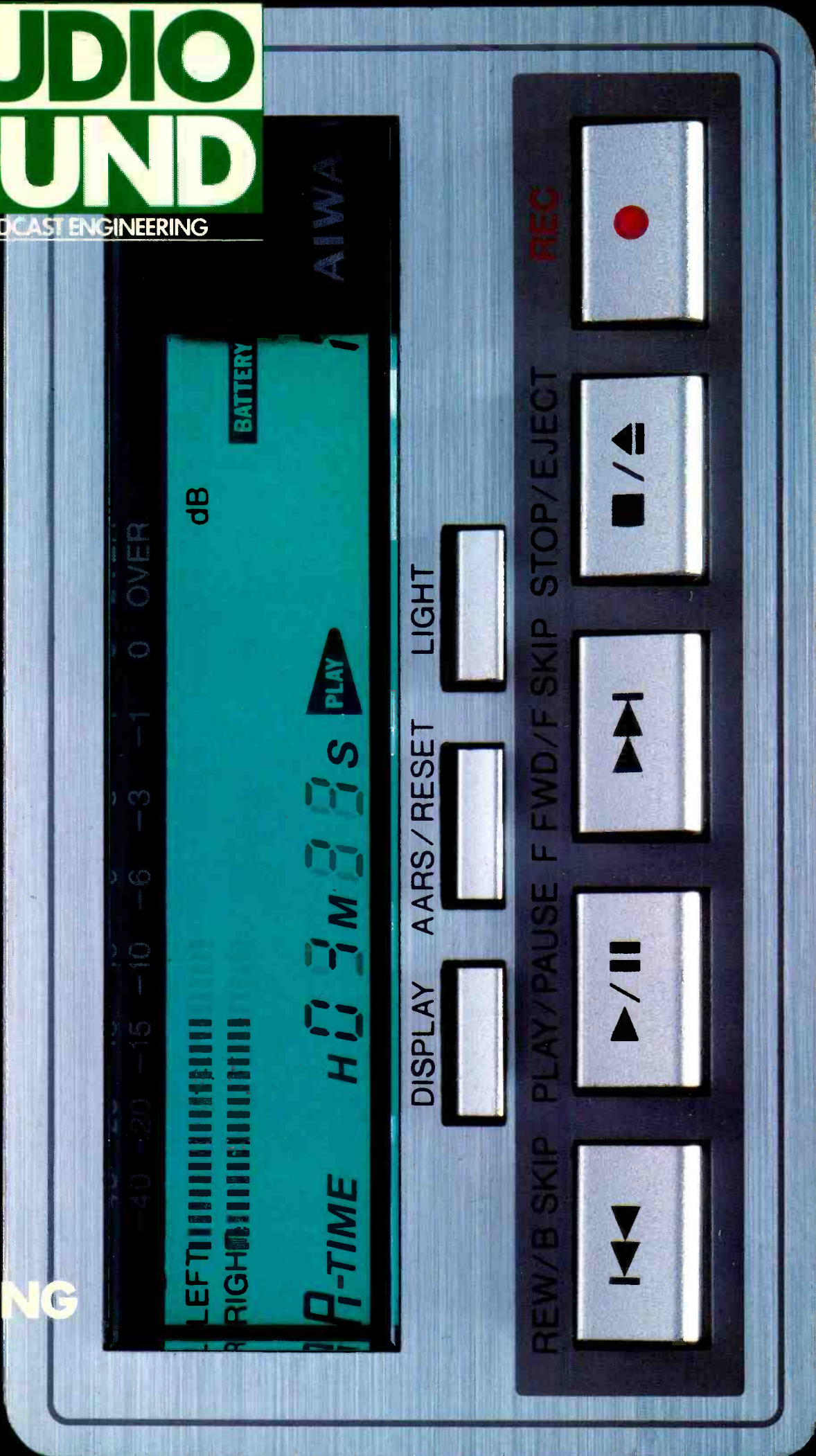


# STUDIO SOUND

AND BROADCAST ENGINEERING

## AUDIO RECORDING



AIWA

40 -20 -15 -10 -6 -3 -1 0 OVER

LEFT

RIGHT

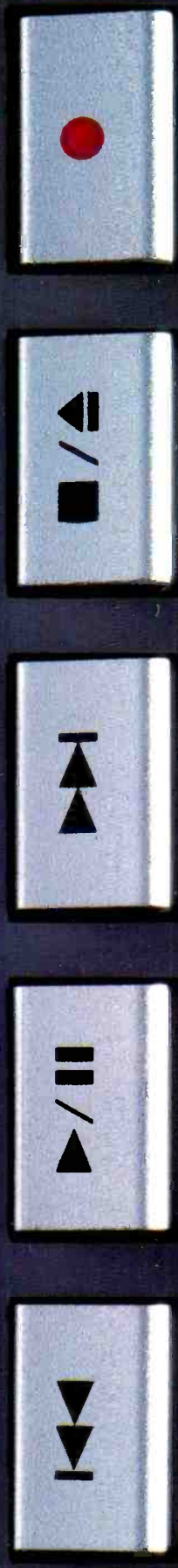
BATTERY

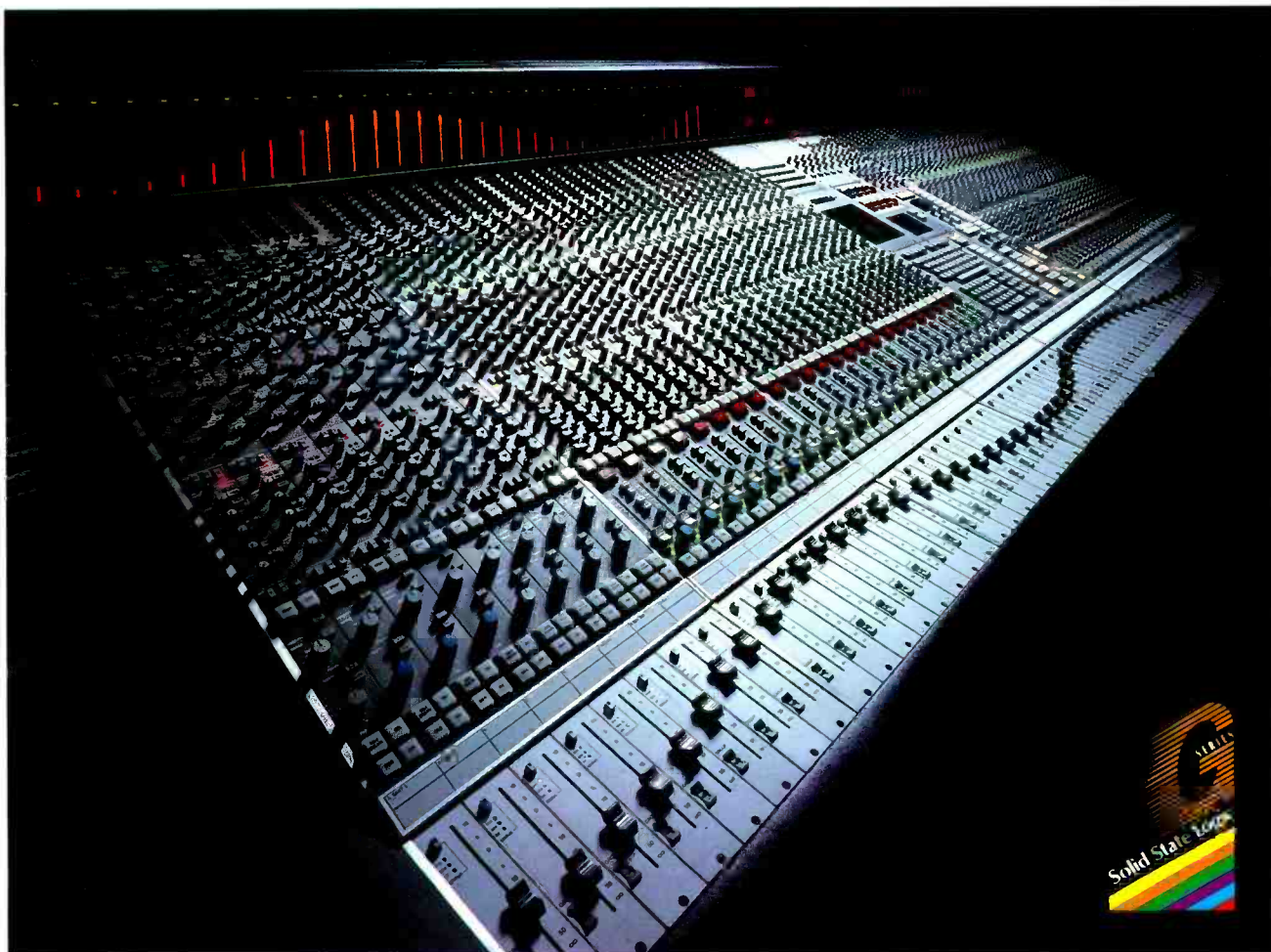
03M39S

PLAY

DISPLAY AARS/RESET LIGHT

REC  
REW/B SKIP PLAY/PAUSE F FWD/F SKIP STOP/EJECT

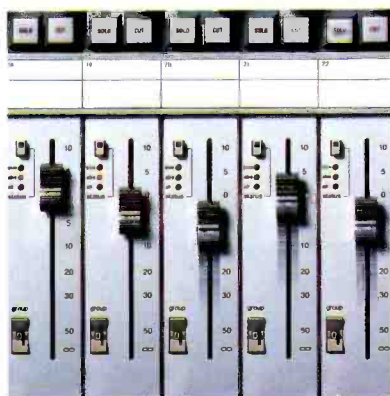




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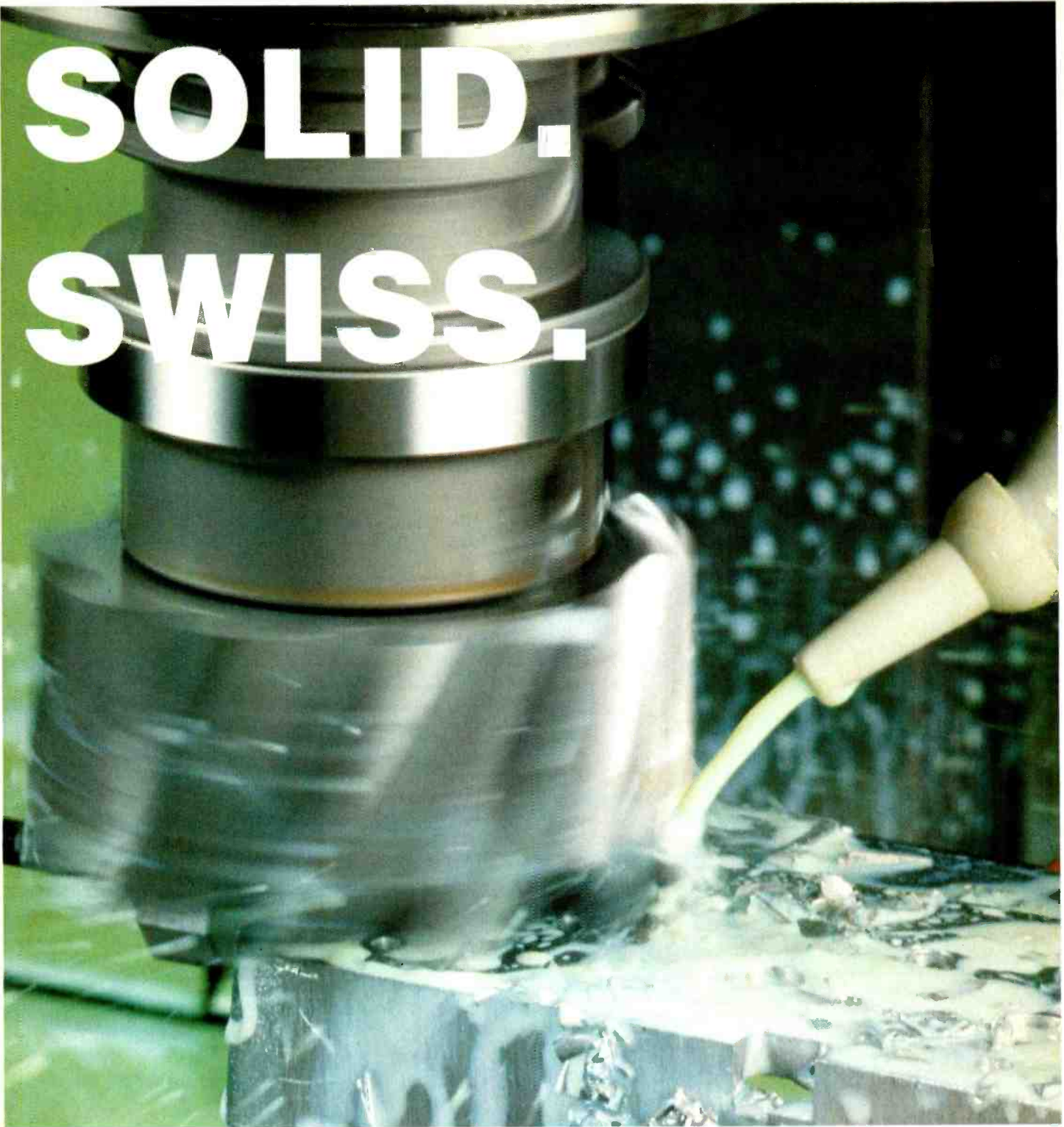
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**Fostex PD-2 see Audio Recording**

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# STUDIO SOUND

AND BROADCAST ENGINEERING

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## Yet another bag of bits

Every so often we all receive a glimpse of a future that doesn't appeal. Mine is about 10 years hence (or less) when this issue of the magazine (on audio recording) will be retitled 'Data Storage' and will read like a computer magazine talking about access times and storage density. The idea of a 'good sounding' machine will largely have been eradicated as an audio concept as we will just talk about data storage devices. To me, part of making a great recording has been the ability to select the appropriate sound, ie machine for the piece of work in hand. With the other inevitable changes that will follow — EQ, effects and dynamics will also begin to fall under the all-encompassing umbrella area of DSP and hence beyond the intimate understanding of most of us. Such moves will remove all the little quirks of equipment that can currently be used to our advantage and make a far more uniform product. From an operational point of view, life will almost certainly be easier and we may even be able to achieve a good sound. Certainly a downside view of the future and one that may not materialise but I am not so sure.

In this issue we have not covered hard disk systems as a recording medium. This reflects recent developments that show such systems maturing into the audio manipulation and editing devices that they were always described as. While there are no interchangeable disk format standards for audio material the recording medium will remain tape because of its greater universality. Even those hard disk machines that are recording oriented and available in multitrack formats up to 64-channel have apparently never been assembled in such sizes. I understand that the average size is 8-channel for such systems with about enough storage capacity for two track hours and so are not really capable of being considered as a replacement for a tape machine.

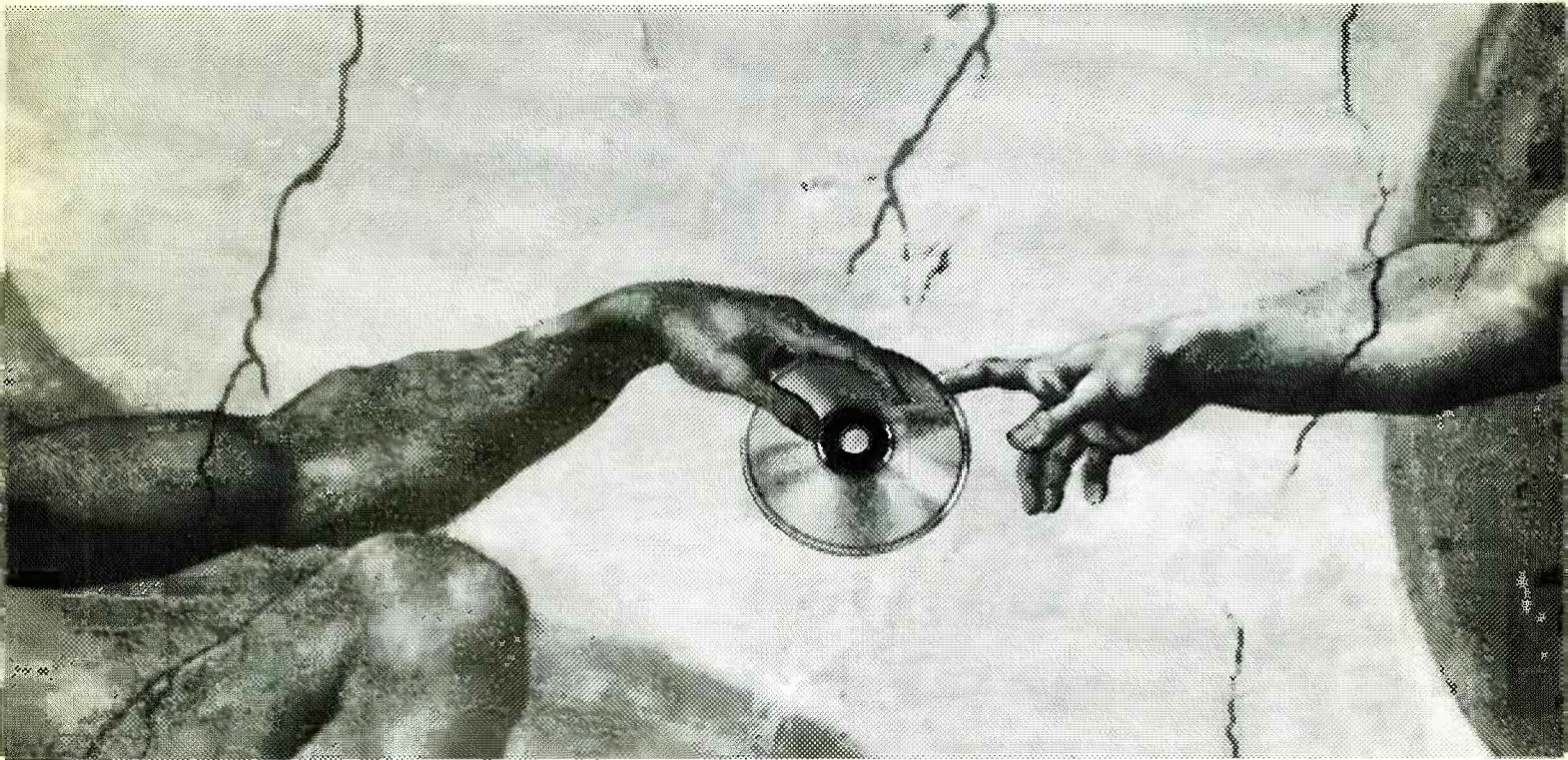
## Snap, crackle and pop

On a completely different matter, in the UK breakfast cereal manufacturer Kellogg's have a new cereal that they are currently promoting. Part of the promotion involves on-the-packet vouchers offering money off records, tapes and, most heavily featured, compact discs. Large compact discs are featured all over the packet vying for space with the Kellogg's logo and pictures of the cereal itself. I can't help but feel the whole promotion is a joke from Kellogg's marketing — money off vouchers for CDs on a breakfast cereal; the product name: Golden Crackles!

