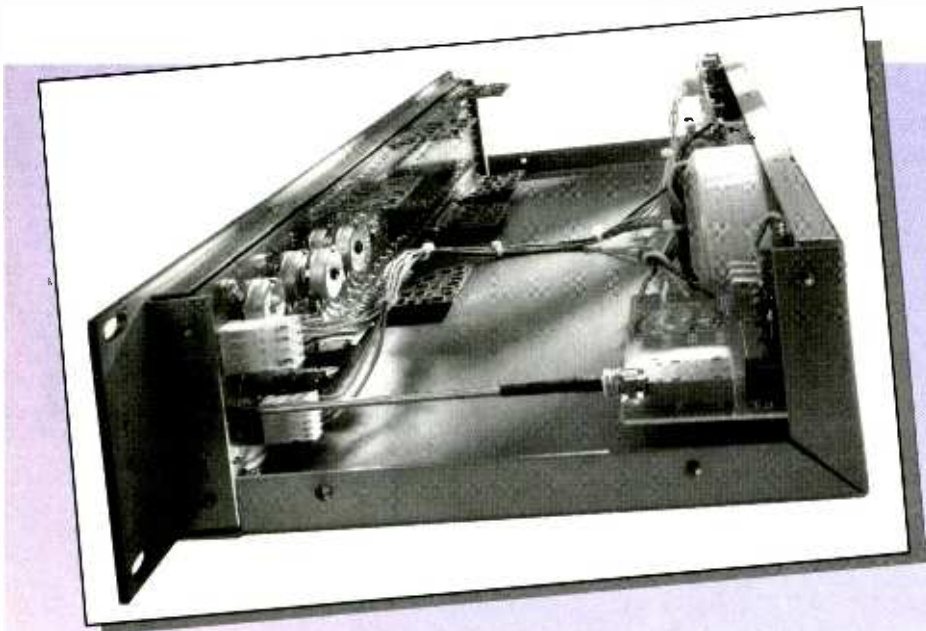
Nearer to home in the concert world, it puts the sound facilities on a par with the lighting!

If there is one phrase that the development team at *Saje* no longer use, it is 'It's only software'. However, the console represents an amalgam of ideas from over 50 live sound engineers plus those of *Saje* and the recent '*Memory* tour' round the major US sound reinforcement companies brought in a further list of serious suggestions.

As with any product, it is never perfect and there are some niggles that can be found with the system. However, these are usually minor and are in line to be dealt with or fall into the 'wouldn't it be nice' category when you can't find anything else to grumble about. The main points to bear in mind are that operation is far quicker than that of a conventional console, coupled with all the advantages of repeatability of complicated cues — and with the best studio console sound quality.

On a closing note, the rapid acceptance of the *Memory* by the US sound reinforcement world was confirmed by the console being used for the 1991 Billboard Music Awards. One console was used for the house and for the nine performers appearing, whereas normally nine consoles would have been used.

Sound supervisor, Mike Stewart, reported that 'for the first time in the history of the Awards, the atmosphere was relaxed at the house position'. Maybe the console is not so expensive after all. ■



Sound is in the air

The key to the GX SERIES unique performance and layout are custom built DLT® hybrid circuits. Each filter of the graphic equalisers is designed for low noise operation and is Dynamically Laser Trimmed to perfectly match mother

natures prescription for ideal interpolation. The resulting wide dynamic range (>118dB) and perfectly flat amplitude and phase response give the GX SERIES an unprecedented level of transparency, thin as air...

ITALY - Grisby Music: 071-7108471 • FINLAND - Nores OY: 90-520311 • FRANCE - Camac: (33) 40.97.71.10
 GERMANY - Audio Export Georg Neumann & Co: 07131-62470 • HOLLAND - Ampco: 030-414500
 • SPAIN - 220 S.C.: 3-4340202 • IRELAND - C.C.T.: 535666-535374 • KOREA - TAD Electronic Co.: (02) 269-0302
 • NORWAY - Lydcompagniet: 03-895450 • SINGAPORE - Electro Systems Ind.: 7425660

GX 130
 GX 215
 GX 230

APEX N.V.
 Prins Bisschopssingel 50,
 3500 HASSELT, BELGIUM
 Tel: +32-11-272983
 Fax: +32-11-274353



EXELMANS GRAPHICS

The 4200 Series. Designed For The Control Room, Not The Living Room.

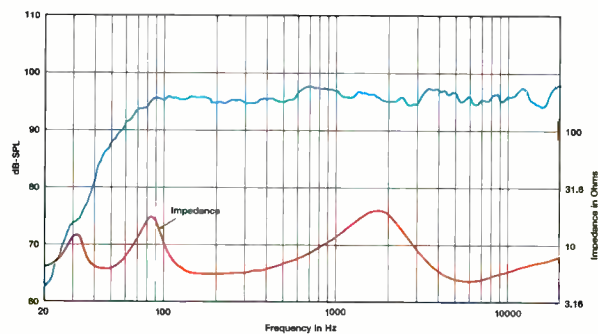
Today's recording studio has evolved into a multi-function facility which simultaneously addresses the specialized needs of music recording, film and video post, and radio production. In this environment, where the most critical listening often occurs in the final mix, close proximity monitors are often more important than the mains. The problem: most console top monitors, unfortunately, were designed for the living room not the control room. Until now.

With the 4200 Series we're taking our stand from where you sit: right where you work at the console. Designed, engineered and tested from this position, the 4200 Series is the first console mount monitor created specifically for the professional recording environment.

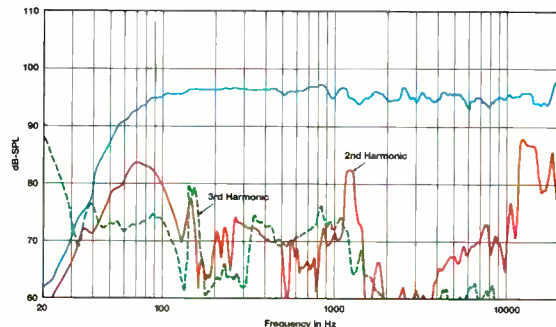
Both models give you pin-point imaging by delivering high and low frequency information to your ears at precisely the same instant. By virtue of their symmetrical design the 4200 Series monitors are mirror imaged.

And so nothing gets in the way of your music, the 4200 Series introduces our uniquely sculpted Multi-Radial™ baffles incorporating newly designed pure titanium tweeters and low frequency transducers. The combination of these technologies successfully corrects time arrival anomalies and eliminates baffle diffraction distortion.

4200 Series: console top monitors designed in the studio, for the studio, with sonic performance rivaling much more expensive monitors. 4200 Series: the shape, and sound, of things to come. Available at your local authorized JBL Professional dealer.



Frequency Response (Model 4206): 96 dB at 1 m, typical console listening levels



Distortion vs. Frequency (Model 4208) 96 dB at 1 m, typical console listening levels (distortion raised 20 dB)



JBL Professional
8500 Balboa Boulevard, Northridge, CA 91329
A Harman International Company

Chameleon

A technical report by Sam Wise on the Chameleon Power Amplifier

Power amplifiers are interesting to me. Why, I ask myself, after all, in theory they should do absolutely nothing to the sound. But it isn't as simple as that and they are interesting. So, this review has whetted a long dormant desire to look at them a bit more closely than budgets will normally allow.

Having been asked to review the *Chameleon*, which as its name suggests is a little out of the ordinary, I asked for permission to partner it with another amplifier of a very different school — the Australian Monitor. The differences really lie in a philosophy of what a power amplifier is intended to do; questions about the power requirements of real music and real loudspeakers. Details on the Australian Monitor *AM1600* follow next month.

On entering the audio industry, one of the first amplifiers I met in professional use was the HH *TPA100D*. They were notable for two properties: firstly, they sounded good, loud and punchy; secondly, they blew up a lot, usually in rackfuls at a time. One of my first jobs was to fault find and reassemble several of these left scattered all over the floor of the maintenance lab by my predecessor. In doing this I noticed that the power supply voltages were very large compared to the rated output power. This led to a theory that perhaps failure was caused by mains borne power spikes pushing the output devices over the limit, but also that these high voltage rails allowed a large output transient power to be produced which could have been a factor in the amplifier's sound quality. Alas, the winds of life blew away from the time and resources to investigate further so theory remained just that and amplifiers came and went until new and more reliable models were invented.

During this same period of my life a Quad 303 found its way in for repair, and sojourned for several days attached to my home hi-fi, replacing a well-respected American hi-fi amp. Enters my wife who shouts from the kitchen — what did you do to the hi-fi?, it sounds really great. Prior to this off-the-cuff comment, said wife had (as still to this day) refused to express her opinion regarding the audible performance of any hi-fi equipment. So, as probably all of you are aware, amplifiers are not the same, even if they measure the same.

First impressions

In many ways, *Chameleon* breaks the mould. The design intent was to pack a lot of punch into a package that requires minimal rack space — and since it is different, it may as well look different.

Chameleon is housed in a 1u high rack

mountable housing, constructed entirely (apart from the rear panel) from aluminium extrusions. Overall depth is larger than most, extending to 600 mm when connectors are inserted. This means that it is unlikely to fit in a 600 mm rack depth, requiring a larger 800 mm size. But, in terms of floor space, a set of these will fit in a lot less racks than a more conventional amplifier — saving money on larger systems. However, hire companies are likely to find existing touring racks need a new balloon-shaped rear cover to fit *Chameleon* in. And don't dare to rackmount it without rear support or side rails, it is relatively light, but 1U of aluminium is not much to support the beast.

There are a pair of extrusions each side, with the power devices sandwiched between the top and bottom sections. The cooling air is forced through the expanding venturi shaped area between these extrusions, passing around the output devices on the way. The shape is claimed to improve cooling efficiency, but it was impossible to confirm this.