Keith Spencer-Allen

Cover: Aiwa HHB 1 PRO. Photography by Nik Milner

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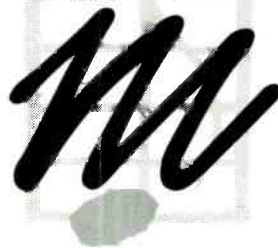
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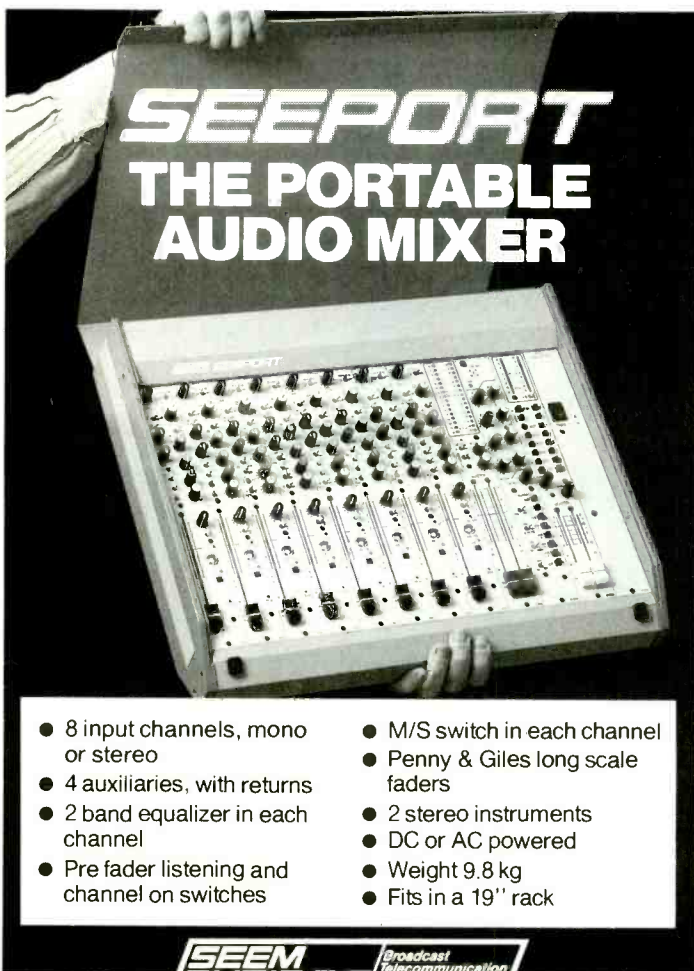
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## Isolation rooms ITS, Montreux — a report

At a time when recording studios are widening their customer services in order to keep their clients, an addition to the usual satellite TV, video and pinball fare has come to the fore. The Ocean Floatroom in Clapham, South London, want to market their isolation float tanks to studios. They claim that 'floating' is a means of relieving stress — "feelings of stress and tension are removed and the blood pressure lowered, as are levels of stress-related biochemicals".

Contact Robert Lancaster at The Ocean Floatroom on 071-720 8817.

## Non-reflective studios

A new non-reflective glass has been put on to the UK market with recording studios in mind. Made by Rankin Glass of Hackney, London, it is acoustically treated and fireproofed. Rankin are marketing the glass, called *Pyroclear*, to recording studios for partitioning of control rooms and performance areas, and for other glass areas around the studio as well as computer VDUs.

Chairman, Clifford Rankin: "We are finding a lot of different applications, for example in private boxes at Wembley Stadium when there's a night game and the lights are on in the box, all the occupants can see are themselves. We put this glass in car showrooms and shops, especially jewellers. In fact in one jewellers we put the glass on top of the showcases and people were hitting their hands against the glass thinking it wasn't there."

There lies the difficulty in marketing this type of glass, you can't see its benefits until you compare it with other types. But when you do see the difference it's very obvious.

"We use our own acoustic resin on the glass and also our laminates for its non-reflective qualities. We do all the cutting and design work in-house."

Rankin, The London Glass Centre, 24-34 Pearson Street, London E2 8JD, UK. Tel: 071-729 4200. Fax: 071-729 7135.

It was back to Montreux for the television world in June for the 17th International Television Symposium. The evolution of the Symposium is also the evolution of the Palais de Congres and though still under construction, it is getting better and less people reported being overheated. Some were even cold from large draughts on the top floor!

Though primarily a television event, this year's show indicated that 'audio-awareness' is slowly but surely increasing and this is borne out by the (generally) good quality of the audio tracks for HDTV presentations. There were also some first showings for audio products.

**Fostex** launched the *P2* professional portable DAT recorder, which contains all the features of the *D20* studio machine, including timecode. Additions include two high quality microphone preamps and an M/S matrix decoder for playback.

A new company, **Audio Follow**

from France, showed the *DDO2* optical disk recording/editing system, which provides two stereo channels or four mono, together with comprehensive controllers for broadcast and film use.

**DAR** launched the *Sigma*, the latest development from the *SoundStation*, which features eight or 16 tracks with Winchester and optical disks, DSP with 4-band parametric EQ, pan and gain to each audio segment. *Sigma* can also be optionally supplied fitted with *WordFit*.

**Publison** continue to expand the

*Infernal Workstation 8000* and it is now available with 16 tracks.

**Revox** are making a determined show in the field of professional audio and offer a complete range of equipment for broadcast use, including an on-air console, CD player, cassette recorder and reception antennae.

**Dolby** were promoting surround sound for broadcast as well as their new *SR-D* digital format for 35 mm film with six discrete channels.

The **Avid 2000** series non-linear editing system for video offers almost as a 'throwaway' 24 channels of 48 kHz/18 bit digital audio. The *300* provides two digital inputs/outputs with 24 virtual tracks for digital track laying, complete with on-screen audio waveforms for each track. The *500* features four digital inputs/outputs and the *MediaMix* application provides stereo mixdown with parametric EQ for each channel, automated digital effects and MIDI record/playback.

At the other end of the scale, **EAA** showed a pre-production *PSP-2* stereo microphone preamplifier/line amplifier to complement the Sony DAT personal stereo, thus providing professional input/output interfacing.

Though to the casual visitor it would almost appear that the picture is everything and the sound a last-minute thought, in fact audio has quietly taken its place at the Symposium and a number of digital editing and processing systems on display were there to verify this. The fact that the latest video editing systems are also providing very high quality audio is also a sign of the times.

**Terry Nelson**



Audio Follow DDO2 optical disk recording/editing system

## BBC Radio 1 production workshop

Long gone are the days when Radio 1 could rely on attracting listeners to their station on name alone. These days with national commercial radio stations on the horizon and strengthening existing local commercial stations, the 'nation's favourite' has to move on to survive.

Egton House, Radio 1's home, has never been at the forefront of technology but now boasts its own production department, called the Radio 1 Production Workshop. Tim Mountain, of BBC Radio projects department, explains its workings, "Radio 1's Workshop is a pre-/post-production type area, which is responsible for the creation of the

majority of trails, promotions and jingles for the network, as well as general wackiness for the Steve Wright afternoon show!

"The old facility, which has been around for many years, was far from ideal and becoming incapable of handling the sort of work now being required by Radio 1. Since the output is now of a much more complex nature, any new installation needed to respond to this."

The old facility in fact was still active at the beginning of the year and was just a 2-track set-up. The new area is on the same floor as the on-air studios and so is more accessible to the DJs. Mountain: "The

area has now been completely re-equipped as a hi-tech studio with cart, DAT and tape machines, turntables, various outboard effects (Roland *E660* EQs, Eventide *H3000*, Yamaha *SPX1000*, etc) as well as samplers (Akai *S1000* and Roland *S50*), Atari computer, routers, etc. The studio was designed by engineer Ray White with help from Paul Newis of the studio operations department, the facility was built and installed by Harris Grant Associates."

Choice of equipment was left to the Project Team, "An Allen & Heath *Saber 32/16/16* console was chosen and installed. This is used in ▷



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## SR-D cinema sound from Dolby

Dolby have finally launched their long awaited digital sound system for film. *SR-D* was introduced in San Francisco in June and the UK launch was at the Odeon Marble Arch cinema in London during July. Dolby say the launch was earlier than they would have liked mainly because of the competition already being out — the *CDS* system from The Optical Radiation Company and Eastman Kodak was launched last year at the Los Angeles AES exhibition.

Dolby *Stereo SR-D* is a 35 mm format that provides 6-channel digital and 4-channel analogue soundtracks printed optically on the same release print. The system has some unique features. The main difference from any other system is the placement area of the digital data. Initially, Dolby were going to place the data between the frame lines but had to rethink when



printing for Cinemascope as there is hardly any room between frames in that format. Dolby then considered putting the data outside the sprocket line, Ioan Allen, director of Dolby's cinema programme, explained that the final decision was to place the data in between the sprocket holes as outside was already being used for information like *Keycode* from Eastman Kodak, which helps in

production with frame counts, and Dolby's own *Edgecode* for automation in theatres.

The soundtrack has a 20 Hz to 20 kHz frequency range at a 48 kHz sampling rate. At the moment there is 16 bit resolution but Dolby say they will be changing to 18 bit in order to improve the dynamic range even further. Playing the digital track on *SR-D* prints requires the

addition of digital readers for each projector and a digital decoder manufactured by Dolby. The decoder interfaces with the cinema's existing Dolby *Stereo* processor which helps to minimise the costs of digital conversion.

Reaction to the new system was quick and favourable, Graham Hartstone, head of post-production at Pinewood Studios said, "I want it now! The Dolby system is very impressive and will become the standard as it is the one the distributors will want. They don't want prints that will just be going in a few cinemas but want the wider distribution that *SR-D* gives."

There was a warning, however, from Dolby for the cinema owners and designers who might have to look more closely at construction and loudspeaker choice to be able to live with the new system. The first *SR-D* film release will be this autumn but will be kept secret to allow Dolby to finally verify print reliability in the theatres. **JM**

## BBC Radio 1 production workshop



conjunction with an Akai audio router of four 32x32 matrices, configured to provide assignment of channel inputs, record source selection, monitor inputs, effects to send/returns and inserts, etc. This was felt to give the most flexibility as well as the ability to be able to instantly configure the studio for different requirements."

With the new production studio

Radio 1 were starting to do things differently, "Although both digital editors and sampling have been used within BBC Radio Broadcasting for some time, the integration of both within an area is something that has just been done within the workshop. The playback of samples triggered from a sequencer and the power of an editor (including its almost instant roll back, auditioning capabilities,

etc) makes it possible to build up a production with many sounds, effectively many tracks, in this kind of virtual multitrack environment. So any number of instantaneous samples of speech, music, etc, can be synchronised to the real audio tracks of the editor using timecode.

"The multitrack facility is provided by an 8-track AMS *AudioFile Plus* digital editor, which has now been fitted with the 'eight simultaneous input' upgrade. Being integrated into the routing system allows flexibility as to what can be recorded and edited, etc. Due to the noise of the cooling fans in the hard disk and processor, these units are installed in an apparatus room, remote to the area, connected by cable to the control surface housed in the workshop."

The benefits of MIDI for broadcast applications are becoming more apparent in BBC Radio and now its uses are gradually being adopted in studios within Broadcasting House.

"MIDI is used extensively within this facility as control and communication between most of the studio devices. Realtime recording of musical notes, playing back either sampled or synthesised instruments, can be recorded into the Atari computer, which uses the Steinberg *Cubase* software. This all provides a great deal of potential for the creation of very complex productions. Interfacing and configuration of the

MIDI control of the equipment is by a Real World MIDI router.

"This MIDI control makes it possible, for example, that by selecting a patch the configuration of the whole studio, the desired routing, effects programs, etc, can be instantly recalled for a particular set-up. Realtime effects automation can also be achieved by recall of individual equipment patches or control of parameters (realtime adjustment of delay or EQ for example) sequenced from the Atari computer. Realtime control of routing configurations, desk channel muting, etc, is also possible."

The refurbishment of the area, installation and testing in Egton House was, with the help of engineering operations, all completed within a week. Mikey Woolmans, a Radio 1 producer now runs the studio: "I work the studio on a booking system like a normal studio but just for the people here. We've done almost everything from stings to a cinema commercial soundtrack. In fact the work here is just like making commercials."

The main criterion for the studio was to provide a facility that had the flexibility to handle anything from a simple dubbing exercise to a full musical production — being able to set up, and achieve the desired results in the minimum possible time. To this end things look and sound very promising. **JM**



# DIGITAL



ISSUE 6  
SUMMER 91

AUDIO TIMES

081 960 2144

## NEW LOOK LISTENING ROOM

A visit to our Scrubs Lane premises is incomplete without experiencing HHB's brand new Listening Room: an acoustically-treated space with a full choice of active monitors by ATC, where customers can critically evaluate the very best products available from a wide range of manufacturers. Popular demonstration subjects include the revolutionary Yamaha DMC-1000 digital mixing console, Eventide's UltraHarmonizer range, valve processors from Summit and the latest generation of Apogee converters. **Call now to make your appointment.**

## SUMMIT AUDIO

HHB is now the sole UK source for the full range of classic valve signal processors from Californian manufacturer Summit Audio. All Summit products are hand-built from selected components to deliver a uniquely musical sound that remains as popular as ever - especially in the age of 'clinical' digital. Alongside the TLA-100A Tube Levelling Amplifier (shown here) and TPA-200A Dual Tube Preamp are two equalizer designs: the EQF-100 Full Range Eq and the dual-channel EQP-200A. And remember: 'valve' is really pronounced 'toob'. TLA-100A: **£995.**



## YAMAHA DMC1000

We're the nation's number one source for Yamaha's stunning new console. A 22-input digital audio mixer with timecode-based moving fader automation, instant recall of all front panel settings and powerful on-board DSP including 4-band parametric digital channel EQ. Yamaha has won the race to produce a full-function all-digital mixer that can interface directly with digital multitracks of all formats, hard disc recording systems, PCM-equipped VTRs, CD, DAT and digital signal processors. Touch-sensitive motorized faders and continuous rotary controls allow mixer moves to be automated against timecode during mixdown and subsequently edited. All parameters can be controlled via either MIDI or RS-422 for compatibility with video edit controllers. Equally at home in music recording or audio-for-video environments, we believe the DMC1000 represents an extraordinary development in digital audio. **From £18,500.**

## DIGITAL AUDIO RESEARCH

### DASS-100

'DASS' stands for 'Digital Audio Synchronising System', but there's far more to the DASS-100 than the name might suggest. Conceived as a 'problem solver' for the modern studio, the DASS-100 allows digital devices of all formats to be interfaced successfully in the digital domain. The spectrum of possible applications is vast, ranging from CD preparation and mastering to audio transfer between digital multitracks, hard disc recorders, D1, D2 & DX VTRs, CD, DAT, digital consoles and signal processors. Basic features include digital format conversion, sample rate conversion, gain adjustment, mixing, addition or removal of emphasis, DC offset removal, synchronisation to word clock and delay. Quick and easy to use, the DASS-100 is a must in any serious digital facility. **£7,995.**



## FOSTEX G24S

24 tracks on 1" tape plus ultra-quiet Dolby S noise reduction, a removable front control panel that doubles as a remote with an in-built 10-point autolocator, MIDI function control and an on-board chase synchroniser option all make the G24S a formidable proposition. Brilliant user ergonomics and impeccable construction help ensure that the G24S is a real contender when it comes to choosing a studio multi-track. **£7,330.**

## SOLID STATE AUDIO FOR VIDEO

Klark-Teknik's DN735 can record and play back short passages of stereo audio in perfect sync with other devices (notably VTRs) via externally applied SMPTE timecode. As such, it can augment any VTR with two fresh audio tracks, greatly simplifying stereo edits and crossfades. 20 seconds is standard, up to 175 seconds with additional memory cards. The 1u, 19" rack-mountable DN735 can be controlled manually, remotely, or via serial RS422. A snip to the audio-post specialist at **£3,550.** Plug-in memory cards from **£475.**



## APOGEE

Here at last, the new generation of Apogee converters offer startling audio quality. Both stand-alone units can help extract optimum performance from your existing digital hardware without substantial reinvestment. Simply the best converters money can buy. AD500 **£1,195** DA1000 **£1,595.**

## SONY STEREO MICS

To partner your DAT portable, HHB offers a choice of stereo condenser microphones from the Sony range. The popular ECM-979 (shown here) and ECM-959 both represent extraordinary value for money, while the ECM-M55 is built to tackle the most demanding applications. We also stock a wide selection of mics from other manufacturers, including the new VP88 from Shure. Sony ECM-979: **£210.**



## MORE NEWS FROM EUROPE'S DAT CENTRE

We're the world's leading supplier of DAT recorders to professional users. And we back all our DAT products with the best advice and service support in the business. Call us first to discuss your precise application requirements.

### AIWA HHB1 PRO KIT

HHB's own groundbreaking professional portable with A-Time record capability is partnered with the Sony ECM979 stereo condenser mic to deliver an unbeatable ENG and location recording package. **£1,250.**

### SONY DTC1000ES 'PRO'

Another HHB exclusive, the 'PRO' takes all the features of the industry standard, best-selling DTC1000ES, while adding a 44.1kHz digital record modification, balanced analogue XLR connectors and a rackmount kit as standard. **Unbeatable value at £1,195.**

### SONY TCD-D3

We now have limited quantities of the world's first DAT Walkman. Buy the TCD-D3 from us and you also tap into Europe's finest service back-up. **Great value at £425.**



### SONY DTC-55ES

Thanks to its superb performance and comprehensive function control, the DTC-55ES continues to provide audio professionals with an ideal low-cost alternative to conventional pro units. **Now just £468.**



### PANASONIC SV3900/SV3700

The new SV3900 from Panasonic can be controlled by either the SH-MK390 wired remote controller or via the unit's comprehensive serial interface ports. Other features include comprehensive indexing functions, SCMS status indication and error rate display. The SV3700 offers similar performance without wired remote operation. SV3900: **£1,250** SV3700 **£950.**

### SONY PCM-7000 SERIES


HHB has the full Sony range of professional 4-head recorders, options and remote controllers on demonstration. Featuring timecode, precision electronic editing and synchronisation, the PCM-7000 Series kicks DAT firmly into the nineties as the Number 1 choice for broadcast audio and post-production applications. **Call now for price details.**

## SUMMER SALE BARGAINS

HHB is offering a number of selected new and ex-demo items for sale at greatly reduced prices. Call for further details.

- Akai DR1200** 12-track Digital Recording System **£8,950**
- Akai DD1000** Optical Disc Recorder **£6,295**
- Akai S1000PB** Playback Sampler **£1,195**
- Tascam MSR24 1"** 24-track tape recorder **£5,295**
- Roland S770** Sampler **£2,795**
- Roland SDE-3000A** Delay **£549**
- Yamaha SPX1000** Multi-effects **£750**
- Klark-Teknik DN360** Dual Graphic Equaliser **£995**
- Wellard Powered Monitors** (pair) **£795**
- Sony DXC-M7PK** Camera Kit (with lens) **£6,200**
- Sony PVM-1320** Colour Monitor **£995**
- Aiwa HDS1** DAT Portable **£395**

- All prices exclude VAT.

A large, professional studio console is positioned on a rocky ledge overlooking the Grand Canyon. The console is a complex piece of audio equipment with numerous sliders, knobs, and buttons. The background is a vast, layered landscape of the Grand Canyon under a blue sky with scattered white clouds. The lighting is bright, suggesting a sunny day.

The Avalon Studiosystem.  
Some things are just beyond compare.

D&R. Every sound under control.



D&R: Headoffice, D&R Electronica b.v., Rijnkade 15b, 1382 GS Weesp, The Netherlands, Phone (..) 31 2940 18014, Fax (..) 31 2940 16987.  
U.S.A. Office, D&R USA, Rt. 3 Box 184-A, Montgomery TX 77356, USA, Phone (409) 588 - 3411, Fax (409) 588 - 3299

[www.americanradiohistory.com](http://www.americanradiohistory.com)

# Beatles Shea Video

Work has recently been completed on the soundtrack for the video release of The Beatles famous Shea Stadium concert, New York, in 1965. Mike Jarratt, an engineer at Abbey Road Studios in London has done much of the sound-to-picture work in the studio's famous 'Beatles' Studio Two.

A recording of the historic concert was previously broadcast in monochrome on BBC TV during the '60s but tens-of-thousands of screaming fans in the audience virtually obliterated the sound from the group's tiny SR columns and the on-stage sound. However, the audio quality of the new video release is vastly superior as entirely new source material has been used. Various audio recordings, including three unsynchronised 2-track tapes one engineer recorded using mainly close mic techniques, have been unearthed and used. The soundtrack is compiled from several totally independent but incomplete recordings of the same concert.

Abbey Road hired in a DAR

*SoundStation II* on which the audio recordings could be assembled, time compressed and stretched in order to marry up with the totally independent recorded film. The studio's in-house Sonic Solutions system was used to remove extraneous electrical noise and to interpolate during momentary microphone failures. When the various audio recordings were assembled and sync'd with the visuals, they were transferred to a Mitsubishi 32-track digital recorder and mixed.

The video, which includes the story of the concert as well as performance footage of Sound Incorporated and The Beatles, is scheduled for UK release by Apple in October. According to Jarratt the quality of the colour film print is very high.

Mike Jarratt also mastered all the Beatles CDs released to date and recently completed mastering CDs of the two singles compilation albums *The Beatles 1962-66* and *The Beatles 1967-70*.  
**Ralph Denyer**

**Mike Jarratt, Abbey Road engineer on the Beatles video**



Photo: Ralph Denyer

## Contracts

- UK-based **Harris Grant Associates** have won the contract for the complete acoustic and technical design of Hit Factory New York.
- Norway's national broadcasting company NRK have confirmed their order for a **Soundcraft 3200** multitrack recording console.
- **Pro-Bel**, Reading, UK, have received an order for a switching system at the Flemish Radio Service of Belgium Radio and Television.
- **Studio Innovations** have refurbished Gee Street Records studio in Gee Street, London.