The front panel is a hollow extrusion section, incorporating a central recessed section which forms a handhold and also serves as the air intake. The first level of air filter is located here — it is easy to service and clean, but also easy to dislodge if the amplifier is used loose and carried by the hand-hold. Internally, construction is relatively tidy. The output load sharing resistors are mounted on PCBs which are mechanically part of the side extrusion assemblies — forming the output sections into units which can be removed for servicing or replacement in about five minutes.

The remaining electronic systems are located down the centre of the unit between these side members. At the front resides the cooling fan, with its secondary air filter. On the left is the 'soft start' PCB, providing reduced in-rush current to prevent accidental tripping of the mains fuse or circuit breaker. To its right is another small PCB controlling the cooling and protection of the amplifier. Next toward the rear is the toroidal power transformer, bolted solidly to the bottom cover of the amp. Behind this is the rest of the power supply, PCB mounted, but well supported to minimise failure due to vibration. Then, finally, at the rear is the connector PCB, which includes input pre-amp and driver circuitry, input/output connectors and several other functions crammed in on both sides of the PCB. Everything connects on plugs and sockets, making disassembly into modules for replacement relatively easy.

The entire unit is finished in a pale grey satin anodising. The legends are of screen printed yellow and red, providing poor visual contrast,

fortunately there are not many controls to worry about. The styling is different, and visually quite attractive. Everyone I have shown *Chameleon* to has made some comment, and very few have been rude.

Cooling system

The amplifier is force cooled, having a thermally controlled fan which is virtually silent under normal conditions, remaining fairly inconspicuous even under load. Removing the input signal after placing the amplifier under some duress has the surprising effect of increasing the fan speed and therefore ventilation rate for a short time. In discussion with designer Malcolm Hill, it was revealed that this is intentional. The fan is fed from a temperature controlled voltage taken from the mains transformer secondary supplies. At maximum temperature, the fan voltage is set to maximum, but the smallest mains transformer has a reduced output voltage due to the load conditions which created the heat in the first place.

If one of the amplifier's protection schemes come into action, output drive can be reduced, or temporarily even shut down completely, reducing the load on the transformer and increasing the voltage fed to the fan — giving it a temporary boost in cooling power just when needed, without exceeding its continuous rating. As long as the design is carefully done, this is the kind of engineering I approve of, getting the most out of a component without breaking it.

Front panel

At the left is the POWER ON/OFF switch, with adjacent red led indicator. No comment except that the switch is recessed, making accidental supply interruption almost impossible.

Just left of centre is the HEAD LOK yellow led. HEAD LOK has the effect of reducing the power supply voltage rails, lowering the maximum output power at the same time. This normally activated by a combination of power supply droop and heatsink temperature. We, in fact, found it quite hard to get HEAD LOK to activate.

At the right of the unit are two identical sets of level controls and indicators. The level is set by a push activated switch, with settings of 0 dB, -2, -4, -6, -10, -20, -35, -55 and off. These are used to set coarse gain, and proved to be within 0.2 dB of setting (worst case), but even more importantly the gain of the two channels matched better than we can measure reliably.

The green SIGNAL led illuminates when a suitable input signal level is present, increasing in brightness as the signal level increases. Onset occurred at an input level of about -30 dBu.

Lastly, at the right of the unit is the red PEAK led. This triggers at output signal clip level, and works in a way which follows the power supplies. This means, for example, that in HEAD LOK condition, or high drive levels into low impedances when the power supply rails have dropped, the PEAK led is still correctly indicating actual clip

levels. PEAK also is used to indicate short circuit protection by continuous illumination.

Inputs and outputs

Inputs are on a parallel pair of three pole, 6.35 mm jacks and an XLR-3 female, also in parallel and wired to the new AES pin 2 hot standard. All three connectors are electronically balanced, and insertion of a 2-pole or unbalanced XLR causes no problems. Input impedance is confirmed as 20 k Ω balanced, or 10 k Ω unbalanced. Since it is possible to end up with many of these wired in parallel in large applications, a higher input impedance would have been preferred. Input overload occurs at +22.2 dBu, and is unaffected by gain setting, high enough for a power amplifier. At the 0 dB attenuation setting, output reached 600 W into 4 Ω with an input signal of 1.02 V, within specification, with a gain of 33.9 dB also within specification. Input common mode rejection is shown in Fig. 1, which differed between input channels.

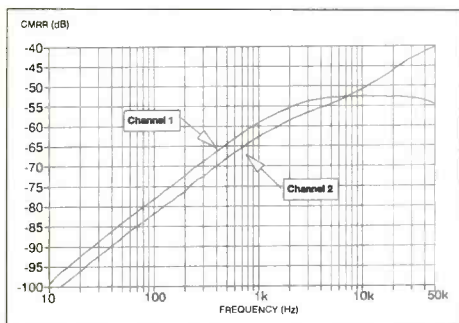


Fig. 1: Common mode rejection ratio of both channels, driven simultaneously at 10 dB below 400 W/channel, into 4 Ω

Output connectors are a pair of five-way binding posts/4 mm sockets. They are tightly spaced to match standard paired plugs in both two channel and bridge mode applications, but are cramped for the finger. A nearby BRIDGE MODE switch inverts the input into channel 2, providing differentially swinging outputs on the two red output terminals. GROUND LIFT disconnects the chassis/power ground from the internal audio earth. Finally, 220V/240V selection allows for international operation. The mains connector is an IEC type, without any cable latch. This includes a mains fuse, and filtering to reduce noise flowing into or out of the mains supply.

Internally, all accessible mains points at the rear of the unit are well shrouded, but it is possible to touch power line voltages around the soft start components at the front. Extending the protective insulation around this area would overcome this criticism. There are several internal fuses, but none of these were affected by any fault we induced during testing.

Frequency response and phase versus output

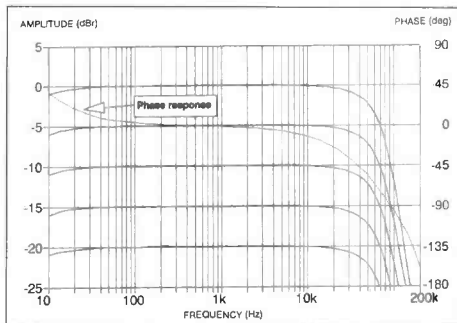


Fig. 2: Amplitude and phase response of channel 1, driven at 0.5, 15, and 20 dB below w/into 4 Ω

power are shown in Fig. 2. As level increases from 60 W (bottom curve) to 600 W into 4 Ω (top curve), there is no variation in frequency response, level at 20 Hz and 20 kHz remaining at -0.3 dB relative to mid-band. At higher frequencies, level is nicely rolled-off, protecting the system against interfering HF sources.

Slew rate measurements showed that the amplifier met or exceeded its specifications, being better than 100 V/ μ S, with rise time less than 2 μ S.

Square wave response is also excellent, maintaining fast edges with little overshoot at all audio frequencies. Addition of a 4.7 μ F capacitor across the outputs has no effect on frequency response, square wave shape or stability.

Channel separation, or crosstalk, was measured while driving one channel to full output into 4 Ω . The result is shown in Fig. 3. Channel 2 is better than specified up to 12 kHz, in fact an excellent performance; while channel 1 misses by about 15dB. Similar variations were found on other units.

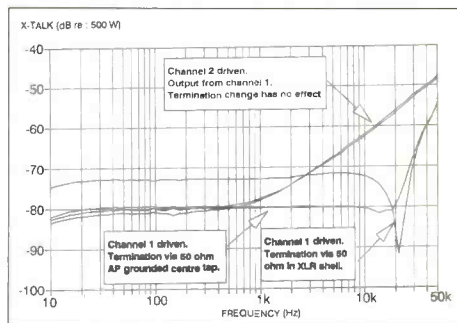


Fig. 3: Channel separation, channel 1 and 2 loaded with 8 Ω , each channel driven alternately at 500 W/channel

Noise and distortion

Table 1 gives the wideband noise measurements. The top figure in each box is the actual noise level into 4 Ω , while the bottom figure is the resulting dynamic range. Into 8 Ω there is no difference in the noise level. The results confirm the manufacturer's specifications. Fig. 4 shows the hum and noise spectrum under heavy drive conditions. Note the 1 kHz tone and its harmonics also.

Total harmonic distortion plus noise measurements (THD+N) were taken under all sorts of conditions. Fig. 5 shows a typical result at 400 W output into 4 Ω using an RMS detector. While not startling, the results are acceptable. These are hard to relate to the Hill specification, which states no load or rectifier type. SMPTE and CCIF twin tone intermodulation distortion ▶

MANUFACTURER'S SPECIFICATION

OUTPUT POWER — SEE TABLE 1

Total Harmonic Distortion (DIN)	1 kHz, <0.003% typ 0.1 W to clipping, 20 Hz to 20 kHz, <0.025%
Intermodulation Distortion (SMPTE)	0.1 W — clipping, <0.01%
Crosstalk, referred to 500 W/8 Ω	1 kHz, <-80 dB 20 Hz to 20 kHz, <-70 dB
Noise, referred to 500 W/8 Ω	<-105 dBA
Slew Rate	>100 V/ μ s
Rise Time	2 μ s
Damping Factor, 50 Hz/8 Ω	>500
Frequency Response, 20 Hz to 20 kHz	+0.1/-0.25 dB
Input Sensitivity, re: 600 W/4 Ω	1.0V
Input Gain	34 dB
Height	1 U, 44.25 mm (1.74 in)

DEPTH

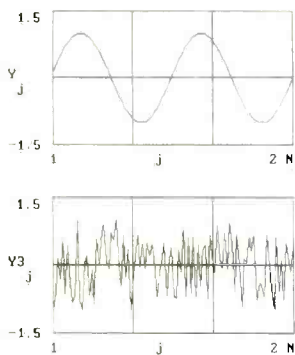
Chassis	502 mm (19.76 in)
Front to Rear Mountings	520 mm (20.47 in)
Overall	569 mm (22.4 in)

WIDTH

Chassis	438 mm (17.25 in)
Overall	483 mm (19.0 in)
Weight	13 kg (29 lbs)
Power	10 A/120 V or 5 A/240 V, 50 or 60 Hz



A fully featured digital oscillator and waveform generator package



- Sine, square, ramp, noise and programmable wave forms (i.e. AES 17, 1991)
- Precision level control
- Wordlength control 16-24 bit
- 10Hz to 24kHz operation
- External reference from AES/EBU or SPDIF
- Channel Status support

The DAS-90/SG can be used to provide a reference source with fully controlled audio and channel Status

Existing users of the DAS-90 Channel Status analyzer can purchase the /SG oscillator as a software upgrade.

Asia's Largest Professional Sound & Lighting Event

Pro Audio & Light Asia '92

The 4th Annual International Trade Exhibition for Professional Recording, Sound Reinforcement, Duplication, Lighting, Lasers, Special Effects and Associated Equipments for the Leisure, Presentation, Entertainment and Related Industries for the Entire Asian Region

JULY 8-10, 1992 Singapore

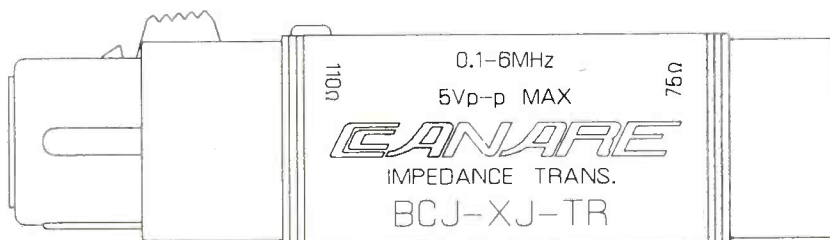
Following the tremendous success of the 1991 event, space reservations for 1992 are already up by 33%. Apart from leading individual international manufacturers many of whom are past exhibitors, official group participation will come once again from the UK and Italy.

If you wish to be part of the largest event ever staged in Asia, and meet the entire Regional users, then you must let us know immediately.

To exhibit/visit, please contact Alan Suen:
BUSINESS & INDUSTRIAL TRADE FAIRS LTD.
 18/F First Pacific Bank Centre, 51-57 Gloucester Road,
 Wanchai, Hong Kong
 Tel: (852) 865 2633 Telex: 64882 ASIEX HX Cable: BIPCCAB
 FAX HOTLINE: (852) 865 5513, (852) 866 1770



IPAA 11-92/SSJ



DIGITAL AUDIO IMPEDANCE TRANSFORMERS

BCJ-XJ-TR: BNC - XLR (3 socket) and BCJ-XP-TR: BNC - XLR (3 pin). Impedance Transformers for conversion of 2-channel digital audio signals between balanced 110 ohm (microphone type cable) and unbalanced 75 ohm (video type cable) resulting in longer possible cable runs and thus allowing the distribution of digital audio signals such as D1, D2, and AES/EBU over a larger area.

FFD FUTURE FILM DEVELOPMENTS

NATIONAL & INTERNATIONAL SALES
 11 The Green, Brill, Aylesbury, HP18 9RU
 Tel: 0844 238444. Fax: 0844 238106
 Tlx: 837896 BRILL G

COUNTER SALES & COLLECTIONS
 112-114 Wardour Street, London, W1V 3LP
 Tel: 071 434 3344. Fax: 071 437 9354
 Tlx: 21624 ALLOFFD G

TABLE 1: BROADBAND NOISE

Conditions	r.m.s. 22-22k	r.m.s. 100-22k	r.m.s. A-wtd	Q-peak 22-22k flat	Q-peak CCIR
Channel 1 : 4 Ω (ref. 800 W / 4Ω)	-65.4 dBu 101.7 dB	-68.8 dBu 106.1 dB	-70.5 dBu 107.8 dB	-59.8 dBu 97.1 dB	-58 dBu 95.6 dB
Channel 2 : 4 Ω (ref. 800 W / 4Ω)	-64.4 dBu 101.7 dB	-68.4 dBu 105.7 dB	-69.8 dBu 107.1 dB	-58.7 dBu 96.0 dB	-58.1 dBu 95.4 dB

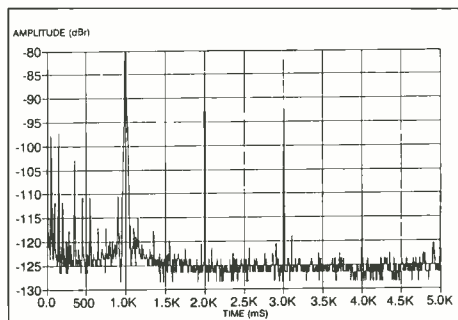


Fig. 4: Averaged noise spectrum output in the presence of a 1 kHz tone at 350 W, showing hum and harmonic distortion products.

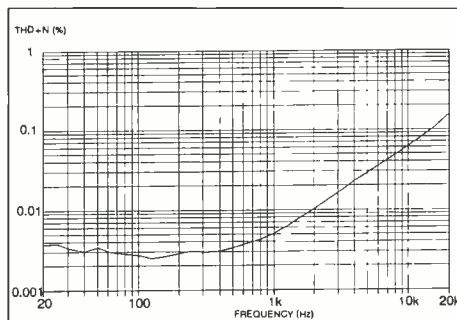


Fig. 5: Total harmonic distortion + noise, channel 1 and 2 loaded with 4 Ω. Channel driven at 400 W.

measurements give similar results, both below 0.01% and thus within specification.

Power Ratings

In the bad old days of twisted specifications, we had **IHF Music Power**. This allowed hi-fi manufacturers to specify 100 W *Music Power* performance from what might be a 5 to 10 W amplifier if measured to present IEC or BS standards. But, there was more than a grain of reality about the music power idea, for it stems from the fact that music is not continuous in any way whereas test signals of the day were mainly the monotonous sine wave. Manufacturers of 'real' amplifiers felt cheated, having spent a lot more money on power supplies and heat sinks, and pushed for a new specification standard. So duly one was written, including the need to pre-heat the amplifier to its worst case dissipation limit of around half power for 30 minutes prior to performing the output power rating test. Relevant perhaps in some instances, but certainly not in all; and required at a time when output transistors were more fragile and protection systems more crude than they are today.

For the last 20 years, mention of the transient rating of power amplifiers has occurred from time to time in the learned journals of audio, and probably in the magazines as well. Now, in the 1990's the principle of transient power arises again, with several manufacturers vying in the marketplace for credibility, this time on maximum transient power ratings.

But it is in music or dynamic power terms where *Chameleon* proves interesting. In its design, a decision was taken that unnecessary power

transformer iron was to be eliminated as far as it could be, until there was an audible performance loss. At that point the results would be evaluated and iron restored as it was felt necessary. The principle being — why haul around a lot of weight and rack space that is not earning its keep.

To evaluate this compromise, we examined the amplifier against various measurement standards. For ease of measurement, all of the following standardised measurements were taken at 1 kHz.

European standards

Present standards differ between countries. *BS 6840 (IEC 268-3:1988)* represents the European view and requires that the amplifier is run at standard test conditions for one hour prior to test, at 10% of (10 dB below) the maximum output power rating. The full power test itself may last only just over 60 secs, and must state the output power achieved into the stated load at the stated harmonic distortion level. If the manufacturer does not state the harmonic distortion level they used for their tests, then we know little about the amplifier's output power rating. For this test Hill use a 3% distortion level. In our lab, 1% is generally used.

For Hill's Sine wave Power rating, a test signal lasting two minutes is applied, with a gap of eight minutes between signals. This is within the BS standard. They claim and we confirm 500 W into 8Ω or 800 W into 4Ω (single channel driven) or 800 W (400 W per channel) into 8Ω and 1200 W (600 W per channel) into 4Ω if both channels are driven.

US Standards

The EIA standard RS-490 specifies amplifier output power differently. In its test, no warm-up is required, but the full rated power must be handled for five minutes continuously. In the case of the *Chameleon*, this reduces the output power rating to 165 W per channel into 4Ω with both channels driven. In fact we found that the amplifier would remain at this level all day. It equates to Hill's specification of 325 VA for industrial use.

Following their tougher conditions for rating continuous amplifier power, the American EIA standard introduces the concept of dynamic power. For their test, a burst of 20 msec of signal at the output clipping level, is followed by 480 msec of signal 20 dB lower. The dB ratio between this result and the continuous average level is calculated. For this test we measured 1140 W into 4Ω (single channel) and 940 W into 4Ω (both channels driven). This seems high doesn't it? Converting to dB and relating to the 165 W available continuously we get a dynamic headroom of 8.4 dB and 7.6 dB respectively. If dynamic power is what we hear from a power amplifier, rather than the continuous rating, then the *Chameleon* is a lot bigger amplifier than it would seem from the continuous rating.

Hill standard

Hill have produced some alternative methods of specifying dynamic power. The first uses a 200 msec signal followed by a 800 msec gap. For this they claim 750 W per channel (both channels driven), while our measurements showed more like 675 W. Looks like a big difference, but in dB terms it is only 0.4 dB, or not worth bothering about.

A further Hill idea, called transient power requires a signal for 20msec to be followed by an 80 msec gap, then repeated. This is similar to, but more difficult than the US dynamic headroom measurement. Here Hill specify 1100 W per channel into 4Ω (both driven), while we measure 920 W. Here the difference is 0.8 dB. Both of these are Hill's attempts to compare their amplifier's performance with the requirements of real music. **Table 2:** gives a summary of measured performance against the specification.