- Newcastle, UK, based Fine-Cut Facilities have ordered a 16-output **AMS AudioFile PLUS** for their new audio suite.
- Who's bassist John Entwistle has bought a **Tube Tech MP 1A** preamp and **CLIB** compressor for his Hammerhead studio in Gloucestershire, UK.
- Ted Taylor of the Ted Taylor Trio has bought a **Soundtracs Megas** studio console.
- Radio 1 contracted **Clyde Electronics** to revamp their Studio Two for night-time broadcasting. Equipment includes a Clyde **Producer** series mixer and **Presenter** desk.
- Solo artist Fish has bought a

## News from the AES

**Images of Audio** is the subject of the 10th AES International Conference, the first to be held in Europe. It will present delegates with four 'images' of the current state-of-the-art in audio technology and techniques. Two sessions are concerned specifically with sound for pictures, while two further sessions cover exciting current developments in digital audio data compression and signal processing.

The main event is preceded by a one-day tutorial on the principles and technology of digital audio, and this may be attended separately or in conjunction with the main proceedings.

The main conference sessions are as follows:

**September 8th  
RECORDING & POST-PRODUCTION**  
Chairman: John Ives, Sony Broadcast & Communications

**DIGITAL AUDIO BIT-RATE REDUCTION**  
Chairman: Neil Gilchrist, BBC Research

**WORKSHOP ON DIGITAL AUDIO BIT-RATE REDUCTION**  
Chairman: Neil Gilchrist

**September 9th  
DIGITAL AUDIO SIGNAL PROCESSING**  
Chairman: Francis Rumsey, University of Surrey

**AUDIO FOR HIGH DEFINITION TELEVISION**  
Chairman: Jeff Baker, BBC Television

**DEMONSTRATIONS OF HDTV SOUND  
WORKSHOP ON HDTV SOUND**  
Chairman: Jeff Baker

On Tuesday, September 24th, the evening lecture will be **Understanding Noise and Distortion — A New Approach** by Bob Stuart of Meridian,

Boothroyd-Stuart. In this talk Bob Stuart will be discussing an approach intended to draw more closely together measurements of noise and distortion (errors) produced in audio components, with the results we hear. His analysis is presented in two stages, the first dealing with the perception of sounds, the second proceeding to consider cognition and significance.

The method is to approach the error from the psychoacoustic viewpoint by calculating and graphing its masked loudness. A model for calculating the contextual loudness of complexes, is developed from recent work and described. Several results will be given illustrating the detectability of several types of distortion mechanisms and also noises — including room, modulation, equipment and various dithers.

The second stage attempts to define some rules by which an error calculated to be perceivable may be given significance by the designer or critic. This approach produces some comfort and several useful surprises.

This will be held at a new venue, please check for details.

For further details on any of the above or on joining the AES, please contact: **Heather Lane, AES British Section, Lent Rise Road, Burnham, Slough SL1 7NY, UK. Tel: 0628 663725. Fax: 0628 667002.**

**Mitsubishi X-850** 32-track digital machine for his new facility in Scotland.

● A **Yamaha DMR8** music production system has been used to record UK band The Mission's latest album in the lead singer's own 16th century barn.

● Abbey Road and Tony Faulkner's Greenroom Productions have become the first companies to install **Mitsubishi PDX-8620** 20 bit digital recorders in the UK.

● The first 56-input version of the **Amek Hendrix** console has been ordered by Elephant Productions in Los Angeles.

● Swedish National Radio has ordered an **SSL SL 6040 G** series

console with **Total Recall** for Studio Two in their Stockholm facility.

● **Trident Vector** consoles have been ordered by Far Studios in Frankfurt and Erich Leissmann's studio in Glashuetten, Germany.

● Singer Lisa Stansfield's Blue Zone studios in Rochdale, UK, have ordered an **Amek Medici** equaliser.

● UK audio post-production facility, Finesplice, have bought a **Fostex D20** DAT recorder for use with their Sonic Solutions editing system.

● Gotham are to supply Park Studios near Lugano, Switzerland, with their third **Lexicon Opus** system. The sale was concluded during the International Television Symposium at Montreux.

## Magmasters to expand operation

Magmasters in London are set to become one of the biggest post-production complexes in the world, as they enter negotiations over the Elstree post-production facility.

If talks with Brent Walker are successful, Magmasters will build brand new studios at Elstree where the old set-making shops were situated.

The new complex will include two dubbing theatres, both designed by Recording Architecture. They will

include Foley stages and computerised ADR. Most of Elstree's equipment will also be kept for the new facility.

The majority of the Elstree staff will be taken on, including Oscar winning mixer Bill Rowe who will become chief engineer and a director of the company.

Magmasters were started nine years ago by MD Steve Cook and have studios in Soho's St Anne's Court and Lexington Street.

## The Studio Accord in practice

The idea for The Studio Accord was mooted about eight months ago in an effort to show a more streamlined, business front to UK recording studios' clients and pro-audio manufacturers. To that end The Accord, made-up initially of 17 studios but now increased to 45, published their proposals in a booklet that was first seen at this year's APRS show. The booklet is primarily there to entice new members and so goes over the reasons why such an organisation should exist. It then proceeds to detail the minimum requirements for membership, which are in fact stricter than the membership standard for the APRS. However, The Accord still want to operate within the APRS and become their recording studio branch.

Some APRS members felt that the organisation wasn't doing enough for them. Mark St John, owner of 145

Wardour Street and one of The Accord's spokesmen explains, "We didn't feel that the APRS could react quickly enough for us when certain things happened. The situation at the moment is disastrous with record company budgets getting smaller and smaller. But we still feel that you can't make a good record on the cheap and that if you pay something like £300 a day for an SSL studio you'll get £300 worth of music. We need to become more businesslike and start reading market forces. The catalogue re-release market has nearly been exhausted and after that something new must happen or we're all in trouble."

Studios wishing to know more about The Studio Accord should contact Mark St John at 145 Wardour Street, London, W1. Tel: 071-734 5784.

Powered Stereo Audio Monitor range.  
FWO Bauch 081-953 0091.

## People

● The new director of sales for DAR UK is now Ian C Dodds. John Wase has been promoted to European sales manager.

● Rik Picton has joined UK pro-audio distributor Music Lab, London, as general manager of their hire division.

## Agencies

● RCF Electronics (UK) have appointed HW International as a main distributor of RCF components and speaker systems. HW International 071-607 2717.

● Soundcraft, UK, have appointed Stirling Audio as a full-line recording dealer. Stirling Audio 071-624 6000.

● FWO Bauch have been appointed UK distributors for San Francisco based Wohler Technologies'

## Letter: Travels with my audio equipment

Dear Sir, Reading Martin Polon's warnings regarding travelling with recording equipment recalled an experience I encountered while returning from a film shoot in Paris.

My primary task was to record sync dialogue but as I was also building a stereo sound effects library I took a Nagra IV-S. Also crammed into the van (truck) were film camera tripods and lighting equipment, also in Cripplecreek flight cases and large black boxes.

On disembarking from the last ferry at Dover I was waved into the 'something to declare' channel and asked for the carnet list of what I was carrying. After reading the list the customs official asked to see the Nagra IV-S so I asked if this was really necessary as it was buried beneath everything else and

that it had been a real juggle to fit everything into the van anyway and that was with lady luck on my side.

This plea and attempt at humour did not deter the official and I imagined that the lubricating oil on the capstan of the Nagra must have smelled like marijuana or cocaine and that his nose was so highly tuned he could whiff it through the foam, wood and metal construction of the flight case.

Having eventually hoisted all the equipment out of the van and duly removed the lid the official took one look and said with a smile, "So that's what a £3,500 tape recorder looks like. You can put it back now."

I asked him if he intended to buy one with the pay rise he was going to get for being a perfect \*\*\*\*.

Yours faithfully, David Hastilow.

## Letter: A-weighting measurements mislead

Dear Sir, Fig 1 in 'Roar Recording' (*Studio Sound* July 1991) shows a plot of crowd noise  $L_{eq}$  measured in dBA. It raises a point I think should concern everyone but which is repeatedly ignored by sound engineers. This is that the A-weighting curve is really only appropriate for measuring low level noise, since it accounts for the frequency response of the ear at levels below approximately 40 phons. At such low levels the LF and extreme HF response of the ear is quite poor, and thus the curve attenuates these frequencies accordingly to give a more accurate subjective measure of the loudness of the noise. At high sound pressure levels the ear's frequency response

is much flatter, making it more appropriate for B or C, or even linear curves to be used.

If high SPLs, such as may damage the hearing either temporarily or permanently, are regularly measured in dBA then surely the results will seriously underestimate the true level of the noise concerned, since the curve will reduce the contribution of LF and HF energy to the total. To me it seems ridiculous to quote values such as '110 dBA' for noise levels, this being a potentially worrying misuse of the A-weighting curve.

Yours faithfully, Francis Rumsey, University of Surrey Guildford, Surrey GU2 5XH, UK.

## In brief

● London, UK: Trident rise as The Sound Studio: The old Trident Studios in St Anne's Court, London,

is now a 24-track facility called The Sound Studio.

● The Netherlands: Ampco Audio new numbers: Ampco have changed their phone and fax numbers to (030) 414500 and (030) 410638 resp.

## Exhibitions and conventions

September 8th to 9th AES 10th International Conference, Kensington Town Hall, London, UK.

September 8th to 11th PLASA Light & Sound Show, Olympia 2, London, UK.

October 4th to 8th 91st AES Convention, Hilton Hotel and Sheraton Centre, New York, USA.

October 16th and 17th The Playback Show 91, RDS Industries

Hall, Dublin, Eire.

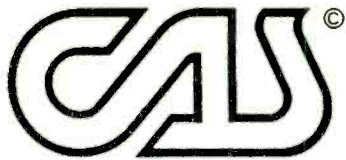
October 17th to 21st IBTS '91, Milan, Italy.

October 17th to 21st Mediatech 91, Milan, Fiera, Lacchiarella, Italy.

1992

March 24th to 27th AES 92nd Convention, Vienna, Austria.

July 8th to 10th Pro Sound & Light Asia, Singapore.



## Coach Audio Sales

**GÜNTHER KUTSCH AND STEFAN MEYER, GBR  
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### USED EQUIPMENT SEPTEMBER 1991

#### CONSOLES:

ADT-SMT, 48 frame, 24 channels + computer  
AMEK 3500, 56 frame, 52 channels  
HARRISON 4832 C + Allison computer  
MCI 500, 56 channels, bargraphs, patchbay  
SSL 4048 E, 48 channels, patchboy, producer desk, bargraph, 8 years old  
SSL 4040 E, 40 frame, 32 channels, Automation  
WESTEC 3020, 56 frame, 48 channels, Automation  
TRIDENT 80b, 40 in/24 out, patchbay, best condition

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

AMS delay

#### OTHERS

AUDIOFRAME WAVEFRAME + direct-to-disk  
FOSTEX G 16  
AKAI-ADAM 12 track digital  
AKAI DD 1000 Optical Recorder  
EVENTIDE H 3000 SE Harmonizer  
SONY 3348 + locator/remote 48-track digital, 1 year  
SONY 3324 A, 24-track digital + locator/remote  
STUDER A-800 MK IV 24-track + locator  
STUDER A-80 2-track  
LYREC TR 532 + locator/remote  
MITSUBISHI MX-80 2-track digital  
MONITOR TECHNOLOGIES Nearfield Monitors, new  
OTARI MTR-90 MK II  
OTARI MX-80 + remote, 2 years old  
OTARI MTR-100 A + remote, low hours, 1 year  
OTARI DTR-900 32 track digital, 2½ years  
QMS 215 speaker + amplifier, complete system  
QMS 405 speaker  
SYNCLAVIER + 8 direct-to-disk  
LEXICON 480 + LARC  
TASCAM ATR-80 24-track + locator/remote  
AKAI S1100 Sampler  
CROWN amplifier DC 300  
CROWN amplifier DC 150  
CROWN AMPLIFIER DC 75  
FM ACOUSTICS FM 800 amplifier  
FM ACOUSTICS FM 600 amplifier  
HSS crossovers (4 pieces)  
DOLBY SR 24 track  
YAMAHA NS 40 M  
SYNCLAVIER 9600 in flightcase  
SUMMIT AUDIO equalizer TPA-200  
SUMMIT AUDIO compressor TLA-100  
SONY DAE 3000 PCM 1630 editing system + DMR 2000  
SONY 1610 + SONY 5850 + DAE 1100  
TUBTECH ME1A Valve Equalizer  
TUBTECH CL1A Valve Compressor

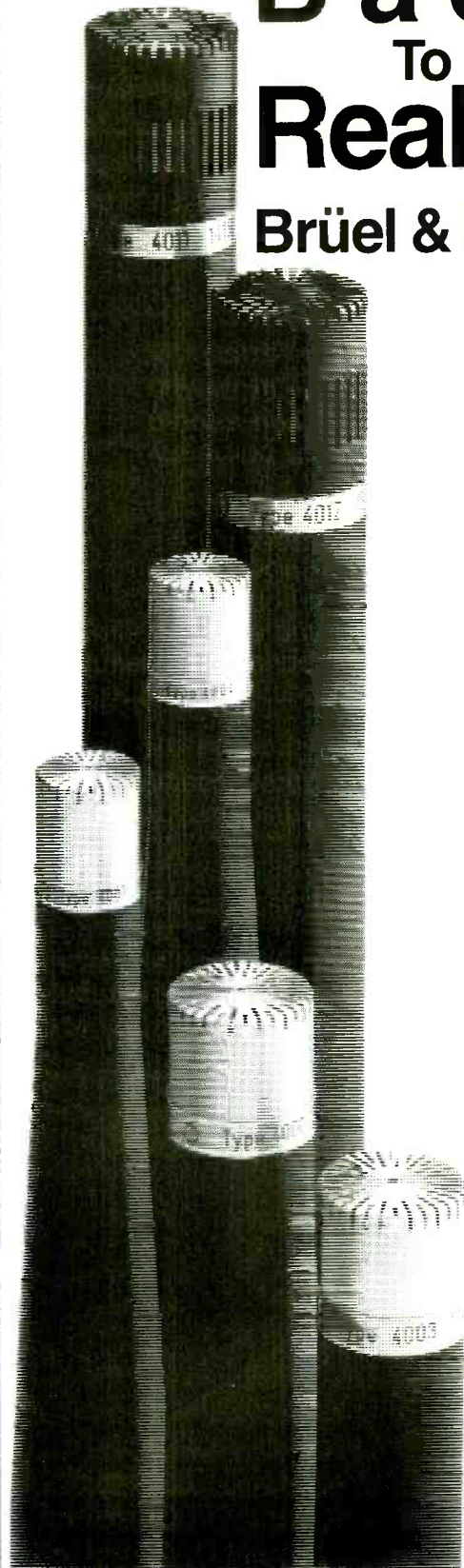
All offered items are subject to prior sale!

For further information and prices contact:

**Mr Günther Kutsch  
phone no. 06894-4717!**

# Back To Reality

## Brüel & Kjær



FOR DETAILED  
INFORMATION  
FILL COUPON &  
RETURN TO:

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Harrow,  
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### Series 4000 Microphones

Name \_\_\_\_\_

Address \_\_\_\_\_

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S/S



## Beyer stereo mic

Beyerdynamic have introduced a general purpose stereo condenser mic, the *MC 833*. This mic contains three condenser elements (non-electret) and is able to provide MS or XY stereo outputs or single element mono. Two mic inputs with 12 to 48 V phantom power are required. The middle capsule is fixed but the two side capsules are mechanical, adjustable over an angle of 60° to 180° with XY/MS output also selectable on the front of the mic. The MS output is already matrixed. The mic is electronically balanced and transformerless.

Beyer have also recently expanded their radio mic range with a new low cost pocket receiver, which is the same size as the *S170* pocket transmitter.

**Beyerdynamic, Theresienstrasse 8, Postfach 13 20, D-7100 Heilbronn, Germany. Tel: 071 31 617-0.**

**UK:** Beyer Dynamic (GB) Ltd, Unit 14, Cliffe Industrial Estate, Lewes, East Sussex BN8 6JL. Tel: 0273 479411/2.

**USA:** Beyer Dynamic Inc, 5-05 Burns Avenue, Hicksville, NY 11801. Tel: (516) 935-8000.



## DAR Sigma

Digital Audio Research have announced a new addition to the *SoundStation II* range of digital production systems — the *Sigma*. This is a *SoundStation* that incorporates segment based EQ, DSP functions, built-in rewritable optical disk storage, 8- or 16-channel varispeed operation and high speed CPU. There have also been upgrades and changes in the cost structure of other *SoundStation* models including an entry level 4-channel system. The

*WordFit* automatic dialogue synchronisation system remains an option for all of the *SoundStation* systems.

**Digital Audio Research, 2 Silverglade Business Park, Leatherhead Road, Chessington, Surrey KT9 2QL. Tel: 0372 742848. Fax: 0372 743532.**

**USA:** Digital Audio Research, 6363 Sunset Boulevard, Suite 802, Hollywood, CA 90028. Tel: (213) 466-9151. Fax: (213) 466-8973.



## Apogee converter

Apogee Electronics have announced the *DA-1000-E*, an enhanced version of the *DA-1000* digital-to-analogue converter. The free-standing unit now incorporates two additional AES or SPDIF digital inputs operating at any sampling rate between 32 and 55 kHz and Apogee describe the unit as offering 'more precise sound staging' than its predecessor. The *DA-1000-E* retains the *964-IV* filters and the *C348* low jitter clock of the

standard model, and runs off 12 V. Owners of the previous model are being offered the software upgrade and two digital inputs free.

**Apogee Electronics, 2103 Main Street, Santa Monica, CA 90405, USA. Tel: (213) 399-2991.**

**UK:** HHB Communications Ltd, 73-75 Scrubs Lane, London NW10 6QU. Tel: 081-960 2144. Fax: 081-960 1160.



## NVision digital converter

US company NVision have introduced a new digital audio sample rate converter. The *NV4448* accepts all common sampling rate frequencies from 32 kHz to 50 kHz and can provide output at 32, 44.056, 44.1, 47.952, 48 and 50 kHz. The input rate and protocols (AES/EBU, SDIF II and SPDIF) are automatically selected while the output sample rate and format are manually determined. The inputs phase lock to the incoming data stream while the data output may be ratio-locked to the input, free

running or locked to an external reference. Certain conversions such as 44.1 to 48 kHz can be processed with 24 bit accuracy. There is a remote control facility for multi-machine support. The unit is 1U 19 inch rackmounting with all controls located on the front panel. **NVision Inc, PO Box 1658, Nevada City, CA 95959, USA. Tel: (916) 265-1010.**

**UK:** FWO Bauch Ltd, 49 Theobald Street, Borehamwood, Herts WD6 4RZ. Tel: 081-953 0091. Fax: 081-207 5970.

## TFT Reciter receiver/exciter

The *TFT 8900 Reciter* combines the functions of an STL receiver and an FM exciter and uses an Intermediate Frequency (IF) as the interface. This process means that the STL signal is not demodulated to the baseband and thus eliminates the weakest link in the FM broadcast chain — the STL receiver's demodulating circuitry.

Features of the *Reciter* include the maintaining of digital quality audio

from sources such as CD, phase/frequency and modulation level synchronisation between main and booster transmitters, 0.02% THD -85 dB S/N and 55 dB stereo separation. The RF power output is adjustable from 5 to 50 W.

**TFT Inc, 3090 Oakmead Village Drive, PO Box 58088, Santa Clara, CA 95051, USA. Tel: (408) 727-7272. Fax: (408) 727-5942.**





Every audio professional knows that the DAT format is ideal for portable recording. But at HHB we believe it need not cost the earth.

That's precisely why we've joined forces with Aiwa to design our own professional DAT portable – the HHB1 Pro.