Fig. 6 shows a typical music sample used for these measurements. These measurements are not highly scientific, in that we have not necessarily measured the highest peak. Nor can we be absolutely certain about the average power, though these are good and pessimistic estimates based on averages of RMS readings over 30s. However, they do show that the EIA measurement standard gives a good estimate of what a power amplifier needs to be. The worst source music we could find would require a EIA dynamic headroom of 8 dB to handle the peaks without clipping. *Chameleon* easily handles this requirement. But the fact remains that we don't know what to call this amplifier — is it a 550 W/ch amp, or a 1000 W/ch amp? Both are true, and both are relevant but neither tells the story. ▶

“LOOK NO FURTHER”

Our extensive line of equalizers is a pretty impressive sight. But let's face it: all equalizers are pretty similar in appearance. It's what's **BEHIND** a product that makes the real difference. Rane offers many unique qualities that you should be aware of when considering your next equalizer purchase.

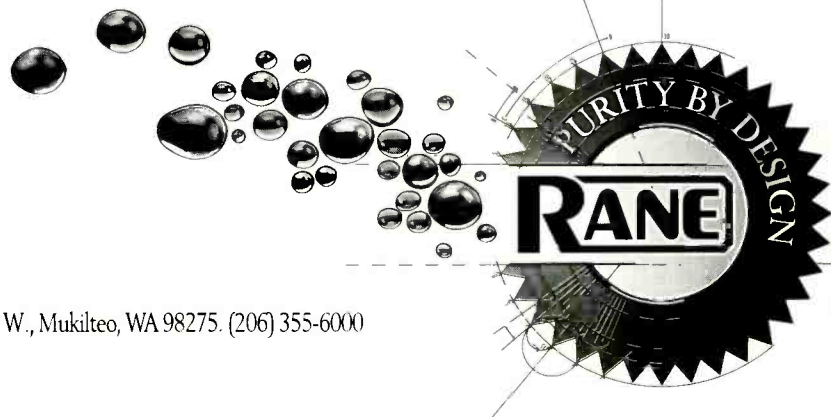
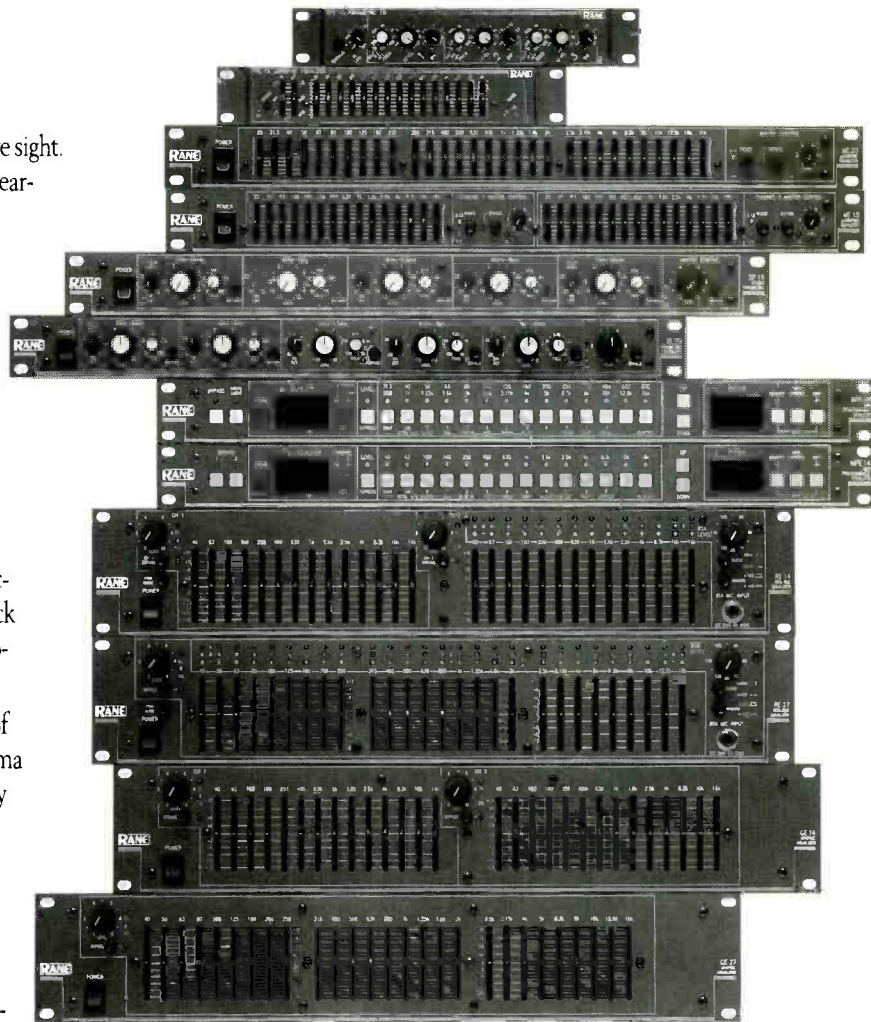
REPUTATION. Rane is synonymous with technological leadership in EQ filter designs: Constant Q, Interpolating, State Variable, Accelerated Slope, and programmable curve combining to name a few.

AN EXTENSIVE VARIETY of formats lets you choose just the right configuration for your particular need. Instrument or voice, sweetening or feedback elimination, analog or digital control — all with studio-grade performance quality.

RELIABILITY proven by flawless operation of thousands of Rane equalizers world-wide, from cinema sound to summit conferences, guitar racks to grammy recordings. All backed by factory support that is second to none.

VALUE: Superlative quality at affordable prices, the unique combination that makes Rane the best investment for your hard-earned dollar.

Stage or studio, fixed or mobile: we've got just the equalizer you're looking for. Professionals deserve the best: Rane. It's worth it.



RANE CORPORATION 10802-47th Ave. W., Mukilteo, WA 98275. (206) 355-6000

Damping factor

Damping factor was measured at several frequencies and confirmed to be greater than 500, we found approximately 1000 at 1 kHz.

Amplifier protection

Several layers of protection are provided, all of which appeared to be effective. ►

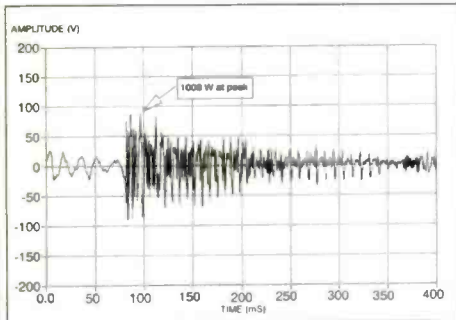


Fig. 6: A typical music sample used for dynamic power estimates.

TABLE 2: SUMMARY OF STANDARDISED POWER OUTPUT RATINGS

	1 ch driven 4 ohms	2 ch driven 4 ohms	1 ch driven 8 ohms	2 ch driven 8 ohms	Bridged 8 ohms
BS 6840:1988 Distortion Limited Output Power Hill — Sinewave power rating	800 W	600 W/ch	500 W	400 W/ch	800 W
EIA RS-490 Continuous Avg Power Hill industrial rating	725 W	550 W/ch	506 W	410 W/ch	330 W
EIA RS-490 Dynamic Power (Dynamic Headroom)	1140 W (2.0 dB)	940 W/ch (2.3 dB)			
RMS 20 mS on/ 80 mS off Hill Transient Power	1090 W	860 W/ch	650 W	590 W/ch	
RMS 200 mS on/ 800 mS off Hill Dynamic Power	1350 W spec	1100 W spec	700 W spec	675 W spec	
	920 W	595 W/ch	560 W	470 W/ch	
	1000 W spec	750 W spec	625 W spec	500 W spec	

YOU ARE VERY CLOSE TO A REMOTE IDEA

3200 MODULAR TWINS

Wide range Remote Control VCA's now complement Avitel's outstanding 3230 Series Audio DA's.

Our expanded range of Audio DA's now offers up to 120dB of Remote Gain Control in the ADA 3233 and ADA 3234 Single and Twin Channel VCA's — the latest in our continually expanding 3200 Modular System.

avitel
VCA

AVITEL ELECTRONICS LIMITED
UNIT 6 - CROYDON ROAD IND ESTATE
TANVARY CLOSE - BECKENHAM
KE'VT BR3 4BY - ENGLAND
TELEPHONE 4410181 655 3200 FAX 4410181 655 0509

Working throughout the world

For nearly 30 years we've been at the sharp end of miniature transducer technology for sound recording and reproduction. That's given us enviable expertise to produce just what the performer needs... a range of microphones tailored to meet the critical demands of broadcast, studio and sound re-inforcement situations. And it's backed by the exacting R&D routines of engineers in both Japan and the U.S.A. who understand leading edge electronics including VHF/UHF systems. Around the globe you'll find A-T range hard at work in all kind of situations...



NORTH AMERICA

*United Nations
Coca-Cola Boardroom
1988 Calgary Winter Olympics
TV's 'The Price is Right' Show
1990 Rose Bowl Parade
Gloria Estefan & The Miami Sound Machine
Session drummer John Robinson*



FAR EAST

*Singapore Parliament
Hong Kong Stock Exchange
N.H.K. Broadcasts Japan
Budokan Hall Tokyo*



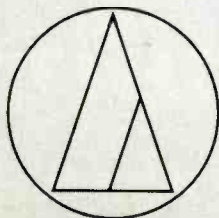
EUROPE

*The BBC
ITV Stations
The Barbican Centre
R.A.I. TV Italy
TV France
Norway National Broadcasting
Royal Dutch Shell Boardroom*

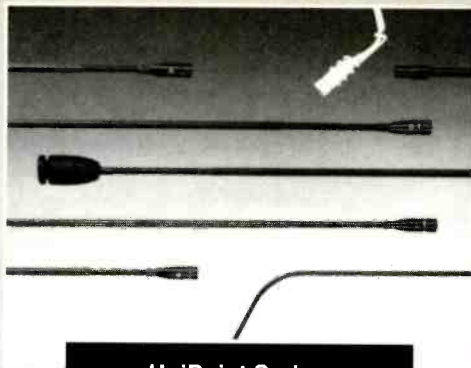


... and the list is growing. Update your technical file today on the innovative (and expanding!) A-T range.

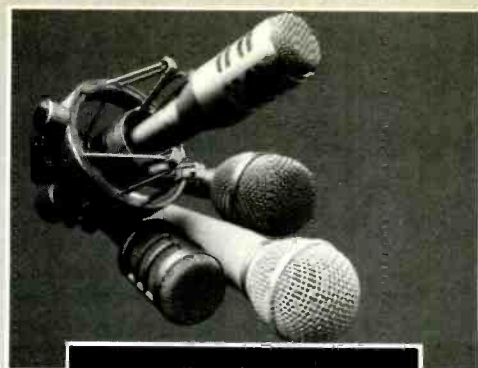
PRO-AUDIO DIVISION



audio-technica[®]
□ INNOVATION □ PRECISION □ INTEGRITY



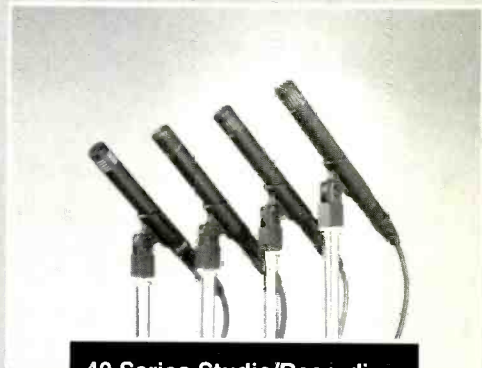
UniPoint Series
High-performance problem-solvers for commercial sound installations



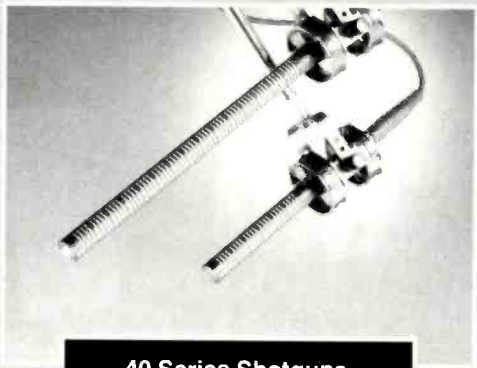
ATM Series
The road-tough choice of professional musicians



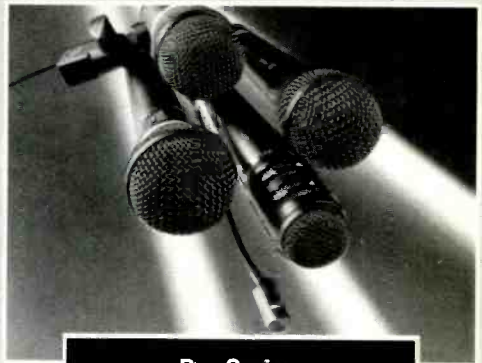
800 Series
A broad selection of vocal, instrumental and shotgun microphones



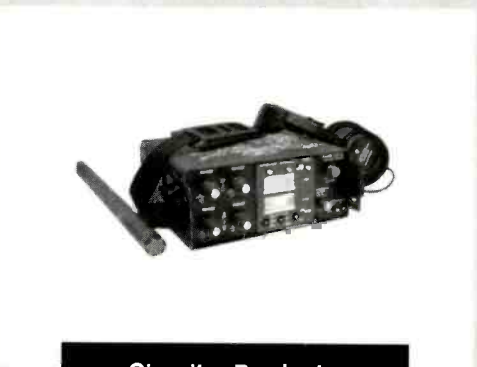
40 Series Studio/Recording
Wide-range, low noise mikes with interchangeable polar pattern capsules



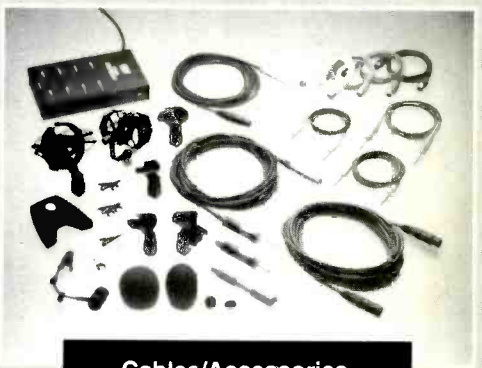
40 Series Shotguns
Long-reach, super-light and super-quiet, for movies, video and broadcast



Pro Series
High-value line covers a wide range of microphone applications



Circuity Products
Versatile stereo field mixer; handy phantom power supplies



Cables/Accessories
A selection of mike clamps and windscreens, plus cables for a variety of uses

Technica House, Royal London Trading Estate, Old Lane, Leeds LS11 8AG.
Tel: (0532) 771441 Fax: (0532) 704836



Firstly, a soft-start circuit inserts a resistor into the power transformer input circuit to limit in-rush on turn-on. This is automatically bypassed in a few hundred milliseconds. Fig. 7 shows the resulting mains current waveform, which reaches an instantaneous peak current of 11 A. Soft-start worked well, but the resistor did fail on the first amplifier tested. This is probably a fluke, since this resistor is operated well within its limits and is itself protected by a thermal fuse.

Short circuit protection is virtually instantaneous. While the amplifier was with us it was subjected to both purposeful and accidental shorts, with and without input drive, and the protection was immediately active. In this condition, the effected channel is shut down until the amplifier is powered off and on again, and the PEAK led remains continuously illuminated.

Thermal sensors abound within the unit, being integrated into the power transformer construction and on the output device heat sinks. These control fan operation, introduce HEAD-LOK which temporarily reduces the power rails from 105 to 85V as a means of reducing transformer dissipation, and activate the final thermal shut-down phase which is a further limit within the power transformer. As mentioned before, one effect of thermal shut down is to give the fan a temporary turbo boost to reduce temperature quickly, allowing the amplifier to automatically cycle into operation again.

Manuals

Inside each *Chameleon* carton are sensible, easy to understand user instructions, including details of connector wiring, power ratings, and information on the best use of the amplifier. But, unusually, it also includes services information. A complete, graphical description of amplifier disassembly makes the job possible for anyone; and a full circuit (less values) is also included. The circuit is drawn to reflect the physical layout of the equipment and PCBs, but is not as intelligible as a circuit laid out for ease of understanding circuit flow would be.

Summary

Chameleon is interesting. It works well and looks

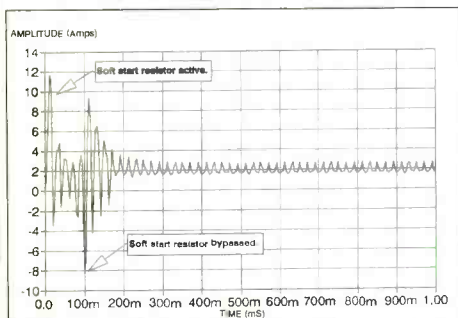


Fig. 7: Amplifier turn-on in-rush current. Note bypass of soft start resistor at 100 msec.

good, though the legends are hard to read — a fault which on more complex equipment would be irritating. *Chameleon* is quiet, both acoustically and electrically. On the road only time will tell, but aside from our perplexing soft-start resistor failure, which had no effect on amplifier operation, it has taken what we have thrown at it. As value for money, it is hard to fault. Would we recommend it? Based on our evaluation, we have bought two for use with our small Isle of Wight based sound system.

During the preparation of this review, one thing has become evident, every aspect of *Chameleon* has been thought through. On every point or query

directed to Malcolm Hill, on every detail investigated we found engineered decisions, and none that we can fault. On this basis alone, *Chameleon* deserves to be a successful product. We hope to report on its longer term endurance after several months in service.

Malcolm Hill Associated plc, Hollingbourne House, Hollingbourne, Kent ME17 1QJ UK.
Tel: +(44) (0) 622 880601
Fax: +(44) (0) 622 880664

for your ears only

SERIES AT THE aes STAND E 721873

■ The VITALIZER is a new powerful and creative psycho-acoustic equalizer. So unique - it's in a class of its own. Specifically designed to be compatible with the way the human ear perceives sound, it produces an uncompromising quality of sound that's subjectively *more powerful, more detailed and more appealing*. But don't take our word for it. Ask **Jean-Michel Jarre**. "I couldn't imagine recording or mixing without the Vitalizer", he says.

GIVE YOUR BASS more punch... RESTORE TIMBRE AND DEFINITION... MAKE YOUR RADIO STATION appear louder... THE APPLICATIONS ARE ENDLESS...

BRIGHTEN your top end... ENRICH your sound... CLARIFY live voice delivery...