In spite of its compact dimensions, the rugged HHB1 Pro offers a wealth of features for the professional user. A single

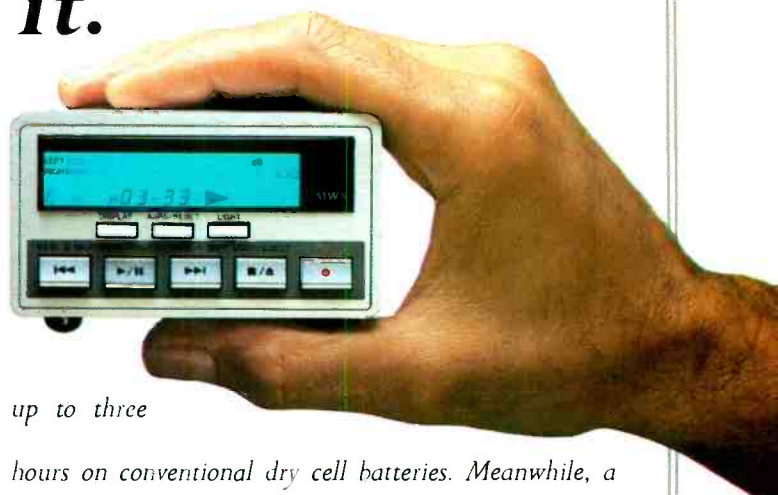
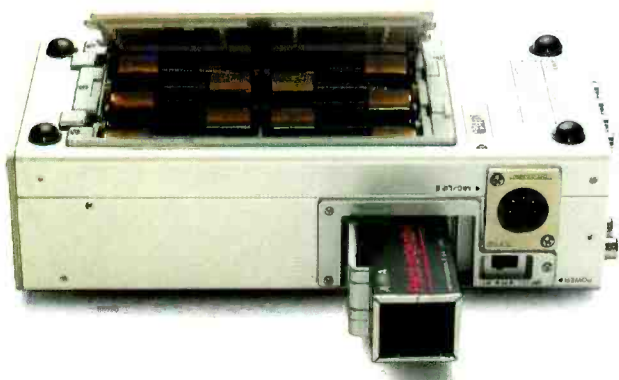


The HHB1 Pro stripes tape with 'absolute time' information as it records. So whenever you insert a recorded cassette, you can see precisely where you are on the tape. With Sony's PCM-7000 range of studio DAT recorders capable of editing to absolute time as well as time-code, you can be confident that your HHB1 Pro will function as their ideal low-cost acquisition partner.

The HHB1 Pro records for

# A professional DAT recorder that goes easy on your pocket. And in it.

5-pin XLR switchable mic/line input allows stereo recordings in the field, while audio quality is assured thanks to the latest single-bit oversampling conversion technology. Of course, AES/EBU as well as SPDIF digital interfaces are provided as standard. And because the Pro's informative LCD display can be illuminated, monitoring in low-light conditions could not be more convenient.



up to three hours on conventional dry cell batteries. Meanwhile, a multi-voltage transformer and a NiCad battery pack – together with a selection of useful professional accessories including a wired remote controller – are supplied as standard. Since it weighs in at under £1,000 and less than a kilogram, picking up an HHB1 Pro from the world's number one DAT centre just couldn't be easier.



## Audio Animation Paragon-Studio signal processing

Following the launch last year of the *Paragon-Transmission* digital broadcast processor, Audio Animation have announced the *Paragon-Studio*, a signal processing package for studio and post applications. The basic unit is equipped with four independent AES/EBU format I/O channels with 44.1 and 48 kHz sampling rates. Two processing functions may be used per channel. Control of the *Paragon* is through a Graphic User Interface and a mouse with the results displayed on a colour monitor. All processing set-ups can be saved and recalled from the internal 40 Mbyte hard disk as well as external MIDI control. The *Paragon* has five digital processing modes including: parametric compander (dynamics control within specific EQ curve, eg

compression of LF with HF expansion; or 5-band EQ without compander); band limited gate;  $\frac{1}{3}$ -octave graphic EQ (ISO centred with -24 dB gain and three EQ comparison stores); band limited compander (allows dynamic processing within determined frequency bands with control of dynamics possible from energy in other frequency bands. Audio Animation say that further hardware and software options are planned. **Audio Animation Inc, 6632 Central Avenue Pike, Knoxville, TN 37912, USA. Tel: (615) 689-2500.** **UK: Meridien Communications Industries Ltd, 33 Greenwich Market, London SE10 9HZ. Tel: 081-293 0909. Fax: 081-293 5856.**



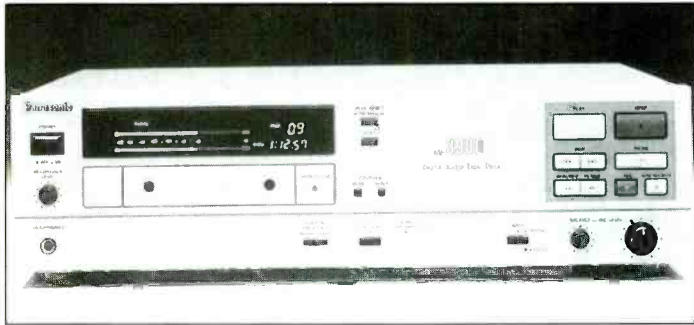
## Sony Pro DAT tape

Sony have introduced a range of professional DAT cassette tapes, which they describe as offering higher levels of performance than previous DAT tapes. The tapes are available in lengths of 30, 46, 60, 90 and 120 minutes and incorporate the APRS recommended tape labelling system. Sony will also shortly produce twin packs in hard cases. Technical specifications quote use of

the UST surface treatment and binder system leading to a block error rate of less than  $1 \times 10^{-3}$  after 100 plays leading to low drop-out and error levels. Also quoted are output levels of +1.0 dB PCM and ATF over standard Sony tape. **UK: Sony Magnetic Products Company, Sony House, South Street, Staines, Middx TW18 4PF. Tel: 0784 467000.**

**The Next Best Thing To An SSL...**

**LOGICFX** from Solid State Logic



## Software for Panasonic DAT

The US AVSG division of Panasonic have introduced a *Developers ToolKit*, a set of software utilities designed to aid the development of application specific software for the Panasonic SV-3900 professional DAT recorder. The *ToolKit* is intended to allow software developers, automation controllers and multiple users to implement full control of individual or grouped SV-3900 machines connected to a

master system bi-directional RS-422 network. Areas for control include transport, systems and supervisory functions such as checking status of individual machines or the grouping of assigned machines for parallel operation.

**Panasonic AVSG, Panasonic Communications & Systems Co, 6550 Katella Avenue, Cypress, CA 90630, USA. Tel: (714) 373-7278.**

## In brief

● **SSL** have announced a digitally recorded sound FX library for the *ScreenSound* system. This contains over 11 hours of material supplied on four 8 mm Exabyte tapes or on WORM optical disks. The sounds have been selected from the Sound Ideas library and have been formatted for immediate use on the *ScreenSound* including naming and timing.

● **Sonic Solutions** have announced new software for *NoNoise* running on the *Sonic System* that includes an algorithm to allow realtime de-clicking and de-scratching in a single pass.

● **DDA** have added an alternative input module for the *DCM* series 32-bus recording console. The new *PPR* module results from the development of the post-production version console *DCM224V*. It offers more EQ, extra filters, additional module switching and enhancement

of the aux sends. The EQ is now five wide-range bands that may be split into two for use in channel or signal paths. The filters can be switched independently of the EQ. Both module types may be fitted to a 32-bus frame.

● Swedish microphone manufacturers **Pearl** have developed a condenser mic *WCM-90* specifically for use with wind instruments. The mic is supplied with a dedicated 100 mm gooseneck to allow optimum positioning. Designed in conjunction with some major Swedish musicians, it has high SPL handling and is available in a variety of configurations including interfaces for radio mic transmitters. **Pearl Mikrofonlaboratorium AB, Astorp, Sweden. Tel: 042-58810. UK: Meridian Communications Industries Ltd, London. Tel: 081-293 0909. Fax: 081-293 5856.**



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And after each recording, the disc is "Red Book" compatible with domestic CD players.

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## YAMAHA DIGITAL SYSTEMS

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# Sony PCM-3348 digital multitrack updates

Sony have introduced a number of upgrades and refinements for the PCM-3348 48-track DASH digital multitrack following input from over 250 installations. An outboard chase synchroniser has been added. This can provide offset with subframe accuracy but also allows the machine to record when in a chase mode. In the area of sampling, stereo operation is now possible with memory being extended to 40 seconds in the mono mode. It is also possible to play the memory out in reverse for special effects.

Further features include a sample looping function and the ability to trigger a memory sample from an incoming audio signal.

Other refinements include the ability to track bounce all 48 tracks simultaneously or one track to multiple destinations; easier adjustment of offset from the remote unit; display of crossfade time in milliseconds on the remote; a varispeed 'set' key allowing the recall of a preset speed; the zero locate function has been changed for a rollback command from the remote; and a 47.952 kHz sampling rate (48 kHz drop frame) has been added.

For those wishing to upgrade their system an update kit is available to existing owners in the form of eight replacement ROMs, four slot-in cards and a new front panel for the remote. This revision will be standard in all new machines from September.

**Sony Corp, PO Box 10, Tokyo Airport, Tokyo, Japan. Tel: 03 448 2111.**

**UK: Sony Broadcast & Communications, Jays Close, Viables, Basingstoke, Hants RG22 4SB. Tel: 0256 483506. Fax: 0256 814397.**

**USA: Sony Corp of America, Professional Audio Division, Sony Drive, Park Ridge, NJ 07656. Tel: (201) 930-1000.**



## Soundtracs new Megas

Soundtracs have added two new models to their Megas console range. The Megas Midi is an in-line recording console with dual inputs on each of the 24, 32 or 40 channels. Each console has eight assignable audio groups; MIDI muting on all inputs, monitors, aux masters and

effects returns as standard; and four stereo returns with EQ. In a mixdown mode, all the inputs are usable providing 56 EQ-equipped inputs on a 24-channel unit.

The second new Megas is the Monitor, a complementary product for the Megas Stage providing 24, 32

or 40 inputs into 12 monitor sends for stage monitor mixes. All inputs include 4-band EQ with parametric EQ on the monitor outputs.

**Soundtracs plc, 91 Ewell Road, Surbiton, Surrey KT6 6AH, UK. Tel: 081-399 3392. Fax: 081-399 6821.**

**USA: Samson Technologies Corp, 485-19 South Broadway, Hicksville, NY 11801. Tel: (516) 932-3810. Fax: (516) 932-3815.**



## Digidesign Pro Tools

Digidesign have released preliminary information on the multichannel version of Sound Tools — Pro Tools. The basic system will be four channels (expandable to 16) of hard disk recording operating on a Mac II system. The system will support unlimited non-linear virtual tracks

and other digital audio features such as graphic editing, crossfades, track slipping and tempo mapping. Mixing functions include realtime mixing and snapshot and dynamic automation. DSP functions include multiple band parametric EQ and realtime effects. The MIDI recorder

aspects include multitrack linear drop-in/out and loop recording, pattern based editing, tempo mapping to digital audio and event editing/filtering.

Other features include continuous SMPTE synchronisation and resolve on all channels; AES/EBU and SPDIF digital I/Os and analogue I/Os, sample rates of 44.1 and 48 kHz, and back-up onto any Mac compatible media, DAT or Exabyte. Expanding the system to 16 channels requires a system accelerator card and four audio cards and audio interfaces. The system accelerator will also allow background loading. The system will still run the external software packages that ran on Sound Tools.

**Digidesign, 1360 Willow Road, Suite 101, Menlo Park, CA 94025, USA. Tel: (415) 688-0600.**

**UK: Sound Technology plc, Letchworth Point, Letchworth, Herts SG6 1ND. Tel: 0462 480000. Fax: 0462 480800.**

## MIDI controller

Philip Rees has jumped into the MIDI instrument market with an unusual device — the *G2* — which performs some of the functions of a MIDI guitar controller. As opposed to treading the long and thankless road to developing an all-singing all-dancing MIDI guitar to satisfy the fastest guns in town, the company has chosen instead to focus on specific aspects of what a guitar has to offer as a mode of exerting influence on the world of MIDI. Thus the *G2* offers a roughly guitar-like shape with a plate of six velocity sensitive pads with lightly raised ridges that enable the player to strum the instrument. Chords are entered into the device's internal memory in advance and are represented by a row of 12 buttons on what could be regarded as the guitar's neck. Forty neck configurations of 12 chords can be stored in the *G2* and each neck can be recalled quickly with a player fingering chords on a single button with his left hand and activating the six separate notes of the chord with his right.



While obviously not a lead instrument, its role as an accompanying instrument is quite convincing. The method of generating notes is fast by definition and falls somewhere between drum pads and a keyboard, and it offers some interesting strumming and arpeggio textures. A pressure plate in the position of the tailpiece on a normal guitar allows MIDI continuous controller information to be introduced.

Chord programming is helped by a large LCD at the top of the *G2* working with an alphadial at the very tip of the neck. While 480

chords may not be quite enough for serious jazzers it is likely to be perfectly adequate for the majority of rhythm thrashers. As such the *G2*, through its straightforward and stripped down approach, could well appeal to guitarists more concerned with getting into MIDI than in breaking the sound barrier or, indeed with Philip Rees' reputation for competitive pricing, in breaking the bank.

**Philip Rees, Unit 2, Clarendon Court, Park Street, Charlbury, Oxford OX7 3PT, UK. Tel: 0608 811215.**

## Zoom 9030

Zoom continues its assault on musicians' senses with the release of the *9030* half-rack width multi-effects processor, which features analogue distortion circuitry coupled to 16 bit full bandwidth effects performance.

A total of 99 presets contain combinations of up to seven separate effects selected from a pool of 47 different types. These include an intelligent pitch shifter that follows scales, amp simulators, numerous modulation and delay programs, reverbs and equalisation. A largish display operates in conjunction with a simple editing process that uses rotary knobs and the *9030* benefits from a comprehensive MIDI spec that allows for realtime MIDI control of parameters.

Interfacing to the unit in performance is made easy by the use of Zoom's new MIDI foot controller, the *8050*, offering five patch pedals and four bank/function pedals in 99 programs. Two expression pedals can be connected and the pedal board can run from the power of the *9030*.

**Zoom, 385 Oyster Point Blvd #7, South San Francisco, CA 94080,**

**USA. Tel: (415) 873-5885. Fax: (415) 873-5887.**

**UK: MCMXCIX, 708A Abbey Road, Tudor Estate, London NW10 7UW. Tel: 081-963 0663.**

## MIDI drawbars

Fujiha have released the sample based *D9* drawbar equivalent organ with MIDI that benefits from nine real drawbar type controls that can be mixed and matched in a similar way to that on the originals.

Surprisingly compact with a 5-octave keyboard, the few controls are all grouped in a section to one side of the keys with six preset selectors and buttons for vibrato, percussion, key click, overdrive and rotary speaker effect.

The sound quality extends well beyond the *D9*'s price tag offering fairly convincing meaty overdrives and more delicate pads. Thus the *D9e* keyboardless expander module version with all the *D9*'s control possibilities represents even better value for money.

There is a lot to be said for merging new technology with old-fashioned

control as Roland have proved with their staggeringly approachable *JD800* and their own drawbar endowed *Rhodes VK1000*, and Fujiha have also managed to introduce simplicity into the equation.

**UK: Fujiha, BCK Products, 136 Hornchurch Road, Hornchurch, Essex RM11 1DP. Tel: 04024 48799.**

## Drum trigger

Yamaha's *DTS70* is a 2U rackmount drum trigger system offering 12 ¼ inch inputs that can accommodate a variety of sources through 3-position input level switches.

Featuring an automatic trigger-learn system, each input can be routed to the *DTS70*'s 12 dynamic trigger outputs or to MIDI with individually assigned trigger curves for each note, and a total of 48 performance memories can be stored.

**UK: Yamaha-Kemble, Sherbourne Drive, Tilbrook, Milton Keynes MK7 8BL. Tel: 0908 366700.**  
**USA: Yamaha International Corp, PO Box 6600, Buena Park, CA 90620. Tel: (714) 522-9105.**

## Keyboarded Proteus

Building on the success of their *Proteus* range of rackmount sound modules, E-mu have announced the *ProteusMPS* a 5-octave pressure and velocity sensitive keyboarded version with digital effects.

MPS stands for Master Performance System as the instrument is intended to act as the hub of a large MIDI system and offers 10 'Quickeys' and performance maps for fast preset access and system reconfiguration. Sample memory is composed of 4 Mbytes of 16 bit *EIII* and enhanced *ProteusI* with 32-voice polyphony, 16-channel multitimbrality and the possibility of routing a number of controllers to over 35 sound parameters.

Futuristic in design, RAM cards are supported with the resulting sounds emerging through four polyphonic outputs.  
**E-mu Systems, 1600 Green Hills Road, PO Box 660015, Scotts Valley, CA 95067-0015, USA. Tel: (408) 438-1921.**

**UK: Syco Systems, Kimberley Road, London NW6 7SF. Tel: 071-625 6070. Fax: 071-372 7660.**

## MIDI boxes

Aside from operating as a MIDI merge box and permitting the demarcation of eight zones on master keyboards, the Quasimidi Products *Turbo-Volcan/D* can operate as a hardware interface for adjusting MIDI continuous controller info.

Eight pots can control channel aftertouch, modulation, breath control, foot control, portamento time, volume, pan and expression. The small box with an LCD can also operate as a template for editing synths from Roland, Yamaha, Korg, Oberheim, Waldorf and Ensoniq.

Other boxes include the *Esmeralda* master keyboard control/filter converter/transposer, which can also send patch changes, and the *User-M-400* memory expansion device for the Roland *E20/E30*.

**UK: BCK Products, 136 Hornchurch Road, Hornchurch, Essex RM11 1DP. Tel: 04024 48799.**

Studio Sound's Music News is compiled by Zenon Schoepe

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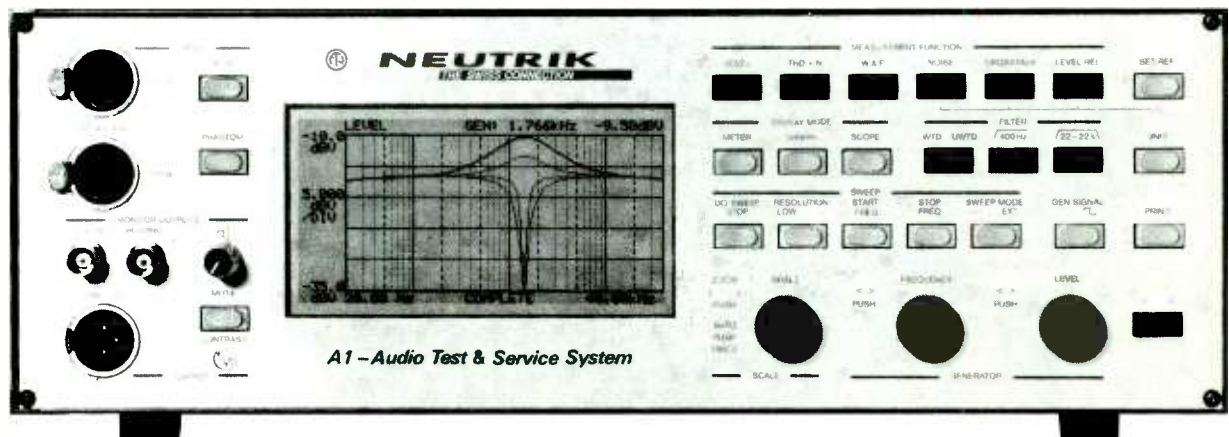
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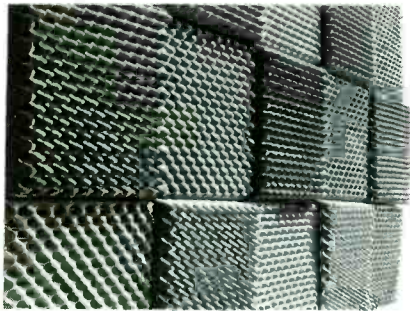
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## SR consoles get first airing

Two of the new sound reinforcement desks that have been launched during the past few months — the Soundcraft *Europa* and the TAC *SR6000* — have seen their first live action.

The China Theatre in Stockholm is the world's first recipient of a *Europa*, as unveiled at the APRS in June. The 40-input desk was ordered through Norwegian theatre sound specialists LydDesign. LydDesign's requirements included 'a high level of clarity from the theatre's multi-speaker system' and simplicity in operation. They state that *Europa's* blend of VCA grouping, channel noise gates, 12 aux sends, active panpots and low noise inputs were the deciding factors.