THE VITALIZER

a truly virtuoso performer

FOR DETAILS OF YOUR U.S.A. DEALER, CONTACT SACO (81) 943 5155

CANADA: SASCOM MARKETING GROUP - (416) 420 0718 • DENMARK: SØ HØYEM AS - (45) 46 30 30 • GERMANY: P.M.E. AUDIO/ORIGNE V
 (1) 3243 8739 • GERMANY: PME AUDIO - 7136 6029 • ITALY: GRISBY MUSIC - (71) 710 847 • JAPAN: SOUNDCRAFT ELECTRIC LABORATORY - (3) 3261 7600 • NETHERLANDS: MASTER BLASTER - 2153 171 44 • SWEDEN: SOUND IMAGE - (08) 44 11 00 • SWITZERLAND: EMB&G MUSIKENGROS AG - (41) 1 242 9053 • SPAIN: TWIN CAM AUDIO - (3) 675 50 11 • UK: THE HOME SERVICE - (81) 943 4949 •

MANUFACTURED BY SPL (49) 2163 8761 FAX (49) 2163 83028 - INTERNATIONAL MARKETING: THE HOME SERVICE TEL (81) 943 4949 FAX (81) 943 5155

CLASSIFIEDS

Advertisements for this section must be pre-paid. The rate is £1 + VAT per word, minimum £20.00 + VAT. Box Nos. £10.00 + VAT. VAT (UK only) \$ rate \$2.00 per word, minimum \$40.00, Box No. \$20.00 extra. Semi-display rates on application. Copy and remittance for advertisements in APRIL '92 issue must reach these offices by 6th March addressed to: The Advertisement Manager, Studio Sound, Spotlight Publications Limited, 8th Floor, Ludgate House, 245 Blackfriars Road, London SE1 9UR. Cheques made payable to Studio Sound. **Note:** Advertisement copy must be clearly printed in block capitals or typewritten.

Replies to Box Nos. should be addressed to the Advertisement Manager, Studio Sound, Spotlight Publications Limited, 8th Floor, Ludgate House, Blackfriars Road, London SE1 9UR, and the Box No. quoted on the outside of the envelope. The district after Box No. indicates its locality. **SEX DISCRIMINATION ACT 1975:** No job advertisement which indicates or can reasonably be understood as indicating an intention to discriminate on grounds of sex (e.g. by inviting applications only from males or only from females) may be accepted, unless (1) the job is for the purpose of a private householder of (2) it is in a business employing less than six persons of (3) it is otherwise excepted from the requirements of the Sex Discrimination Act. A statement must be made at the time the advertisement is placed saying which of the exceptions in the Act is considered to apply.

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 the trader or a private seller.

SERVICES

THE COMPLETE SERVICE.....

DIRECT

- Record Pressings
- Cassette Duplication
- Compact Discs
- Post Mastering
- P.Q. Encoding
- Print & Reprographics
- Video Duplication
- Competitive Prices
- Free Quotations

Make it with us
We make the hits

SRT

MARKET LEADERS

☎ 081-446 3218 LONDON
☎ 0480 61880 CAMBRIDGE



TAPELINE

Blank & Duplicated Cassettes

New Tapematic Loop Bin Duplication & Loading High Spec Professional Bin Mastering

- ★ 120x Real Time Duplication
- ★ Ferric & Chrome Cassette supplies
- ★ Printing & Packaging, cases & accessories.

FOR HIGH PERFORMANCE CASSETTES
CALL 061-344 5438

Tapeline, Unit 2, York Works, York Street
Audenshaw, Manchester M34 5HD

CASSETTE DUPLICATION — Second to None. Simon Stable Promotions. Lyrec Loop-bin. On-body printing. Shrink-wrapping. Blanks wound to length. *Sample tape available.* Tel: 0869 252831.

LOCKWOOD, TANNOY, etc. New and used equipment bought, sold, serviced. Authorised Tannoy specialist. Lockwood Audio. Tel: 0923 210254. Fax: 0923 240558.

IVIE analysers: SERVICING & SALES. Contact: Sound Products, PO Box 91, Newport, Gwent NP9 1YP. Tel: 0633 252957. Fax: 0633 252958.

jbs records

MUSIC-SPEECH-DATA

REAL-TIME/HIGHER-SPEED Quality Cassette Duplication and Blanks from 1-1000. Computer printed Labels. Solo, 1/4" reel, Sony Betamax or R-DAT recording. Fast Security Delivery service.

FILTERBOND LTD, jbs records div, FREEPOST
19 SADLERS WAY, HERTFORD, SG14 2BR 0982-500101

MEET YOUR NEED

FOR 5", 7" and 10 1/2" white tape boxes; 5" and 7" tape spools
Leader and splicing tape; Ampex mastering tape (all lengths and sizes)

Phone us on **0372 460135** for full details and prices

MEDIA TAPE LIMITED

PO Box 120C, Esher, Surrey KT10 9JS

HIGH SPEED HIGH QUALITY LOOP-BIN DUPLICATING BY SRL TAPE SERVICES



THE BETTER THE MASTER THE BETTER THE COPY!
HOW MANY WOULD YOU LIKE? 100-5000
381-886 5555 081 866 5555 PHONE FOR PRICE CHECK

FOR ALL YOUR RECORDING NEEDS

AMPEX · BASF · MAXELL · AGFA · JVC
AUTHORISED NATIONAL AUDIO/VIDEO TAPE DISTRIBUTOR
Spools, boxes, blades, splicing and leader tape. Blank custom wound cassettes C1-120, labels, library cases and cards, C-zeros, pancake, etc. Broadcast Cartridges.



12 Britannia Road
Sole, Cheshire M33 2AA
Tel: 061-905 1127

FOR QUALITY, PRICE AND SERVICE

TASCAM MSR24 24-track 1in dbx. 6 months old, used twice. Offers invited. Revox C278 1/2in 8-track, excellent condition. £1,500. Tel: 0222 777739.

STUDIOS



ANDY WHITMORE

PRODUCER & Top Keyboard player / programmer

CO - PRODUCED:

Boy George - Generations of Love;
Danni Minogue - Jump to the beat, Baby Love, Success;
Eilon John - Understanding Women;
LA Mix - Mysteries of love

KEYBOARDS & PROGRAMMING

Cathy Dennis - Top Many walls, Everybody moves;
Soul II Soul - Get a Life Album;
Fine Young Cannibals - I'm Not The Man;
Erasure - How I love you;
Terence Trent D'Arby - Dance Little Sister & Album

GREYSTOKE STUDIO

Studio 1 & 2 equipment includes: 3x S1100 HD, 10 Meg. C-Lab, JD800, Wavestation, AIRBX, Prophet, Moog, DAT, Multitrack, Airconditioning.

Studio 2 with Prog/Eng. At comprehensive rates.

39 Greystoke Park Terrace, Ealing, London W5 1JL
Telephone (081) 998 5529
Fax (081) 566 7885

AMPEX MM1100 16 track 2in recorder. £5,500. Raindirk series 1 38:8:16 desk. £3,500. Wanted: 24 track combination similar to above. Tel: 0734 661306.

QUALITY MASTERING AND DUPLICATION. Audio/video post-production and synchronisation. Worldwide video transfer and copying, any quantity. While-you-wait service, 24 hours. 7 days a week. G.W.B.B. Audiovision 071-723 5190.



THE CASSETTE DUPLICATING SPECIALISTS

Real time & high speed loop bin duplication, printing & packaging. Blanks wound to length

TEL: 061-973 1884



Digital and analogue editing, mastering. Duplicating of any format including One-off CDs from £45 Also CD testing, custom wound blanks and voice-over recording

Ref SS591, 13a Hamilton Way
London N3 1AN
Tel: 081-346 0033
Fax: 081-346 0530



CUSTOMER SUPPORT ENGINEER

Lancashire Salary Negotiable

We wish to recruit a Customer Support Engineer to expand our support activities which include telephone helpline support and customer training. Candidates should have experience of Broadcast and Post production activities, some knowledge of digital audio systems, and a working knowledge of computer technology. The post demands contact with industry professionals at all levels requiring well developed communication and interpersonal skills, as well as the ability to work well under the pressure of time and customer demands.

Interested?

For more details contact in confidence John de Jong, Service Manager on (0282) 57011 or write with full career details to:

The Personnel Officer,
AMS Industries plc,
Billington Road,
Burnley,
Lancashire BB11 5ES

FOR SALE

1 x MCI JH 110 1/4 inch stereo recorder, perfect condition, 7.5; 15; 30 IPS; w integrated speaker; 15 000 French Francs

1 x Series III Fairlight as new ; rack mount version (separated kboard & monitor) ; 16 voices ; 14 Meg RAM; 190 Meg Hard Disk; 60 Meg tape streamer ; 1 x remote cable extension ; 120 000 French Francs

2 x Westlake Studio monitors w 2x39 cm woofers and wood exponential horns ; 15 000 French Francs

3 x EMT plates : 1 stereo model 162 ; 7 000 French Francs
2 x mono model 140 ; 4 000 French Francs each

Contact :
Patrick PELAMOURGUES
STUDIO JEAN MICHEL JARRE
B.P. 58
78290 CROISSY SUR SEINE
FRANCE
Fax : (33) 1 39 76 76 07
Tél. (33) 1 39 76 41 47

King's College London
UNIVERSITY OF LONDON

Digital Signal Processing Short Course Programme

Digital Signal Processing for Digital Audio

21-22 May 1992

A hands-on course to introduce and explain the basics of digital audio.