SSE Hire, meanwhile, was the first UK SR firm to take TAC's new *SR6000* console into the European touring market. The deal was widely expected thanks to SSE's close ties with the Nottingham-based manufacturer, but the *SR6000's* performance on Elvis Costello's summer tour — and its compact dimensions — elicited considerable interest. SSE cite its VCA master fader, controlling up to 10 outputs, and the versatile aux bussing system as particularly strong recommendations. Opinions on the small frame among the tour crew were divided between those who found it cramped and those (including the FOH engineer) who appreciated the convenience it affords.

## New product launches

● Peavey UK have introduced two products of SR interest.

The *PC4-XL* is a programmable digital crossover. Nominally 4-way, it is also configurable as 2-way mono or stereo, 3-way or 3-way plus an additional low, mid, high or full-range output.

The *BLS-3* balanced line splitter contains three independent 1-in, 3-out channels and units can be daisy-chained for use with multiple amp rack systems.

● Electro-Voice have replaced their *DH2* compression driver with the *DH2A*. The new unit provides 6 dB extra output above 10 kHz than its predecessor, featuring a new one-piece titanium ribbed dome and surround, and a convex-drive phase plug.

With a pure aluminium wire voicecoil and revised mechanical construction, E-V states the *DH2A* offers improved high frequency response and stress resistance.



## Joseph's amazing DMR-8

The recently launched Yamaha *DMR-8* digital production console is being used in an unexpected role — at the heart of Martin Levan's sound system for the new West End production of *Joseph & The Amazing Technicolor Dreamcoat*. Sound designer Levan specified the *DMR-8* because of its multiple automated production facilities and the SMPTE and MIDI interfaces.

Its major tasks are to handle a

variety of stage microphone mixes during the show, cueing pre-recorded Stock, Aitken & Waterman backing tracks for the finale and triggering effects units via MIDI. The *DMR-8*, working in tandem with two Yamaha *PM3000* FOH desks, also provides synchronisation with a Vari-Lite console. The sound production for the show (which stars Jason Donovan) is by Derrick Zeiba's Dimension Audio.

## Comment

In the European touring market's traditionally dull late summer, most SR companies are quiet. A few, bucking the trend, are remarkably busy. But while all contemplate the new array of SR consoles (surveyed in last month's *Studio Sound*) and ponder how to accommodate one within already-stretched budgets, an unexpected sector has been flourishing this year.

A minor boom in amplified classical productions has helped compensate the industry for a shortfall in regular business caused by the recession and Gulf war cancellations. There have been major shows by the LCO, Nigel Kennedy and Pavarotti. Renkus-Heinz successfully debuted their new *C1-A* system before capacity crowds at the Leeds Castle, UK, 'popular classics' concerts in July; and theatre sound designers are showing how (important lessons having been learned) the 'arena opera' concept can win public — if not yet unanimously critical — support. Tosca at London's Earl's Court proved that large does not necessarily mean lousy while arena productions of *Aida* and *Turandot* are both on this autumn's schedules.

Although the overheads of these shows (Tosca cost £2.5 million) equals the high-risk category of West End musicals, their success this year in 'bringing the classics to the masses' has already done much to dispel the classical establishment's deepest criticism of the genre — namely, that rock'n'roll-bred SR techniques could never meet their idea of sonic fidelity. There is still much ground for improvement but the SR industry seems to be much closer to the public's wishes than the critics give it credit for.

## Nigel Kennedy with B&K

Further fuel has been added to the debate about microphone techniques in sound reinforcement for classical music. Brüel & Kjaer have announced that Gary Falkenthal, Nigel Kennedy's FOH engineer, is using three B&K *4011* cardioid microphones in a technique first developed by engineer John

Kurlander when recording Kennedy in the studio. Three *4011s* are mounted on a triangular frame above the conductor, with another suspended above the violinist. SR company Canegreen will be employing the system — and the *4011s* — on Kennedy's next amplified dates.

## SA power Vangelis

A recent outdoor show by keyboard showman Vangelis featured the largest ever SRS assembled by Netherlands manufacturer Stage Accompany.

Held at a Rotterdam dock in June, the event had a 60x20 metre stage, a full size replica of the Parthenon, a site the equivalent of 30 football pitches and an audience of 150,000.

Stage Accompany provided their *Blue Box* processor-controlled system,

with a total system rating of 500 kW RMS (700 kW peak): the largest *Blue Box* wattage seen to date on one show. SA's marketing director commented: "It was done within the possibilities of a small country. Nonetheless, technically the event was a big success."

Studio Sound's Live Sound News is compiled by Mike Lethby

# THE COVER VERSIONS



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# THE STUDER STORY

**W**hen I look back on my life, it really has been a series of lucky breaks." A pause, followed by a wry smile and, "I don't even know whether I really deserved them."

Though perhaps not quite the 'Father of Recording' the techniques and improvements that Willi Studer brought to the infant technology certainly makes him a senior uncle. However, his story starts much earlier than his involvement with recording: in fact, Dr Studer's beginnings in life were what might be termed 'difficult', though he is adamant that the first of his 'lucky breaks' was his foster parents who, he says, "really welcomed me as part of the family".

The inventive side of the Studer nature manifested itself early on: "I was always tinkering — radios, mechanical objects, that sort of thing — taking them apart to see how they worked and then trying to improve them.

"I built a simple telephone from the house to the other side of the road when I was 11 or 12 years old but that did not last long. I was ordered by the PTT [Swiss Post Office] to take the wire down as it was not according to regulations and needed to be PTT-approved!"

At 15 the opportunity of an apprenticeship arose at a small manufacturing outfit for various physical apparatus in Berne but, "At that time, you had to pay apprenticeship fees as well as accommodation and living expenses. Not like today at all. Fortunately, the Bernese provincial government gave me the equivalent of a grant, which meant that I could join the company."

Two years later he felt that he had learnt all he could from his apprenticeship and that it was time to move out into the world and start earning a living.

"I started work in a shop selling photographic and electrical goods, as a radio technician. However, as well as doing service and installation work, you installed radios in people's homes very often then. I was also involved in selling in the shop, which was useful as it brought me into contact with customers."

In common with many audio engineers over the years, Studer was also a film projectionist in the evenings, an occupation that helped to complement the monthly finances a little.

In 1930 Studer again began to develop itchy feet. He was already feeling constrained by working in the shop and he felt the prospects were not too interesting. His next move was to Zurich where he joined an import/wholesale company as a radio technician.

"I was the sixth technician in the company but I soon found out that I was about the only one who really understood radio and this led to some awkward situations.

"In those days one had to work by what I call 'troubleshooting by method'. There was no test equipment available so it really was a question of using common sense by starting from the output stage and working towards the front end until the



## Dr Willi Studer talks to Terry Nelson

fault was found.

"Unfortunately, the fact that I was good at my job brought me into conflict with the boss's nephew, who accused me of taking work away from him and the other radio techs. Once again it was time for me to move on and the day I left also happened to be my 19th birthday."

Coincidentally, Studer had also just built his own radio receiver, which incorporated a lot of advanced design features. "One of my friends suggested that we should build and sell radio sets based on my designs. I would look after the technical side and he would take care of the sales, with the profits being split 50/50.

"The first problem was finding suitable premises in which to set up a workshop and here my parents came to the rescue. They offered us the use of a loft in their house in the canton of Berne and there we made 10 radio sets.

"However, things did not go as smoothly as I had anticipated and there were soon financial problems between my partner and I — ie he wasn't giving me any money!"

The problem came to a head when his partner left Switzerland to return to Germany taking all the money with him. But because Studer was not yet 20 he could not be declared bankrupt and the company had to be kept going until it could be wound up properly.

Studer returned to Zurich and there followed a meeting with one Herr Holzheu who owned the trade name of Sondyna Radios.

"These radios were very complicated so I got hold of one and modified it so that it was a lot more efficient. This turned out to be very successful so I made the proposition to make the new version 'in-house'. It would be a lot cheaper and the manufacturing space was available."

This led to the foundation of Sondyna AG, though Willi Studer had no shares in the company. He was still Fr6000 out of pocket from the previous venture and so did not really have any capital to invest.

The Sondyna venture was much more long-lasting and the period 1935 to 39 saw Studer developing the company's range of products but still there was no test equipment. So what methods did he use at that time?

"What I knew already plus the best set of test equipment that we still have today — my ears! When it sounds right then it usually is.

"Due to the fact that I was very occupied with the building and testing of the equipment destined for sales, I was very short of time for development work. This in turn meant that most of my Sundays were given over to R&D with the rest of the week dedicated to production.

"Needless to say, this method of working would just not be possible today with the rules and regulations that surround companies. I also doubt whether people — with the exception of those working for themselves — would be prepared to do it."

By 1939, Willi Studer was again feeling dissatisfied with life: "Working for Sondyna was alright but I did not have much say in things and I was, after all, responsible for the product." It was once again time to move on.

The next stage was the formation of a new company, named Schwachstrom AG, where Studer was appointed technical director: "This time we had several different product lines, including amplifiers, radios and, finally, professional test equipment."

However, once again there were difficulties. During the war years components were very scarce, making planning for production very difficult.

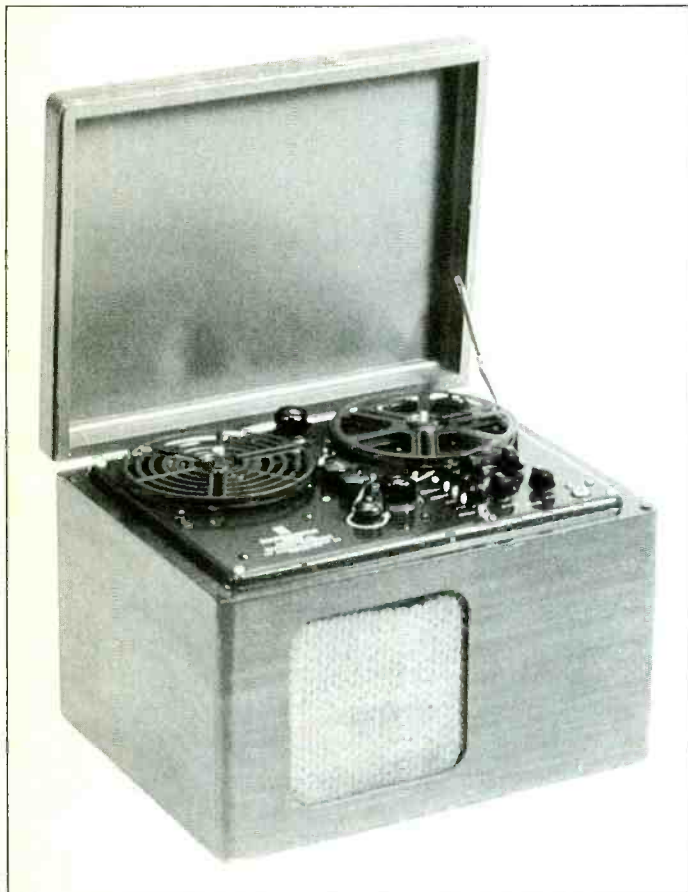
"Also, I was not a shareholder in the company and, quite frankly, I was not very happy with the situation. I decided to form a new company, called Metrohm AG, with a friend of mine in Herisau, canton of Appenzell, with funds which were forwarded by his father and where I would have 30% of the share capital.

"I would describe this as a step forward and a step back! On the one hand I was not part of a company but on the other, the war situation made life very difficult, especially with regards to making any money and this was essential in order to pay back the loan for my interest in the company."

However, the product that would be the determining factor in the formation of Willi Studer AG was in development: a high quality oscilloscope. But their ideas differed on how it should be marketed. Once again, it was time for a parting of the ways.

"The split was perfectly amicable and part of the settlement terms was the oscilloscope, which I took with me."

The 'scope itself had applications for test work in



**The US Brush Sound Mirror was adapted and rebuilt by Dr Studer in 1949**

high voltage test bays and interest in the instrument had been shown by the Basle company, Haefely AG.

"Haefely made me an offer to make the oscilloscopes on a 50/50 basis but by this time I had had enough of partnerships which started and ended in short succession and decided to go out on my own.

"I replied a firm 'No' to their offer but proposed to supply them. They placed an order for six units at SF10,000 apiece (a lot of money in those days) and against a down payment as confirmation of the order, I went to work."

January 2nd, 1948, was a landmark as it saw the emergence of the new Willi Studer company in his old premises with a workforce of three people.

"We delivered the order in about six to seven months and from then on Haefely distributed our oscilloscopes on a worldwide basis.

"I continued development work on the instruments but I was missing working with radio and music and these influences were definitely pulling at me. The question was, what to do about it?"

The answer to the question was provided in 1949 when a Swiss importer brought in 100 'Sound Mirrors' (otherwise known as tape recorders) from the United States, which needed to be modified and tested for sale on the European market.

"It was a very big job and there were two main problems: the machines were made for 60 Hz operation and there was a lot of trouble with vibration.

"There were also other things that I did not like and by the time all of the modifications had been done I was convinced that I could do much better by starting from the beginning and building my own tape recorder.

"I discussed the situation with the client and told him that the cost of modifying the US recorders was much too high and proposed to make him my own unit.

"To my pleasure — and somewhat to my surprise — an order was immediately placed for 200 recorders and I had not even got a prototype ready yet! It was just the spur I needed to get a move on."

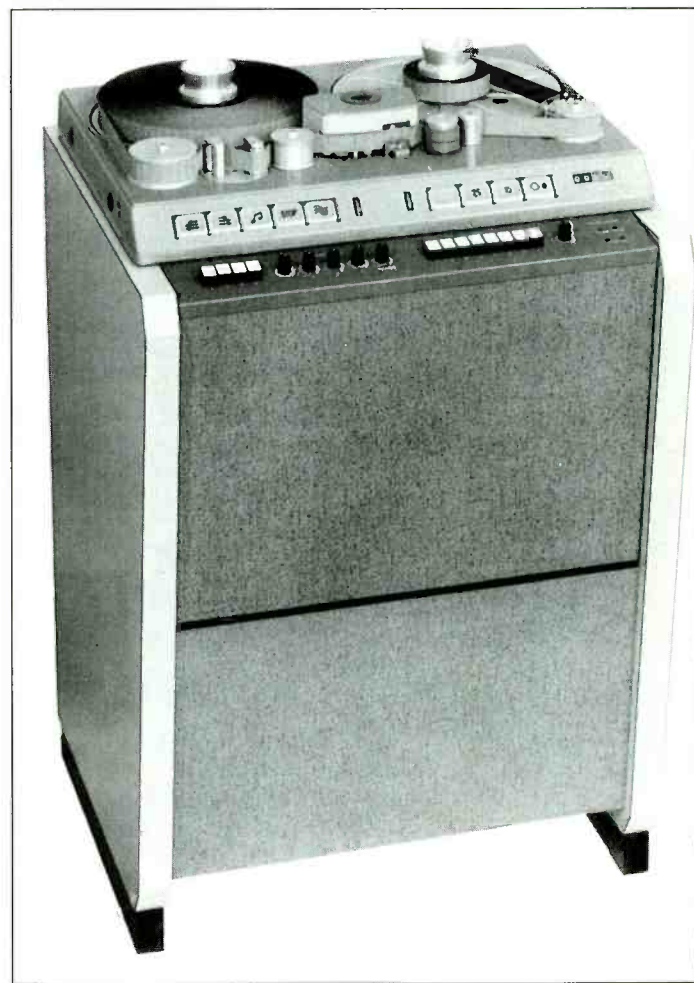
By the end of 1949 the first Willi Studer tape recorder (and, incidentally, the first European domestic recorder) was ready to go into production.

"These first units cost SF495 ex works and were sold in the shops under the name of Dynavox for 2,500 Francs.

"I soon realised that it was the retailer who made the money and not the manufacturer and that the best course of action would be to combine manufacture and sales."



**1951 — the model 27. The box behind the recorder is a 4-input mixer including record/reproduce electronics**



**The first multitrack — the J37 4-track recorder appeared in 1964**

This led to the formation of ELA AG, the ELA standing for Electro-Akustik. "I wanted to use the name Revox [repeats voice] but found out that it already existed as a trade name, though it applied to a completely different field."

The details surrounding the use of the name were 'settled satisfactorily' and in 1951 the Revox range of high fidelity equipment was born.

The radio interests also continued in development and the Revox T26 was a combined tape recorder and radio set.

The domestic recorder underway, the next step was a professional machine and a certain amount of consolidation in the manufacturing capabilities.

As well as manufacturing in the workshop (the basement of a Zurich post office), a certain amount of development work was done literally 'in-house' and this was not always to the pleasure of Mrs Studer. So was there any truth in the stories about the bathroom being used as a work room?

"To be exact, the heads of the recorder, which were then encased in *Araldite*, were baked hard in the oven in the kitchen, which made me unpopular with my wife as she could not get on with the cooking!"

The success of the Revox recorders (as well as the continuing production of the oscilloscopes) led to larger production facilities within the year and new machinery to enable greater in-house production of parts, thus cutting down greatly on subcontracting.

In 1950 development work on the professional machine was started but was the Telefunken *Magnetophon* any influence on him?

"I knew about the machine, naturally, but I never handled one. It was a professional machine and very expensive so there were not many of them around at all.

"As far as being an influence, it was certainly a standard to be at least equalled but my aim was still to make the best machine possible and not gauge performance by existing equipment."

There were also some musical outings in 1950 and one of these was a trip to Innsbruck to record a performance of Beethoven's 5th Symphony.

"Everything went very well but an amusing incident occurred coming back into Switzerland. We dutifully declared everything to the Swiss customs, including the rolls of tape. He asked us what was on the tape and we said that it was recorded music. He then unwound about a metre, looked at it dubiously and said that he could see no sign of it! I think he must have thought it was a photographic process or something."

In 1951, the prototype Studer 27 professional studio tape recorder was ready for trials, with the first evaluation being by Swiss radio for the International Music Festival in Lucerne, where they were tape recording live for the first time.

Everything went very well, though when he was listening to the recorded programme over the radio, Studer noticed straightaway that the response was lacking in high frequency. Very worried, he immediately made investigations to find out whether there were problems with the machine only to be reminded that it was, after all, normal AM bandwidth! The quality of the recordings was perfectly up to standard.

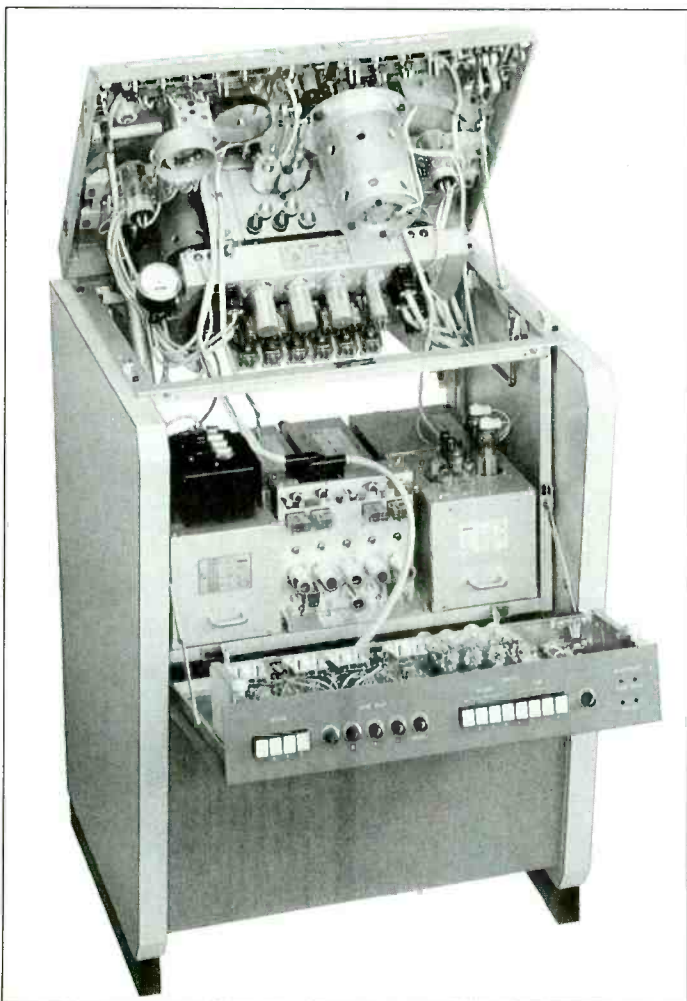
The early days of OB tape recording had other problems as well: "The Zurich radio studio did a recording in very cold weather and the van was not very well heated. When the tape was being replayed at the studio, the producer noticed that the music was not in the correct key and was sharp. It is a moot point as to whether the listeners would have noticed the difference but the producer was a purist and would not take the chance. We had to rig up a temporary system with Variacs in order to varispeed the machine to the correct pitch and I often wonder whether this was the first time that varispeed was used for pitch correction in playback."

The success of the Studer 27 led to the sale of 100 machines in 1952, and developments came in quick succession with the A37 and B37 recorders, culminating with the famous C37 in 1960.

It is perhaps not widely known that the transport of the C37 was designed from the outset to be very robust in order to cater for the multitrack models that were planned further on down the line. The amplifier electronics were also designed to be as compact as possible for the same reason.

The first multitrack, the J37 4-track, first made its appearance in 1964 and one of the very first machines was whisked away almost immediately to Abbey Road Studios for use in the *Sergeant Pepper* sessions.

"We got a panic phone call asking if they could have one of the new



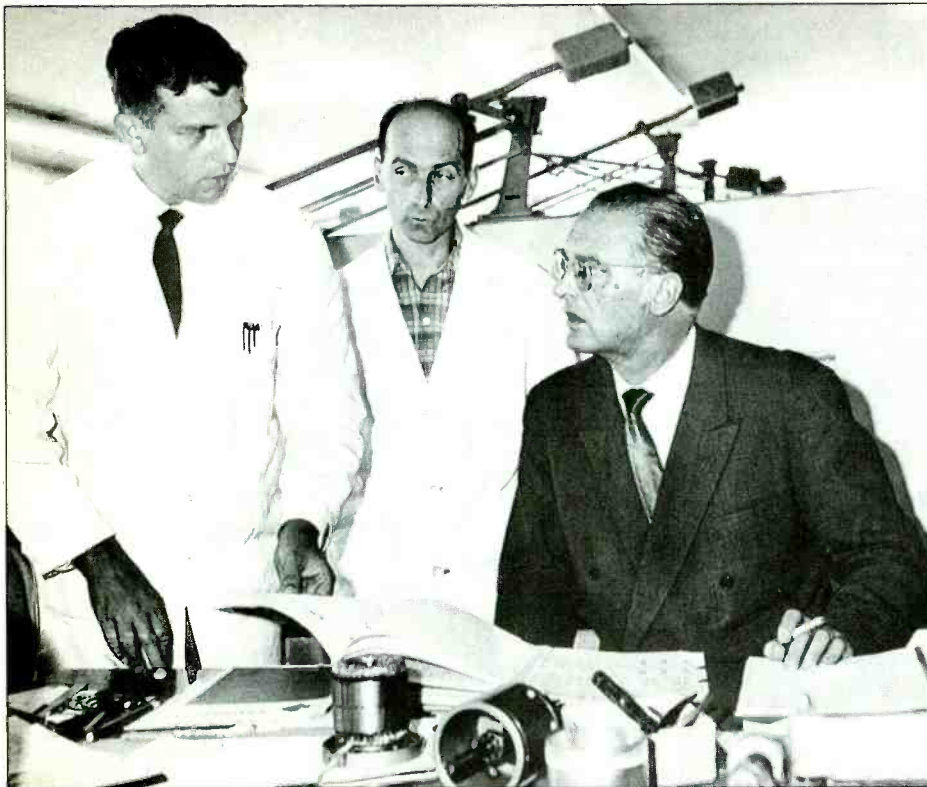
Inside the J37



The Revox G36 was the last in the series



The Revox A77 launched in 1967 is still sought after



**Dr Willi Studer in 1968 discussing a new motor with his engineers**

4-tracks. The machine of a competitive make they were using was having constant breakdowns and risked being thrown out of the window at any moment."

The Revox line was not being ignored during this period either and the first of the 36 series recorders, the A36, saw the light of day in 1954 and incorporated such advanced features as three motors, pushbutton control and direct capstan drive.

This was followed by the B36 with separate record and playback heads and in 1960, Revox went stereo with the D36. A stereo amplifier followed a year later. The 36 series ended with the

G36 recorder, which holds a special affection for many hi-fi enthusiasts.

A landmark year for Revox is 1967, which saw the introduction of the newly designed A77 tape recorder and matching A50 amplifier and separate stereo tuner.

It also marked the end of production for the oscilloscopes.

"The A77 really is the most successful product that we have ever produced, with sales turning around the half a million. It found uses in all walks of life from hi-fi to broadcasting to recording studios, government institutions, etc."

Did Dr Studer have a preference between hi-fi

and professional equipment?

"Both are equally important to me. My great love is music so it is equally important to be able to capture it properly as it is to reproduce it.

"My guideline has always been quality in all areas coupled with long after sales service — 20 years or more with some equipment.

"From the start, my policy was one of gradual expansion in order to cover all areas of the audio chain."

The first Studer console, the 69, was introduced in 1958.

"I recognised the importance of digital audio at the beginning of the '80s and instituted an extensive research programme in order to be ready for it. My feeling always was that we may not be the first but we must always be the best!"

In 1990 the first 48-track digital recorders, the D820/48, were starting to come off the production lines bringing Studer firmly into the digital market.

One of the reasons for the successful developments in Studer equipment was the almost total in-house manufacture of all parts. This allowed custom engineering to be applied to production line manufacturing together with stringent quality control.

The 'everything in-house' philosophy was even extended to high quality printing for brochures, manuals, etc.

Behind every aspect of the company was the influence of Dr Willi Studer and his concern for a quality product and service. Though this could be seen now as rather patriarchal, the success of the company and the reputation of the Studer name far outweigh any negative points.

In 1990, the Studer group of companies was taken over by the Motor-Columbus group.

Though officially now a private citizen, Dr Studer is back in his old offices in the original Studer Revox building in Regensdorf. Although he regrets no longer being able to have any influence in the company's future development, the latest range of Revox hi-fidelity equipment is very much his brainchild.

For someone who had built up the company on a very personal level, the slightly 'corporate' character that Studer Revox AG is gradually taking on probably appears very strange and perhaps a little distressing.

It is clear from the animated conversation with Dr Studer that meeting challenges was, to him, a way of life.

"When I look back on the early days of Studer, I think I would say that our landmark products emerged in an ideal era. The time was right for the particular product and everything moved forward — it was exciting to have been a part of it." □

Since retiring from full active service within the company, Dr Studer is founding a museum of products in which he has been involved. This ranges from his early radios to test equipment and through to the start of the Revox and Studer machines.

"I will be very pleased to hear from anybody who has old equipment that I may have been involved with — whatever the condition. We often do not realise the importance and interest of the things we do for later generations and I am very keen to make this museum see the light of day."

Dr Studer can be contacted at the company address: Althardstrasse 150, CH-8105 Regensdorf, Switzerland. Tel: (1) 841.10.03.

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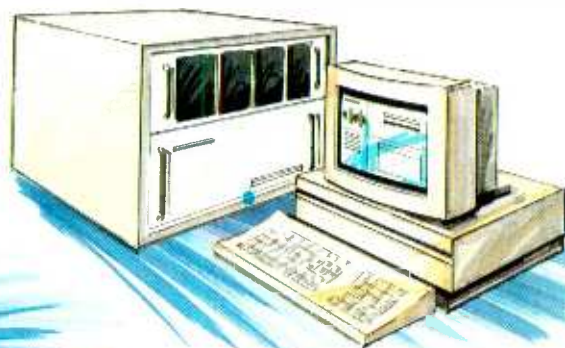
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If it could be said that there is a 'Moscow Sound', then the prime candidate for this would be MDM Recording — together with producer/engineer Igor Zamarayev. In many ways, the history of the Moscow 'underground music movement' is encapsulated in Zamarayev's career and here he talks about the early days of rock recording in the Soviet Union and how the situation stands today.

"I was a student at the Theatrical Institute and studied the technical side of theatre production. At that time (the '70s) a sound engineering programme had just been introduced and I was able to leave the Institute as a qualified sound engineer. I would hasten to add that, given the depth of training, it was really more of a formality than anything else.

"However, when I was a boy I was always interested in radio, amplifiers, speakers, basic acoustics — that kind of thing — so I was glad to take advantage of whatever formal training was available. I also had friends who were musicians and I ended up servicing their equipment and building effects pedals for them.

"This was the epoch of such groups as Machina Vremeni, Vessokosnoye Leto and Oudatchnoye Proibretenije who were playing the then 'forbidden' rock music! Quite exciting times.

"The actual gigs were in old cellars around the city and the concerts moved around in a manner that would avoid police intervention. There was no real publicity, the public being informed by word of mouth.

"During my military service I was involved in the musical side of things (due to my formal training at the Institute), which was fortunate, and when I was discharged, I was lucky enough to get a job with the Soviet 'Frank Sinatra', Miousleem Magomaiev.

"The experience was particularly good as Magomaiev was very popular and, because of this, was the only Soviet performer who was well equipped, having both a decent road system and a small private studio. In 1983, the studio was upgraded to 8-track and thus became the first 'non-official' recording studio in Moscow (ie: the studio was not run by a State organisation such as Melodya).

"The actual equipment was Tascam 8- and 2-track machines, Soundcraft console and effects from such as Eventide and Ursa Major. However, the monitoring was not very good so it was difficult to get a good idea of what things really sounded like."



# MDM RECORDING

Terry Nelson visits a 24-track studio in Moscow



As it turned out, Magomaiev never used the studio for himself but allowed Zamarayev to bring in groups to record during his free time.

“Mr Magomaiev is really the father of Soviet rock music. Not for the music that he did but for the help he gave to young musicians — especially to what I would call the heroes of the underground movement. He really went out of his way to help things along and because of that, most groups started their careers in his studio.”

As the musical movement gathered strength, so did Zamarayev’s reputation and in 1985 he started working with the group, Alliance, who combine ethnic elements of music with modern sounds and interpretation.

“We were making successful records using cheap instruments such as basic synthesisers and drum machines. Any instrument from outside the Soviet Union was very expensive and also hard to come by. We often had to rely on friends working abroad who could bring things back with them into the country.”

The big leap towards a fully professional studio came in 1987 when the Komsomol Concert Hall complex was nearing completion (the Komsomol is the Communist Youth Organisation). The hall was being equipped with sound reinforcement systems from the West (supplied by Berry-Brown in the UK) and it was also planned to have a control room running in parallel with the main hall in order to record and/or broadcast the concerts. But who should run the studio? Zamarayev felt that the only way he could take the job was by going independent.

The next problem was how to release the studio from the control of the hall’s sound department.

“Fortunately, Mr Babuskin (a well known figure from the sound department of Soviet television) took an interest in the studio and was able to influence the powers-that-be to set up the studio on an independent basis from the hall and only be answerable to the Komsomol. I was then able to start organising the installation of the studio and even had to set up a temporary studio in order to do productions for groups such as Autograph (funk music) and Andre Mising.

“The equipment itself had been supplied in 1984/5 so my main area of influence was in the actual building of the studio. The



original area was much too small and I was able to find a larger space in which to install the control room and studio area.”

Zamarayev was given a free hand with the design but had to make do with local materials and a budget of 45,000 Roubles.

The construction took eight months (fast by local standards), with Zamarayev’s attention being divided between the new studio project and the recording projects in the temporary studio. He is proud, however, that the Autograph CD was classed as one of the “best-sounding Soviet records — even though the name of the studio did not figure on the sleeve”.

The studio is situated on the second floor of the Komsomol Hall and forms part of a ring of large rooms running round the perimeter. On entering the studio, the visitor arrives in a lounge/reception area (dominated by a large motor cycle), which accesses the small studio area to the left and the much larger control room to the right.

The control room has windows to the left and right of the front wall, giving visual contact with the reception area and studio respectively. The rear wall is V-shaped into the room, thus breaking up direct front-to-back reflexions.

The acoustic treatment of the room includes a floated floor, glass fibre absorption areas and hessian covering. There is a suspended false ceiling with heavy absorption behind with that rare commodity for control rooms, height — 4.5 to 5 metres.

Monitoring is by Tannoy *Super Reds* suspended on cradles just slightly forward of the front wall, fairly high up and angled down to the mix position. This gives the advantage of the direct sound being completely unobstructed and the sharpness of the angle diminishes the risk of strong reflexions back to the mix position from the rear walls.

The size of the room means that the sound is naturally uncompressed and the stereo imaging is perfectly acceptable along the length of the console.

Recording centres around an Amek *Angela* console and a Studer *A800* 24-track recorder with Dolby *SR*. Mastering is by a Studer *B67* analogue and a Sony *55ES* DAT for digital work.

The studio features a respectable effects list (housed in a single rack next to the console), including a complete Audio-Design *Scamp* rack with mainly compressors and gates, AMS reverberation and delay units, Lexicon *224* and Klark-Teknik *DN27* graphics.

As with studios everywhere, most keyboard tracks are done in the control room and a table in front of the console provides a handy keyboard stand. A second table is also installed to the left of the console.

The studio is large enough for a rhythm section and has a fairly dead response. It seems it is mainly used for overdubs with usually no more than two or three musicians at any one time.

“We do a very wide variety of music here. We also do a lot of work compared to the State studios. I would say that Melodya do about 30% of the production that we do here.

“They are also very jealous of us because most artists either prefer to work here, or would like to if they could. There is a kind of silly rivalry where they try to make out that we are not technically competent and do not know what we are doing. However, our customers are not easily fooled so it does not worry us.”

The special situation in the Soviet Union surrounding State and ‘independent’ organisations often causes acrimonious rivalry, which most studio people elsewhere would probably find hard to understand. With the opening of the communication barriers, the less attractive aspects of State-run organisations are becoming more and more evident and comparisons are easily made.

The situation at Melodya, for example, where a committee decides what will or will not be recorded provides a prime mover for musicians to go elsewhere so they can at least do what they want to do. The question of copyright — or the lack of it — coupled with very low session rates, does not make recording for Melodya a very enthralling prospect.

“You lose all rights to your music if you sign with them. Here you can do what you want.”

As it is funded by the Komsomol Central Committee it could be argued that MDM are also a State studio but there is a difference.

“As we have seen, the Komsomol Central Committee funded the studio and it still belongs to them. As far as they were

concerned the studio was a prestige symbol and it still is, due to the amount of work that it does and the reputation it has gained. The main problem just over the horizon will be the question of renewing the equipment as the money is just not available at present."

So how is the studio financed and who pays who what?

"I am in the lucky situation where I am paid a basic wage by the Komsomol for looking after the studio and have no overheads, such as rent, etc, as it is a State studio. This is then augmented by what I will describe as 'unofficial' sessions.

"The actual studio rates are the most expensive in the USSR, being 235 Roubles an hour, but people still prefer to record here. We also get clients from Sweden, Finland and (what was) East Germany (eg the popular singer, Tino) and here the rates are set at \$50 (approx £30) an hour.

"With foreign customers, I would much rather be paid in equipment and it is this kind of arrangement that has made it possible for me to acquire the A800 and most of the effects."

Zamarayev can choose groups and artists that he wants to produce without having to finance the sessions directly.

"The studio does not have the financial constraint of having to make a profit so I find myself in the position of a theatrical director, where I can choose what production I want to put on.

"It is clear that if we can cut a record, then the session charges can be recouped but we do a fair contract with the group or musicians, including royalties, in order to keep the situation business-like and friendly."

One of Zamarayev's favourite groups is Alliance — a sort of ethno-rock group, Soviet-style, and at the time of my visit the final mixes for their next album were being done.

"We are getting a lot of international interest and I am looking forward to the group being known outside Russia," he says.

The beginning of this report refers to the 'Moscow Sound'. But is there one?

There is a marked preference for an aggressive middle frequency predominance. This is to be found in most aspects of Russian music whether live or on record, so it is fairly safe to assume that this is the aim and not a result of the monitoring.

## Equipment list

### Mixing and monitoring

- 1 Amek *Angela* 36/24/4/2 console (VCA faders)
- 2 Studer A800 MkIII 24-track recorder
- 3 Studer A80 2-track master recorder
- 4 Dolby SP series
- 5 Sony DTC-1000 R-DAT
- 6 Tannoy *Super Red* monitors
- 7 Yamaha NS-10M monitors
- 8 Auratone nearfield monitors
- 9 Studiomaster MOSFET 1000 monitor amp
- 10 Two Quad 405 monitor amps
- 11 Quad 303 headphone amp

### Onboard

- 12 Audio+Design *Scamp* rack: five S31 compressor/limiters; seven S30 expanders; four 100 dual gates
- 13 AMS *rmx.16* digital reverb

- 14 AMS *dmx.15* digital delay and 800 ms sampling and pitch shifting card
- 15 Klark-Teknik DN300 EQ
- 16 Lexicon LXP-1 digital reverb

### Microphones

AKG, Shure, Beyer Dynamic, Sennheiser, Electro-Voice

### Also available

Revox B77 tape machine  
Technics cassette deck  
Yamaha CD player  
Synthesisers, samplers, Atari ST computer, etc  
Arrangers/programmers, original music composition, experienced studio musicians, radio and TV commercials, music productions

The standard of production here is way ahead of anything else heard in the Soviet Union. Looked at impartially, the studio is like many solid middle-of-the-market studios in the West but within the context of the Soviet Union, it is exceptional and one can only wish them well.

The rates are attractive for prospective Western clients but you then, of course, have to add in the high cost of travelling to and staying in Moscow, and the problems of everyday subsistence. However, if you are looking for something completely different in the way of surroundings for your next project, Igor Zamarayev will be only too pleased to discuss the possibilities. □

MDM Recording, 28 Komsomolski pr, Moscow, 119146, USSR. Tel: 2460669. Fax: 2461207.

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# AUDIO RECORDING

We have compiled a list of equipment on the market from information available to us at the time of writing

## Analogue tape machines

**Akai:** *MG14D* 1/2 inch cassette-based recorder with 12 channels plus control track and sync track.

**Digitec:** Following the formation of a joint company with Studer the status of Digitec tape machines is as yet unconfirmed.

**Fostex:** *E-2* 1/4 inch 2-track. *E-22* 1/2 inch 2-track. *R8* 1/4 inch 8-track recorder. *G24S* 1 inch 24-track recorder with Dolby S-type noise reduction. *G16S* 16-track version of *G24S*. The *G16* 1/2 inch 16-track recorder is the successor to the *E16*.

**Lyrec:** *FRED* editing tape deck for 1/4 inch tape. *FRIDA* 2-channel 1/4 inch recorder with timecode.

*TR-533* offers 16/24 tracks on 2 inch tape.

**Otari:** The *MTR-100A* is available in 1 inch 8-track, 2 inch 16-track, 16-/24-track and 24-track versions, featuring automatic alignment of audio functions. The *MTR-90 III* is available in 1 inch and 2 inch, 16-channel, an upgradable 16-channel version and the 24-channel. The *MTR-15* master recorder provides 1/4 and 1/2 inch tape formats in mono, stereo, 2-track and 2-track with timecode. The *MTR-12* 1/4 inch 2-track with and without centre-track timecode; 1/2 inch 2- and 4-track. The *MX-80* range is available as 2 inch 32-track, 2 inch 24-track, 2 inch 24-track prewired for 32 tracks, and 2 inch 16-track. *MX-70* 1 inch 8- or 16-track recorders. The *MX-55* 2-track machine aimed at radio news applications. The *MX-50* is a 2-track

machine aimed at the lower budget professional market. The *MX-5050 BIII* 1/4 inch 2-channel. The *MX-5050 mk IV-2* 1/4 inch 2-channel in a console cabinet. The *mk IV-4* 1/2 inch 4-channel and the *mk IV-8* 1/2 inch 8-channel.