Fee £325

Further information from:
The Continuing Education Unit,
King's College London, Cornwall House Annex,
Waterloo Road, London SE1 8TX
Tel: 071-872 3055/6

FOR SALE



Sound incorporated

tel: 0892 861099

nick ryan

The Old Barn,

Barren Road, Speldhurst

Kent, TN3 0LH

fax: 0892 863485

SSL 6048E, computer & TR
Neve 8058, 28 16.24 offering 52 chs in mix V. special console
Soundcraft TS24, 36 chs + 4 FX rets, BG meters & Mastermix
Soundcraft TS12, 40 chs + 6 FX rets, tape remotes & loom
Harrison MR3, 36 chs, extra patch, Mastermix, 7 years old, v.g.c.
Trident Diane, 4023, 1988,
72 chs of Reflex auto, v.g.c.
TAC Scorpion, 24 16.2
Amek 2520, 48 chs with Mastermix 2 years old, excellent condition
Yamaha C7, grand piano immac.
Westlake BBSM 12, monitors

SPOA Studer A800 mkIII, rem & auto £17,775
SPOA Studer A800 A810 mkIII, £16,795
SPOA Studer A810 mkI, centre time code, 7.5/15, 2 track £2,450
Otari MTR90 mkI, v.g.c. £7,650
Otari MTR90 mkII, 24 track £14,250
TC2290 multi fx unit, 64 sec £1,575
Eventide SP2016 multi fx unit £595
AMS Audiophile, 2 hour V8, 12B £27,995
SSL E series computer £11,995
Ural LA4 compressors (pair), v.g.c. £675
Lexicon 224XL £675
Lexicon PCM70 (2 available) £3,425
Lexicon PCM70 £975
Yamaha SPX90 (3 available) £235
Neumann U87 (4 available) £425
AKG C414 ULS (2 available) £595

NEW PACKAGES COMING IN SHORTLY. CALL ME FOR THE MOST UP TO DATE INFORMATION. WHETHER YOU ARE BUYING OR SELLING. CALL ME.



Sound incorporated



Sound incorporated

DATS THE WAY TO DO IT!

Full range Sony Pro DATS always in stock. Best deals and rapid delivery.



Telephone
0789 268579

Fax
0789 414450

SITUATIONS VACANT

AKAI JAPAN

SOFTWARE WRITER - SALARY UP TO 40K

We are looking for a software engineer to write operating system code for sophisticated musical products. It will be written mostly in 80X86 assembler (with some DSP56000), requiring detailed attention to low-level control of peripheral devices and speed optimisation. For non-time-critical routines, C can be used. Applicants should have several years experience of this type of software. They should have experience of writing MIDI software, and a knowledge of electronic music technology and digital reverberation techniques.

Location: preferably working from home, within easy travelling distance of Oxford and West London.

If you are interested, please send your CV to: Studio Sound, Box No 1

THINKING OF MAKING A CHANGE? PARTNER WANTED. Technical marketing person with European technical sales experience required to help with forming a European distribution/rep company along with an established worldwide marketing specialist in the audio . . . video/broadcast field. Applicants should have experience with technical sales support-software-communications-report writing and also a good grasp of European distribution networks. Send CV, letter and or reference to Studio Sound, Box No 2. Confidential.

FOUR Sondor MO-3 Libra 16mm 2 track+cue track tape recorder/reproducers. Also two optical encoders. Serial Numbers 0082, 0482, 0711, 0881. These machines have been in use in a dubbing studio and were maintained to factory specification by Sondor agents. Contact: Robin, Johannesburg, South Africa. Phone: 27.11.673.6609. Fax: 27.11.673.3948.

SPECIALIST Valve Sale: Microphones Neumann Valve: U67 (\$4,000 each); U66 (\$3,000 each); U47 (\$5,500 each); KM54 (\$1,500); Peak Limit/Compr (x2) EMT with valve (\$3,500 each). All the best working. Write: B.P. 52, B. 1470 Waterloo, Belgium.

SALES PROFESSIONAL - AUDIO

Broadcast / Post Production / Studio

Akai Digital, a fast growing division of Akai (UK) Ltd, is looking for a sales professional to expand its business in Broadcast, Post Production and Studio markets. Candidates will have several years experience and a good technical knowledge of digital recording systems.

Applicants should be highly motivated and be able to handle the responsibility for developing business in these important markets.

An excellent package is provided and in the first instance apply in writing, enclosing cv to;

David Caulfield
AKAI DIGITAL
 Haslemere Heathrow Estate,
 Silver Jubilee Way, Parkway,
 Hounslow, Middlesex TW4 6NQ.
 Telephone: 081-897 6388
 Fax: 081-759 8268



EAST MIDLANDS AUDIO

STUDER-REVOX

NEW AND USED SALES

SERVICE — SPARES

APPROVED CONVERSIONS

STUDER A62 B62 SPARES

STUDER A80 16 TRACK MK ONE	£5,600
STUDER B62 VU, TROLLEY	£1,000
STUDER C37 STEREO, VALVE	£1,000
STUDER B67 COMPACT BROADCAST	£1,700
STUDER B67 STEREO, PORTABLE	£1,500
STUDER A80 VU Mk ONE, 7' 2", 15.	£3,000
STUDER A807 STEREO, TROLLEY	£2,800
REVOX PR99 Mk ONE, TROLLEY	£1,200
REVOX A77 Mk III HS	£650
REVOX B215 CASSETTE	£1,100
REVOX B77 HS Mk II, NEW	£1,300
REVOX PR99 Mk III, HS, NEW	£1,950
REVOX C221 PRO CD PLAYER, NEW	£880
REVOX C270 TWO TRACK MASTER	£2,600
REVOX C278 EIGHT TRACK, NEW	£5,000
REVOX C115 CASSETTE, NEW	£820
REVOX MB16 16CH BROADCAST	£6,600
REVOX C279 SIX CH DESK, NEW	£1,750
REVOX C274 4CH MASTER, NEW	£3,800

ALL PRICES PLUS VAT

TEL 0246 275479
FAX 0246 550421

PRIVATE STUDIO SALE

OUTBOARD EQUIPMENT		CASSETTE M/C	
1 x SONY DRE 2000 REVERB	£2,500	1 x JVC KD21	£50
1 x KLARK TEKNIK DN34D ANALOGUE TIME PROCESSOR	£2,000	1 x SONY TC K60	£50
2 x KLARK TEKNIK DN70 DIGITAL TIME PROCESSOR	£225 each		
1 x BELL BD80 DIGITAL PROCESSOR DELAY	£250	AMPLIFIERS	
1 x AMS DMX 80S DIGITAL DELAY	£1,500	2 x ELA PHONO PRE-AMPS 804	£50
1 x DRAWNER DL231 DUAL EXPANDER-COMPRESSOR	£300	1 x BGW 750	£400
1 x AUDIO-RESIGN VOCAL STRESSOR F769X-R-E900		2 x BGW 150	£400
SWEEP EQ	£400		
1 x SONY 701 SYSTEM WITH SL-C9 VIDEO	£600	OTHER	
		4 EMT 140 STEREO ECHO PLATES	£500 each
MICROPHONES		6 x DOLBY 361 TYPE A	£350 each
2 x NEWMAN U87	£475 each	2 x DOLBY M16H (24 CARDS)	£2,000 each
1 x SENNHEISER MD 409 U3	£70	1 Q LOCK 4-10 SYNCHRONISER WITH CARDS	£2,500
2 x SENNHEISER MD 414	£200 each	1 UMATIC 0286 OD LOW BAND	£100
4 x SENNHEISER MD 421 U5	£120 each	1 UMATIC VO 1810 LOW BAND	£100
1 x SENNHEISER MD 441	£100	4 x SPEAKER STANDS	£50 each
2 x AKG 222	£65 each	1 OUTBOARD 19in RACK — 4ft x 2ft	£150
2 x AKG C452EB	£95 each	VARIOUS XCR BOXES	P.O.A.
2 x CROWN P2M	£125 each	4 MICH STANDS	£20 each
		10 MUSIC STANDS	£10 each
INSTRUMENT		4 x CONTROL ROOM CHAIRS	£85 each
1 YAMAHA C7 GRAND PIANO	P.A.O.	ACCESSORIES	
TAPE MACHINES		MIE ANALYSER (FULL SPEC)	£2,000
1 x MCI ½ in JH110 M/C STEREO	£1,500	FERROGRAPH RECORDER TEST SET	£350
2 x MCI ½ in JH110 M/C STEREO	£1,200	LEVEL AC MICRO VOLTMETER	£75
3 x REVOX A77	£150 each	SABTRONICS 2000 DMM	£50
SPEAKERS		BROADCAST EQUIPMENT	
1 PAIR OF UREI 813	£950	1 x SCHIFF APPARATUS RAY	£7000
1 PAIR CELESTION DITON 44's	£300	AS NEW FULLY TESTED WITH FOLLOWING ITEMS	
1 PAIR WHARFDALE E50	£450	A) ONE WARS DISTRIBUTION PANEL	
1 PAIR SPENDOR BC1	£250	B) TWO BT LINE FEEDING AMPLIFIERS	
1 PAIR A&R 3A IMPROVED	£100	C) HOUSING FOR (B) WITH POWER SUPPLY	
1 PAIR 295A TANNAY EATONS	£300	D) FOUR ROWS OF 24 JACKS (TYPE 316)	
1 PAIR YAMAHA NS10	£130	E) KROWE DISTRIBUTION SYSTEM	
1 PAIR AUROSTONE	£50	1 x SONIFEX M/C CONTROL DESK (16 INPUT FRAME)	£2,300
HEADPHONES		1 x SONY MVP 2000 DESK	£6,500
3 PAIR BEYER DT100's	£30 each	1 x YAMAHA PF 2250 AMP	£350
3 PAIR KOSS K6	£30 each	(SONIFEX MICRO H2 - 200 BX STEREO) (3 CUE RECORDER-PLAYER) (AS NEW)	£1,200
TURNABLES		2 x SONIFEX FX500 CART M/C's	£500
3 x TECHNIG QUARTZ SP15	£150 each	SELECTOR TURNTABLES-MONITORS	
1 x JVC LA 120	£60	1 x SONY T.C. DSPRO STEREO CASSETTE RECORDER	£200
1 x JVC JLA-15	£50	2 x SONY ECM-50 FDW ELEC-COND MICH'S	£100
2 x PIONEER DECKS	£50 each	1 x CANFORD AUDIO HEXAGONAL STUDIO TABLE	£150
		1 x PAIR P.P.M.S.	£100