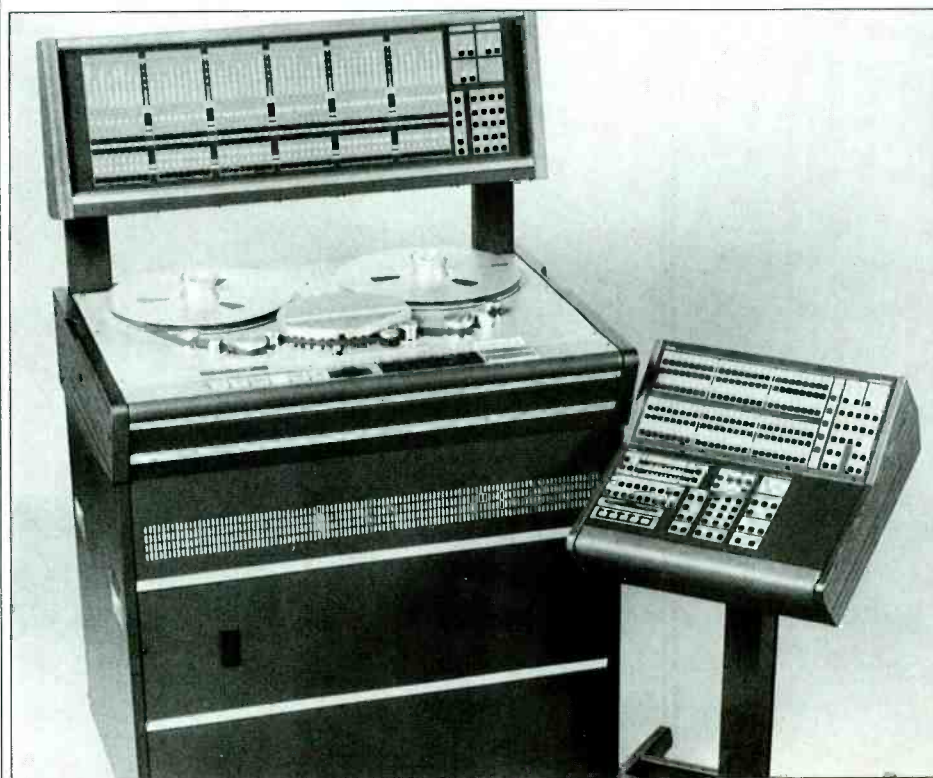
**Revox:** *C270* 2-track on 1/4 inch, *C274* 4-track on 1/4 inch and *C278* 8-track on 1/2 inch. Latter two also available in logging versions. *PR99 mk III* wide range of formats on 1/4 inch; *B77* 1/4 inch 2-track.

**Saturn:** The 824 analogue tape machine is 2 inch 16-/24-track with full autolocator and has automatic digital alignment as an option. The 624 is also a 2 inch 16-/24-track machine based on the 824 design but without auto-alignment. The remote is a much simpler version of the 824.

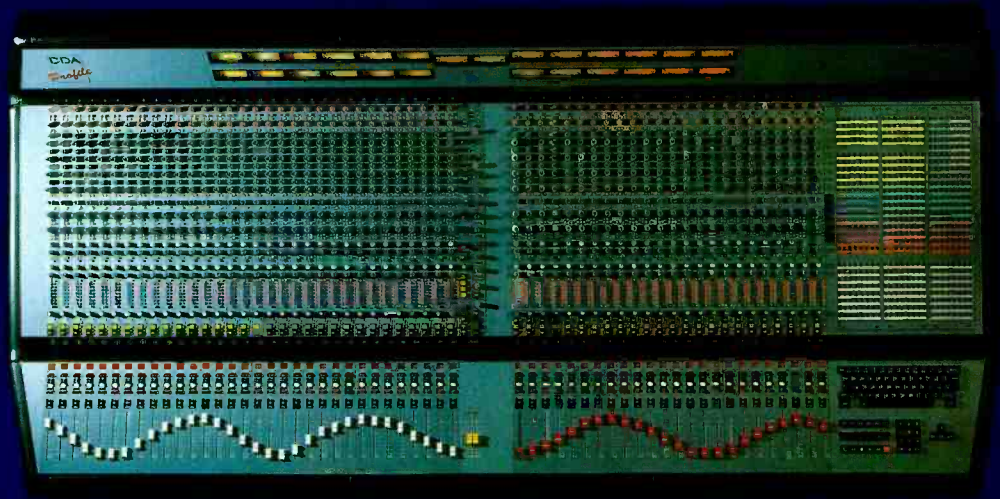
**Sony:** *APR-24* is a 2 inch 24-track machine with remote. The audio electronics are based on the 5000 series mastering machines. 5000 series range of mono, stereo and 2-track mastering machines on 1/4 inch with stereo 1/2 inch version and centre-track timecode options.

**Stellavox:** The *TD-9* modular tape recorder offers 1/4 inch and 1/2 inch tape or 16 mm 'perfortape' operation and headblocks available in 12 different track configurations from mono to 4-track.

**Studer:** *A807* 1/4 inch 2-track mastering machine with centre-track timecode. *A812* 1/4 inch mastering machine with centre-track timecode. *A810* 1/4 inch recorders only in pilotone and timecode versions. *A820* 2-track recorders available in 1/4 inch and 1/2 inch versions with



Studer D820-48 DASH recorder



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SOUNDCRAFT 16 track mk3 with remote	£1,495
STUDER A800 24 track	POA
STUDER A800 24 track	POA
STUDER A80 mk2 24 track	POA
TASCAM MS16 with DBX, rem, auto, console	£4,500

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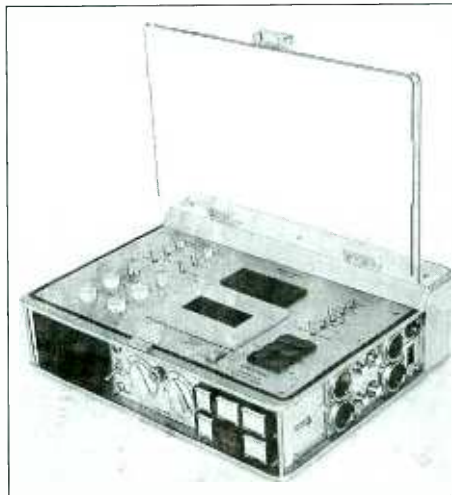
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All prices are exclusive of VAT

centre-track timecode. A820 multitrack recorder. A827 low cost 2 inch 24-channel multitrack recorder.

**Studio Magnetics:** SML1216 mk II budget 16-track, 1/2 inch. AR2400 24-track, 2 inch. AR1600 16-track, 2 inch. Omega 24- and 32-track machines on 2 inch.

**Tascam:** ATR-60-16 1 inch format 16-track machine, ATR-60 series includes 1/4 inch, 1/2 inch and centre-track timecode recorders. ATR-80-24 2 inch recorder. MSR-16 1/2 inch 16-track recorder. MSR-24 1 inch machine is based on the MSR-16 recorder. Tascam have launched a version of the MSR-24 and MSR-16 with Dolby S-type noise reduction called the MSR-24S and MSR-16S. TSR-8 1/2 inch 8-track recorder. The BR-20 series are 2-track recorders in three versions: BR-20N NAB version; BR-20D DIN version; BR-20T with centre-track timecode. 32/34B 1/4 inch 2- and 4-track recorders.



Stellavox StellaDat

## DAT

**Denon:** DTR2000 with twin 2 bit DACs.  
**Fostex:** D-20 DAT allowing use of Fostex' own and IEC timecode formats. PD2 portable designed for mobile or location use.

**HBB:** DTC 1000ES HBB modified to record 44.1 kHz and 48 kHz. RSDAT RS 1000 with broadcast and theatre applications, with on-air controls. HBB 1 PRO portable professionalised version of Aiwa HD-S1 built to HBB specification.

**JVC:** two pre-production models — more information pending.

**Panasonic/Technics:** Compact portable SV260A replacement for the 260 with enhanced mic input stage (known differently in different territories). SV360 with useful error status indicator. SV-3700 designed for broadcast and post-production facilities. SV-3900 with full remote control via serial control interface, SH-MK360.

**Sony:** PCM-7010, PCM-7030 and PCM-7050 four-head timecode capable machines; PCM-2700 low cost four-head machine; PCM-2500 first Sony pro machine; PCM-2000 portable; TCD D10 Pro2 compact portable with A-time.

**Stellavox:** StellaDat portable DAT recorder with digital timecode. Also two-transport studio version.

**Tascam:** DA-30 with 48/44.1 and 32 kHz sampling rates.

## Digital tape machines

**Akai:** DR1200 12 tracks on 8 mm video cassette which records 12 digital PCM channels.

**Mitsubishi:** X-400 16-channel PD format multitrack. X-880 32-track multitrack in PD format. X-86 and X-86C 2-track mastering recorders. PDX-8620 2-track recorder, 20 bit ready with choice of converter. PDX Eight Eighty Two 64-track digital recording system comprising two 32-track recorders, the Eight Eighty Two master and slave machines, and a 64-track autolocator.  
**Nagra:** Nagra D is Nagra's own format with rotary head digital audio on 1/4 inch tape with reel-to-reel. Provides two or four tracks with 20 bit word length at 48 kHz.

## Addresses

**Akai Electric Co Ltd, Electronic Musical Division, 335 Kariyado, Nakahara-ku, Kawasaki-shi, Kanagawa, Japan.**

**UK:** Akai (UK) Ltd, Haslemere Heathrow Estate, Silver Jubilee Way, Parkway, Hounslow, Middx TW4 6NQ. Tel: 081-897 6388.

**USA:** Akai Professional Products, IMC, PO Box 2344, Fort Worth, TX 76113.

Tel: (817) 336-5114.

**Denon, Nippon Columbia Co Ltd, 14-14, 4-Chome Akasaka, Minatu-ku, Tokyo 107, Japan.**

**UK:** Hayden Labs, Chiltern Hill, Chalfont St Peter, Bucks SL9 9UG. Tel: 0753 888447.

**USA:** Denon Digital Industries Inc, 1380 Monticello Road, Madison, GA 30650. Tel: (404) 342-0637

**Fostex Corporation 3-2-35, Musashino, Akishima, Tokyo, Japan. Tel: 0425 45 6111.**

**UK:** Fostex UK, Unit 1, Jackson Way, Great Western Industrial Park, Southall, Middx UB2 4SA. Tel: 081-893-5111.

**USA:** Fostex Corp of America, 15431 Blackburn Ave, Norwalk, CA 90650. Tel: (213) 921-1112.

**HBB Communications, 73-75 Scrubs Lane, London NW10 6QU, UK. Tel: 081-960 2144.**

**Fax: 081-960 1160.**

**USA:** HBB 1 PRO is available from Stellar Audio. Tel: (201) 728-4529. Fax: (201) 728-0438.

**Lyrec Manufacturing A/S, Box 123, DK-2740 Skovlunde, Denmark. Tel: 44 53 25 22. Fax: 44 53 53 35.**

**UK:** Lyrec UK, Ardhaven House, Old London Road, Milton Common, Oxford, OX9 2JR. Tel: 0844 278866. Fax: 0844 278810.

**Mitsubishi Electric Corp, Mitsubishi Denki Building, Marunouchi, Tokyo 100, Japan.**

**UK:** Mitsubishi Pro-Audio, Travellers Lane, Hatfield, Herts AL10 8XQ. Tel: 07072 78749. Fax: 07072 78694.

**USA:** Neve North America, Berkshire Industrial Park, Bethel, CT 06801. Tel: (203) 744-6230. Fax: (203) 792-7863.

**Nagra Kudelski SA, CH-1033**

**Chesaux/Lausanne, Switzerland. Tel: (021) 731 21 21.**

**UK:** Hayden Labs, Chiltern Hill, Chalfont St Peter, Bucks SL9 9UG. Tel: 0753 888447.

**USA:** Nagra Magnetic Recording Inc, 1147 North Vine Street, Hollywood, CA 90038. Tel: (213) 469-6391.

**Otari Inc, 4-33-3 Kokuryo-cho, Chofu-shi, Tokyo 182, Japan. Tel: (0424) 81-8626. Fax: (0424) 81-8633.**

**UK:** Otari Electric (UK) Ltd, Unit 13, Elder Way, Waterside Drive, Langley, Berks SL3 6EP. Tel: 0753 580777. Fax: 0753 42600.

**USA:** Otari Corp, 378 Vintage Park Drive, Foster City, CA 94404. Tel: (415) 341-5900. Fax: (415) 341-7200.



**Otari:** DTR 900 II 32-track PD format recorder.

**Sony:** PCM-3324/3348 24-/48-track DASH recorders. PCM-3402 DASH 2-track.

**Studer:** D820X 2-channel digital mastering recorder for the DASH format. D820 24-/48-channel DASH digital multitracks.

**TEAC/Tascam:** DA-800 24-track DASH format recorder.

**Yamaha:** DRU8 8-track 20 bit digital recorder in a rackmount format. Also comprises part of DMR8 digital mixer/recorder system. □

**Panasonic/Technics, Matsushita Electric Ind Co Ltd, PO Box 51, Osaka Central 530-91, 1006 Oaza Kadoma, Osaka 571, Japan. Tel: 06 908-1121.**

**UK:** Panasonic UK Ltd, Panasonic House, Willoughby Road, Bracknell, Berks RD12 4FP. Tel: 0344 853176.

**USA:** Panasonic Professional Audio Division, Matsushita Electric Corp of America, 1 Panasonic Way, Secaucus, NJ 07094. Tel: (201) 348-7000.

**Revox AG, Althardstrasse 146, CH-8105 Regensdorf, Switzerland. Tel: 41 1 870 77 11. Fax: 41 1 840 09 18.**

**UK:** Revox UK, 1 Berkshire Business Centre, Enterprise Way, Thatcham, Berks RG13 4NA. Tel: 0635 76969. Fax: 0635 72556.

**USA:** Studer Revox America, 1425 Elm Hill Pike, Nashville, TN 37210. Tel: (615) 254-5651.

**Saturn Research, Unit 3A, 6-21 Southgate Road, London N1 3JJ. Tel: 071-923 1892. Fax: 071-241 3644.**

**Sony Corp, PO Box 10, Tokyo Airport, Tokyo, Japan.**

**UK:** Sony Broadcast & Communications, Jays Close, Viables, Basingstoke, Hants RG22 4SB. Tel: 0256 55011. Fax: 0256 474555.

**USA:** Sony Corp of America, Professional Audio Division, Sony Drive, Park Ridge, NJ 07656. Tel: (201) 930-1000.

**Stellavox, Digital Audio Technologies SA, Puits-Godet 20, 200 Neuchatel, Switzerland. Tel: 038 244 400.**

**USA:** International Audio Technologies Ltd, 13897 J Williard Road, Chantilly, VA 22021.

**Studer International, Althardstrasse 10, CH-8105 Regensdorf, Switzerland. Tel: 01-840 29 60. Fax: 01-840 47 37.**

**UK:** FWO Bauch Ltd, 49 Theobald Street, Borehamwood, Herts WD6 4RZ. Tel: 081-953 0091. Fax: 081-207 5970.

**USA:** Studer Revox America, 1425 Elm Hill Pike, Nashville, TN 37210. Tel: (615) 254-5651.

**Studio Magnetics Ltd, Unit 4, Radfords Field Industrial Estate, Maesbury Road, Oswestry, Shrops SY10 8HA, UK. Tel: 0691 670193.**

**UK:** Music Lab Sales, 72-76 Eversholt Street, London NW1 1BY. Tel: 071-388 5392. Fax: 071-388 1953.

**Tascam, TEAC Corp, 4-15-30 Shimorenjaku, 4-Chome, Mitaka-shi, Tokyo 181, Japan. Tel: (0422) 45-7771.**

**UK:** Teac UK Ltd, 5 Marlin House, The Croxley Centre, Watford, Herts WD1 8YA. Tel: 0923 225235. Fax: 0923 36290.

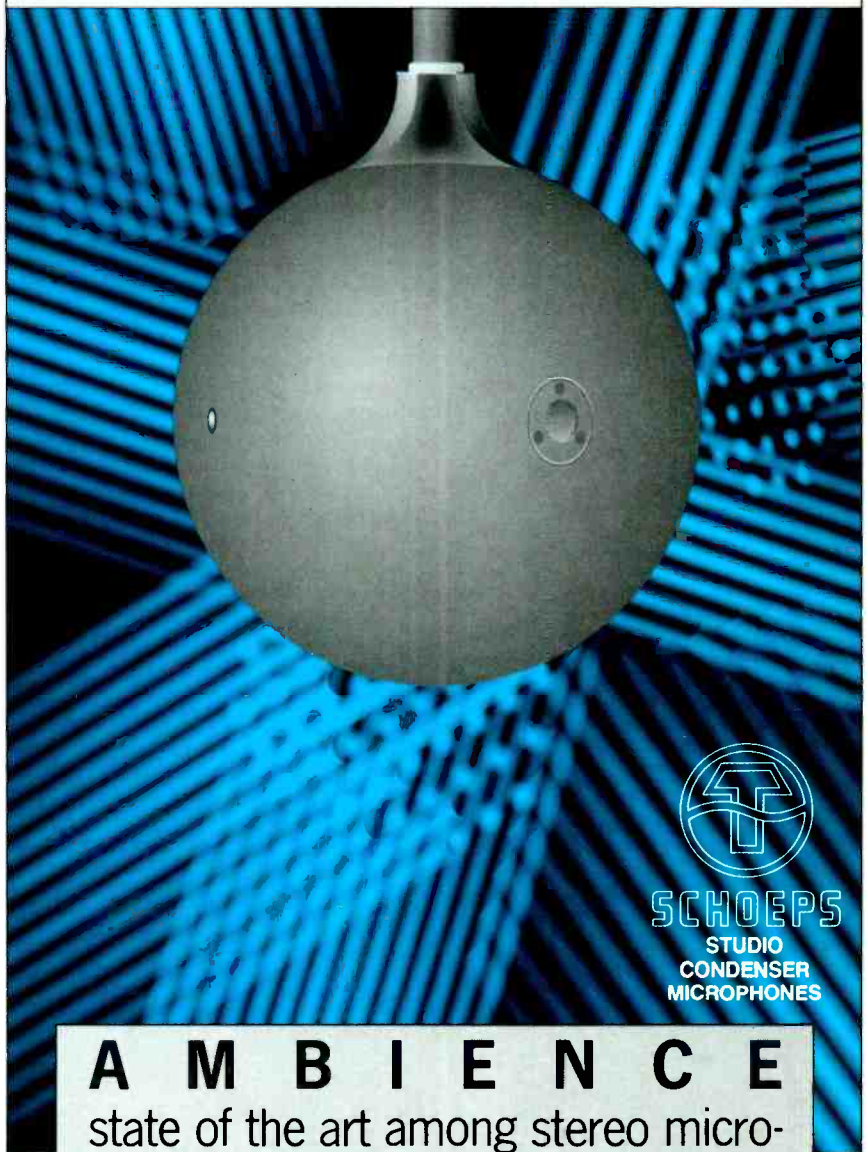
**USA:** Teac America Inc, 7733 Telegraph Road, Montebello, CA 90640. Tel: (213) 726-0303.

**Yamaha Corp, PO Box 1, Hamamatsu, Japan.**

**UK:** Yamaha-Kemble Music (UK) Ltd, Mount Avenue, Bletchley, Milton Keynes MK1 1JE. Tel: 0908 71771.

**USA:** Yamaha Corp of America, PO Box 6600, Buena Park, CA 90622-6600. Tel: (714) 522-9011.

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21/F, 8 Luk Hop Str., San Po Kong  
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**S** Jela Ijud/RMS ab  
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76130 Norrtelje,  
Tel.: 46(0)176-146 50

**CH** dB Decibel S.A.,  
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1604 Puidoux,  
Tel.: (021) 9 46 33 37

**GB** Scenic Sounds Equipment  
Marketing Ltd., 10 William Rd,  
London NW 1 3 EN,  
Tel.: 071-3 87 12 62

**USA** Posthorn Recordings,  
142 West 28th Street, 10th Floor,  
New York City, N.Y. 10001,  
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# ASPECTS OF MIDI TIMING

Vic Lennard dispels a few myths that have grown up around the subject of MIDI timing. Many of the inherent errors can be overcome and reduced to inaudibility

Anyone who has ever used a computer running a MIDI sequencer will have complained at some time that they can hear notes slightly out of sync. It is a fact of life that the use of MIDI results in timing errors but their audibility depends on the circumstances. Given a situation, there is usually a way to improve certain aspects so leading to smaller, hopefully inaudible, delays.