ALL PRICES ONO, EXC VAT. VIEWING POSSIBLE. ITEMS SOLD AS SEEN.
 TEL: 0923 857792 FAX: 0923 858052

ADVERTISERS' INDEX

Audio Precision	IBC	Malcolm Hill	14
Ampex	71	Nagra	77
Apex	94	Neve	93
Abacus	20		
Akai	26 + 27		
AMS	28 + 29	Otari	40 + 41
Apogee	35		
AKG	37, 42	Penny & Giles	52
Audio Technica	102	Plasmec	53
Avitel	101	Pan-Technical	73
Bruel + KjaER	59	Professional Monitoring	83
Bop Studios	22 + 23	Prism	98
Coach Audio	20	Pro Audio Asia	98
		Panasonic	13
Drawermer	51	Peavey	33
Drake	59		
D & R Electronica	62	Rane	100
Digital Audio Research	75	RE Broadcast	80
Digigram	10	RTW	18
Dolby	39		
E A Sonter	54	Soundcraft	IFC + 3
Euphonix	60 + 61	Studer	4
Focusrite	OBC	Solid State Logic	8 + 9
Future Film Developments	98	Sony	17, 89
		SEEM	20
GLW	6	Summit	38
		Stirling	49
Hayden	67	Soundtracs	65
Home Service	50, 103	Schoeps	72
HHB	15, 21, 91	Sennheiser	79
		Surrey Electronics	84
JBL	95		
		TC Electronic	48
Klark Teknik	31	Trident	85
		Turbosound	92
LA Distribution	24 + 25	TEAC	86 + 87
Larking Professional Sales	44		
Lyrec	45		
3M	46		
MBI	80	Walters Sturyk	36



STUDIO SOUND is available without charge to key personnel actively engaged in sound recording in any part of the world. Copies must be individually requested. Non qualifying readers will be notified in writing and invited to take out a subscription (see below for details)

SUBSCRIPTION ENQUIRIES:
 Subscription Dept, Studio Sound, Spotlight Publications Ltd, 8th Floor, Ludgate House, 245 Blackfriars Road, London SE1 9UR.

The cost of an annual subscription to Studio Sound is:—
 UK: £24.00
 Overseas surface mail: £30.50/US\$52
 Overseas air mail: £52.50/US\$89
 USA airspeeded delivery \$70

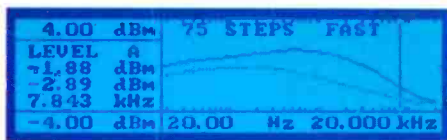
The publishers reserve the right to refuse applications and restrict the number of free copies sent to any one company or organisation

PORTABLE ONE

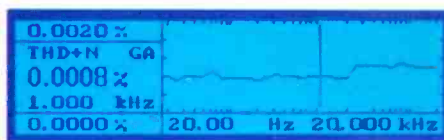


The newest member of the Audio Precision family of test instruments... the Portable One Plus
 ...A comprehensive, high performance instrument combining sweep test and graphics capability with
 12 audio measurement functions.

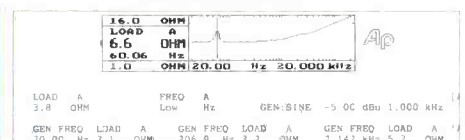
SWEEPS



GRAPHS



PRINTOUTS



- Press a button to sweep
- Acquired data shown numerically and graphically
- Makes both single & dual channel swept measurements
- 3 to 150 steps per sweep or sweep ISO standard 1/3 octave frequencies
- External sweep mode for test tapes, CDs or incoming signal sweep
- User selected end points for both axes of graph
- Automatic dynamic redraw for graph rescaling
- User selectable measurement units
- Graphic cursor provides numeric reading for any point
- Drives external printer through standard parallel port
- Prints graph or numeric sweep data table
- Also prints key analyzer/generator settings or bargraphs
- Printout menu allows combined tabular, bargraph & sweep printouts on one page

PORTABLE ONE PLUS...AUDIO PRECISION QUALITY IN A PORTABLE PACKAGE



Audio precision

P.O. Box 2209, Beaverton, OR 97005-3070
 503/627-0832 1-800/231-7350
 FAX: 503/641-8906, TELEX: 283957 AUDIO UR

Australia: IRT Electronics Pty. Ltd., Tel: (61) 2 439 5744 Austria: ELSINCO GmbH, Tel: (43) 222 812 1751 Belgium: Trans European Music NV, Tel: (32) 2-466 5010 Bulgaria: ELSINCO, JSC, Sofia, Tel: (359) 92 581 696 Canada: GERRAUDIO Distributor, Tel: (416) 898-2779 China, Hong Kong: A C E (Int'l) Co. Ltd., Tel: (852) 423-0387 Czechoslovakia: ELSINCO GmbH, Tel: (43) 222 812 1751 Denmark: nph Elektronik aps, Tel: (45) 86 57 15 11 Finland: Gemetic OY, Tel: (358) 77 13311 France: STS Mesureur, Tel: (33) (1) 45 83 66 41 Germany: RTW GmbH, Tel: (49) 221 70 91 30 Hungary: ELSINCO KFT, Tel: (36) 112 4854 Israel: Can-El Technologies, Ltd., Tel: (972) 3-544-1466 Italy: Medea S r.l., Tel: (39) 2/4840 1/86 Japan: TOYO Corporation, Tel: (81) 3 (5688) 6800 Korea: Myoung Corporation, Tel: (82) 2 784-9942 Malaysia: Test Measurement & Engineering Sdn. Bhd., Tel: (60) 3 734 1017 Netherlands: Trans European Music NV, Tel: (31) 034 987 0717 New Zealand: Audio & Video Wholesalers, Tel: (64) 7 847-3414 Norway: Lydconsult, Tel: (47) 9 19 03 81 Portugal: Acatron Electroacustica LDA, Tel: (351) 2414037 / 0450862 Poland: PAJU INTERLAB, Tel: (48) 22 335 454 Singapore: TME Systems Pte Ltd., Tel: (65) 298-2608 South Africa: SOUND FUSION, Tel: (27) 11 473-1315 Spain: Telco Electronica, S. A., Tel: (34) 1 531-7101 Sweden: Tal & Ton Elektronik AB, Tel: (46) 31 80 36 20 Switzerland: Dr. W.A. Gunther AG, Tel: (41) 1 910 41 41 Taiwan: Litz Technologies Ltd., Tel: (886) 2 758 5280 United Kingdom: SSE Marketing Ltd., Tel: (44) 71 387-1262

ARIF MARDIN

DON WAS

LIONEL RICHIE

AL SCHMITT

LINDA RONSTADT

AARON NEVILLE

STING

ERIC PRESTIDGE
MICK GUZAUSKI
TOM WERMAN
RINGO STARRLYLE LOVETT
LITTLE FEAT
GEORGE MASSENBURG
BONNIE RAITTB.B. KING
KENNY ROGERS
ED CHERNEY
PETER ASHER
DIANA ROSS
BETTE MIDLER
NATALIE COLE

STUDIO C HAS BEEN BOOKED AROUND THE CLOCK SINCE BUDDY BOUGHT A FOCUSRITE STUDIO CONSOLE WITH GML AUTOMATION. AND THE CLIENT LIST READS LIKE A WHO'S WHO OF CONTEMPORARY MUSIC.

PUTTING A FOCUSRITE CONSOLE IN STUDIO C HAS GIVEN US NOTHING BUT SLEEPLESS NIGHTS

BUDDY BRUNDO, CONWAY STUDIOS, L.A.

TOP RECORDING FACILITIES LIKE CONWAY LEAD, THEY DON'T FOLLOW THE CROWD. AND THAT'S WHAT MAKES THEM WORLD CLASS. FROM L.A. TO TOKYO AND FROM LONDON TO NASHVILLE, THE BEST ARE BREAKING THE MOULD. THEY'RE CHOOSING FOCUSRITE.

AN UNCLUTTERED LAYOUT THAT'S TRANSPARENT TO ANY AUDIO PROFESSIONAL. HIGH PERFORMANCE EQ AND DYNAMICS THAT ARE SIMPLY THE FINEST AVAILABLE.

ANYWHERE. MEANWHILE, AS THE ONLY LARGE CONSOLE DESIGNED WITH REAL 48 TRACK ROUTING, LARGE SCALE MULTI-TRACK PROJECTS CAN BE RECORDED AND MIXED WITHOUT TYING THE DESK IN KNOTS.

WHICH BRINGS US TO THE MAIN REASON BEHIND THE MOVE TO FOCUSRITE. IT DELIVERS THE SONIC RESULTS THAT HIGH QUALITY SOURCES AND STORAGE MEDIA DEMAND. NOT TO MENTION THE AUDIO PERFORMANCE THAT THE CD-BUYING PUBLIC DESERVES. SOMETHING THAT CONSOLE DESIGNS CONCEIVED BEFORE THE DIGITAL ERA SIMPLY CANNOT GUARANTEE. WITH LONG QUEUES FORMING OUTSIDE FOCUSRITE STUDIOS THE WORLD OVER, IT'S CLEAR THAT THE FACILITIES WITH A REPUTATION FOR GETTING IT RIGHT ARE DOING SO ALL OVER AGAIN.

FOCUSRITE. WORLD CLASS, NOT WORLD STANDARD.

UK: FOCUSRITE AUDIO ENGINEERING, UNIT 2, BOURNE END BUSINESS CENTRE, BOURNE END, BUCKINGHAMSHIRE, SL6 5AS. TEL: (01628) 819456. FAX: (01628) 819443
USA: GML, 7821 BURNET AVENUE, VAN NUYS, CALIFORNIA 91405. TEL: (818) 781-1022. JAPAN: TIMELORD, 3-5-10 SHINJUKU, ZUSHI-SHI, KANAGAWA 249. TEL: (468) 73 6226