For a start, three misapprehensions need to be cast aside. Firstly, hardware MIDI Thru ports do not cause delays. Poor quality or aged optoisolators can cause the leading edge of the MIDI squarewave signal to be out of vertical but this ultimately leads to corrupted data. Secondly, the MIDI hardware of the computer is rarely to blame. Most modern computers use microprocessors operating at a fast enough rate to be able to handle almost any MIDI load, although this will be partially dependent on the quality of the software program being run. Finally, the internal resolution of a sequencer. A slightly more thorny issue but suffice to say that at a resolution of 192 ppqn (common by today's standards) and a tempo of, say, 132 bpm, the internal clock of the sequencer is ticking every 2.4 ms so the timing of a buffered MIDI byte is being distorted by a maximum of 1.2 ms.

There are three principal problem areas that lead to timing errors: the serial nature of the MIDI protocol; the reaction time of MIDI hardware; software.

MIDI is an asynchronous serial protocol meaning that one byte is followed by another without being subject to a rigid timing clock. MIDI operates at 31.25 kbaud and as each MIDI byte is made up of 10 bits this equates to 320  $\mu$ s/byte. More to the point, a MIDI Note-on comprises 3 bytes, giving the Note-on status, MIDI channel, note number and velocity, and so takes just less than 1 ms to transmit. Take a situation that could commonly occur at the start of a bar. Bass drum, hi-hat, bass, piano playing an 8-note chord, a brass stab of three notes and a 4-note pad. Total — 18 notes. The gap between the first and last note will be 16.32 ms and this would probably be heard as a chord lacking in tightness rather than a string of events taking over 16 ms. The reason for this is that each event is heard followed by the next as a rapid arpeggio. If only the first and last notes were heard in isolation, the delay would be more apparent.

Were all 18 notes played at exactly the same moment? No, but by processing the data in a particular manner, the notes have been moved to the same time point. This process is called quantisation and is the singularly worst enemy of MIDI timing. Quantising moves all notes to the nearest, user-determined note value and so can lead to control of the intended priority of the output of MIDI data being lost. In this example, the drums and bass may need to be transmitted first — a reasonable requirement as lack of tightness in the rhythm part would be the first

audible sign of trouble. If MIDI events at the same time point occur on multiple tracks of a sequencer, priority is often given in track order starting from Track 1. If drums are on Track 1, bass on Track 2 and so on, quantising will have no effect on the order of event output. However, if the events have not been recorded on tracks in the intended order of transmission, quantising will rob you of this control. A thought process of 'now which track should I record this on to ensure that the MIDI timing is as good as possible' is unlikely to occur during a creative session. Selective quantising is a better idea, where only the most important events are moved onto a set note value. With different instruments on different tracks, track delays can be used to force the order of transmission so keeping the situation under control.

The more MIDI events that have to be output, the longer the queue at the output buffer and the longer the delays. Filtering unwanted MIDI information on input will help, especially aftertouch, which generates MIDI events according to the additional pressure brought to bear on a key once it has been played. For instance, aftertouch should always be filtered out when using a MIDI keyboard to trigger a drum module — playing keys in the fashion necessary for this is very likely to trigger the aftertouch. If possible, such controllers should be turned off from the master device.

Some MIDI messages can be thinned out, especially pitchbend, and this is often offered as an option within the sequencer. The MIDI specification for pitchbend allows for a maximum of 14 data bits, which equates to 16,384 different positions from centre to top and back and would cause extreme delays to the following note information. Most keyboards use a pitchwheel resolution of 8 or 9 bits giving 256 and 512 positions respectively. If the pitchwheel range on the receiving device is set to an octave, a slight stepping effect might be heard on a slow pitchbend but if the range is only a couple of semitones, this is most unlikely.

In the latter case, the pitchbend could be thinned further without audible effect, perhaps to only 7 bits. The saving between 7 and 8 bits is 128 positions, which would hold the MIDI bus for over 120 ms as pitchbend also requires 3 bytes. Aftertouch can be thinned out similarly, as can MIDI Volume (controller #7) and several others. As long as the effect is inaudible, the small timing improvement may prevent audible problems.

Another way to shorten the output queues is to lessen the amount of time that a Note-off has to spend in the output buffer. Most drums are triggered in what is termed 'one-shot' mode where

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the Note-on is received and a drum sound of predetermined length is played. The Note-off is necessary but the point of time when it is received is irrelevant. Consequently, keeping the duration of all drum notes on the sequencer to a minimum will cause the Note-off to be sent out as quickly as possible. This is especially relevant when the MIDI data has been input from a MIDI drum pad, which will often have a relatively long gate time.

Within the MIDI specification there exists a method for compressing MIDI data called Running Status. The idea is that if the MIDI Status byte doesn't change from one MIDI event to the next, it doesn't need to be retransmitted. For example (all numbers in hex):

```
92: MIDI Note-on, Channel 3
3C: Note number 60 (C3)
42: Velocity 66
92: MIDI Note-on, Channel 3
3C: Note number 60
00: Velocity 0
```

The second event is the MIDI Note-off for the first event, as the velocity is zero. The Status byte

of 92H remains unchanged so the message could be transmitted as:

```
92 3C 42 3C 00
```

so saving a byte.

Taking our original example of 18 MIDI events, the saving would be 17 bytes or over 16 ms. The situation with continuous messages such as pitchbend or aftertouch is far more pressing. Using the example of 128 pitchbend steps, 127 bytes would be saved with a time saving of over 120 ms. All receiving devices are supposed to be able to recognise running status although some older machines may be suspect.

## Hardware reaction time

One result of having a serial interface is that all MIDI devices through a standard MIDI system receive all the transmitted information. Consequently bottlenecks occur at the MIDI

output buffer of the computer and also at the MIDI input buffer of each device. The former problem can be partially solved by limiting the MIDI data on transmission as mentioned in the last section but the latter bottleneck is less predictable because different pieces of hardware are involved. The occasional resulting MIDI buffer overflow, with accompanied screen message on a MIDI device, can lead to lost or hanging notes due to corruption of MIDI messages.

If the reaction time of a MIDI device is constant, it can be dealt with by using track delays on the sequencer. Variable delays are more awkward, however, and are becoming more frequent with the modern multitimbral synths where, perhaps, seven MIDI channels of data are being processed simultaneously. It is quite likely that higher processor loads lead to greater variation in reaction time. So when MIDI data are in a state of high flow, reaction time will be slow but when the rush is over, the reaction time will improve leading to an effect akin to unprogrammed tempo changes. The only way to lessen this effect is to reduce the load on the MIDI input, but, as previously noted, all MIDI data go to all devices so there is an *impasse*.

The solution is to use a MIDI port expander, which is likely to be proprietary to the software manufacturer. A typical unit might give you an extra two or three independent MIDI Outs so that the amount of MIDI data being received by each device can be restricted. For example, with three extra MIDI Outs and a carefully thought out network, each device will receive about a quarter of its previous load. While there will still be peaks and dips in the transmission of MIDI data, the effect will not be as marked. The port expander will also cut down on delays due to the queues at the MIDI Out of the sequencer.

## Software delays

The quality of the software program present in a sequencer, synth, MIDI patchbay or other device is an imponderable. Generally, if MIDI data is being handled by software there have to be delays due to the transfer of data to and from RAM by the processor. Whether these are audible or not will depend on the workload of the processor. The article on MIDI patchbays in *Studio Sound*, January 1991, went into detail on the routing of MIDI data and the problems confronting a patchbay designer.

The other area of software delay is 'soft' MIDI Thru ports. Data received at a MIDI In port follows one of two routes: to the processor via the UART, or to the MIDI Thru. Consequently there are no delays attached to such a Thru, however, a software MIDI Thru processes the input data and merges the original information with the processed version, hence the possibility of delays.

## Summary

When MIDI was originally created, it would have been difficult to foresee the day when 16 MIDI channels would not suffice. Effectively, that is the current problem, which is why MIDI port expanders are becoming very popular. So they should — running more than 16 MIDI channels without one is bound to lead to delays.

The MIDI protocol is not perfect but very usable if care is taken not to overload it. Next time music appears to be out of sync with itself, have a close look at the routing and filtering within the system. □

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**DIGITAL AUDIO RESEARCH**



Surprisingly few of the 50 or more organs within the UK university city of Oxford are worth considering for recording. Mainly because of building decay, mechanical or electrical defects in the instrument caused by poor maintenance, insufficient funds or merely lack of interest.

Initially eight organs were chosen to be recorded on one compact disc to partner *The Organs of Oxford* illustrated guide. The final choice of organs to record was made by Bernard Martin and his company OxRecs Digital. He was looking for instruments that were in regular use, at evensongs, recitals, concerts or university functions.

Martin, "It soon became obvious after consultations with the directors of music, organists and other interested individuals that we would be unable to adhere to the anticipated one disc. CD time constraints limited us to less than 10 minutes an organ.

"A 20 minute slot was allocated to each organist for a proposed music list, this meant a two-volume CD set, which was probably more satisfactory. Personal input was made, however, the organists' choices were paramount considering their familiarity with each instrument."

There were organs that definitely had to be included. The Sheldonian, which is a Harrison & Harrison, was initially thought to be the main instrument to feature as its location is such a popular tourist venue, because there wasn't believed to be a recording of this organ over the past 20 years and it would put the romantic organ back on the map.

Martin, "We also wished to include the Town Hall organ as it is an original Father Willis (known for his well-balanced choruses and powerful reeds)."

Sadly there has been a decline in popularity of the English organ in recent years and there has been a preference for a more classic design of the North-West European style favouring rather harsh tones. The eight organs chosen for the recordings were all designed to have particular styles of music played on them.

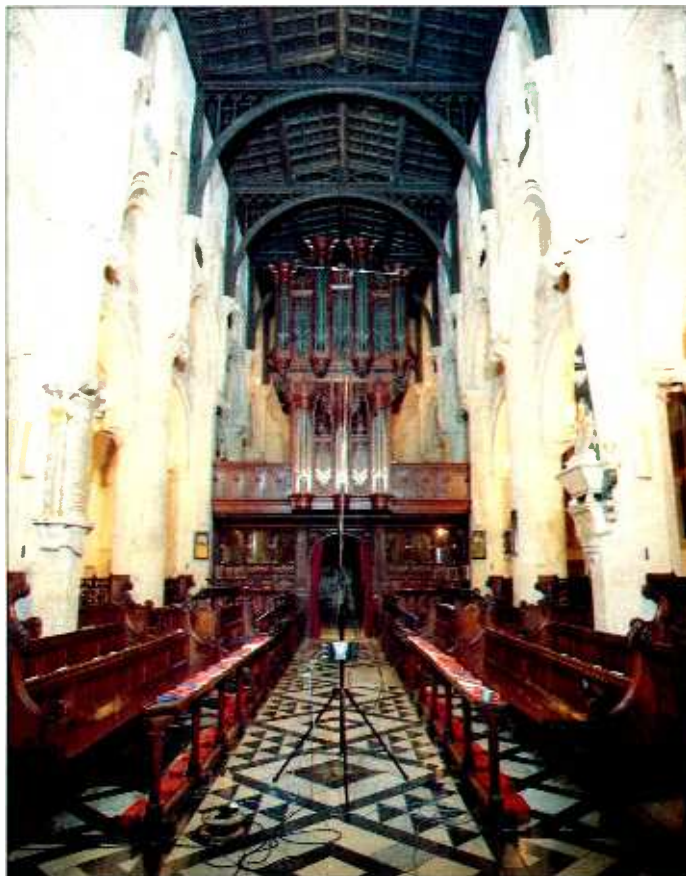
Martin, "The Sheldonian Theatre/Town Hall organs are romantic designs. So music is chosen which needs, say, large reed or string stops/swell box/variety of manuals to combine different stop combinations. However, the Sheldonian organ has electric stop action and the Town Hall has manual stop action.

"The University Church/Queen's College organs are replicas of the classic Baroque design. The style of these organs originates in the 18th Century, the swell box had not been invented and each department was designed to contain a rank of pipes constrained by its length. So a German/Dutch/North European selection was chosen.

# ORGANS OF OXFORD

As part of 'The Campaign for Oxford' fundraising project, 'The Organs of Oxford' illustrated guide details the best city and university organs. An audio recording of the organs seemed a logical accompaniment. Julian Mitchell talks to recording engineer Bernard Martin

Photo: Pete Downes



Recording at Christ Church College

"Magdalen College favours the very early English period (17th Century) and Holywell Music Room is a typical English chamber organ. So all English composers were chosen. New College organ follows very much the designs of a French classical instrument; lots of mutation (overtone) stops producing a very harsh sound. Christ Church again follows the European school but

with a general variety of different stops. Probably the most versatile of the bunch but also very harsh."

OxRecs Digital was formed in 1984 to supply specialised location recording services mainly around the Oxford area although in practice, work is done all over the country.

"The company was formed to satisfy and fulfil a longtime personal ambition with the aim of providing a service by someone who has personal experience of singing in a first-rate choir and has varied keyboard and conducting experience. The aim of OxRecs is to supply our customers with a realistic recording to satisfy the artist more than the intended audience. We supply a package to our customers — the art/design, printing, copyright fees, editing, copying, etc, is all handled by us."

From the planning stage OxRecs had to have sponsorship before they even considered starting the project. Martin went to the main pro-audio shows to find such commercial help. "I was looking for sponsorship at APRS 1990. I needed free use of the equipment in exchange for advertising/promotion on the finished product."

The Oxford organ recordings were made on a Sony SLC9/PCM-701ES and backed up onto an S-VHS Panasonic NVFS1B. Monitoring was performed either on Tannoy Little Reds or JBL Control 1s driven by a Quad 405 amplifier. Microphones were a B&K 3529 set (two 4003 omnis).

"Apart from a very modest Yamaha mixer and Beyer DT100 headphones, no other equipment was used for the recording. However, to make life easier we had to have a flexible talkback system from organist to control room. As the venues differed so much, we had two choices: an intercom, which worked by plugging into the mains, or a couple of CB walkie-talkies. In practice, the walkie-talkies were better as they worked every time. They had limited range and even though they were left on during a recording, were not interrupted by any external transmission on the open channel. The intercoms proved more difficult. They only worked if the master/slave set were plugged in on the same electrical phase, invariably the control room was on a different phase from the organ loft hence they could not be used on the majority of sessions.

"My guidelines for recording were to locate a single position within the building where all the pipework from

each department could be heard. As these organs were above head height, the optimum vertical position was then assumed to be in line with the mouths of the main pipework. In the case of a two-case organ, ie Christ Church, New College, Magdalen, University Church, the microphones had to ideally be above the positive case, which stands in front of the main case. If this were not

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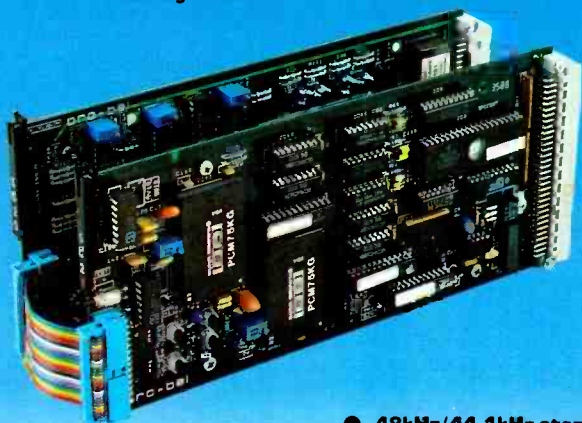
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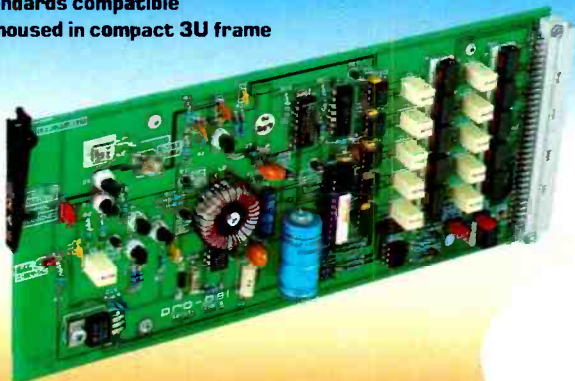
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**Bernard Martin in a makeshift control room**

possible then the stand had to be moved back or the microphones angled slightly upwards (Queen's has an enormous arch in front of the three in-line cases).

"The distance between the microphones was decided by personal preference: too close gave little or no stereo image and the maximum distance was determined by the length of the crossboom. The absence of a clear stereo image was intentional. After all who listens to an organ standing immediately in front of the pipework? However, some spatial feeling was needed and this was achieved by prudent use of the black cones on the B&K mics. These appeared to stabilise and control the image in a very lively ambient building, whereas without them, the image sounded muddled. However, in a less ambient building, the cones seemed to have little effect.

"The most difficult problem was getting enough height for the microphones. The standard configuration was to extend a heavy duty telescopic stand by adding a further extension from a standard boom. This gave us about an extra metre but increased the instability of the rig when fully extended and carrying the two microphones. It's open to speculation that increased height would have given a more satisfactory position. I'm tempted to say that it would, as we probably compromised by moving the stand further back to compensate for the obstruction of the positive casework, whereas if the microphones had been higher then they would have sat above this positive case thereby directly facing the main pipework. It is, of course, debatable if the height makes any substantial difference at all, it all probably depends on the reflected sound from the building fabric. It was not practicable to sling the mics within any of the buildings."

It was decided from the outset that the recordings would have to take place at the quietest possible moments — if not in the evening through the night. Most of the organs are within the centre of Oxford and so are surrounded by busy traffic most of the day and long into the evening, there were, however, other problems to contend with, "For the Magdalen session there was a howling gale during the early part of the night and we finished about 05:00. Two of the musical items had to be omitted from this session owing to excessive wind noise. The University Church sits in the High Street in the centre of town. Immediately



**B&K 4003s on extended stand**

outside is a pelican crossing and all the traffic could be heard from within the building. We simply had to record during the quietest moments, which worked out to be the 01:00 to 04:00 slot. A central heating timer was buzzing throughout the whole session and could not be switched off.

"The New College session was interrupted by a TV film crew in the quad recording an episode of *Inspector Morse*. The Sheldonian session was abandoned at 23:00 owing to rainwater dripping from a blocked gutter drain following a downpour, after a long hot spell. At Christ Church, the church PA system was left on, so a slight buzzing is just detectable during quiet passages."

Martin's main priority for each recording was always to reflect the true sound of each organ, "Unfortunately, many other commercial recordings seem to rely on a very clinical, unmusical sound, produced with the stereo buff in mind. These recordings are for the organists and musicians."

In retrospect Martin was also more than happy with the equipment he ended up using with a couple of small exceptions, "As the recordings were digitally edited, it was not possible to use the *PCM-701* for transfer as it has no digital output, so a *PCM-601* was used. Some of the recordings were

The CDs were mastered by Nimbus and are now available as a companion to *The Organs of Oxford* illustrated guide. For more information and availability of copies contact Bernard Martin at 18 Oxford Lane, Grove, Wantage, Oxon OX12 7PJ, UK. Tel: 0235 770477.

copied directly onto DAT using the *601*. Therefore, on reflection, the editing exercise would have been considerably shorter had I been using a DAT machine and *SLC9PCM-601* (or modified *701*) for backup. This way I could have performed some pre-editing for all the master DAT tape in advance. However, funds were not available to buy or hire a DAT recorder.

"The only processing that would have improved the final result would have been some digital EQ during the editing to reduce rumble from the traffic noise on the Queen's College recording. Otherwise the intention was to reproduce the organs as faithfully as possible, so any other processing would have been unreasonable."

Bernard Martin has been living and working around Oxford for a long time and has been interested in organs and organ playing for most of his life. In such a specialised subject in a relatively small geographical area it wasn't long before he made friends with another keen organist, Colin Sanders of SSL. "Colin Sanders had offered editing facilities on the *01* console. As the machine is unsupported and the only two complete machines remaining lie unused, much effort was put into rejuvenating the machine at Begbroke. It became obvious after many fruitless hours by the SSL engineering staff that the machine could not be made good for the project, so an alternative editing location had to be found. The Clockhouse Studios at the University of Keele was chosen using Cliff Bradbury and the Atari computer running *SoundMaestro* software."

The editing proved to be a baptism of fire for Martin, "Having no experience of this kind of editing before, I scheduled a day per CD to perform it. However, on the first day at Keele nothing was really done until 8 o'clock in the evening after a full day investigating a hardware fault on the Winchester disk. The next day Cliff Bradbury and I spent around 11 hours editing the first CD and then found we had 4 to 5 minutes over the maximum time limit allowed. So the master tape had to be recopied omitting two pieces, one of which we had spent an hour or so editing.

"The next visit to Keele to edit volume two, resulted in a 9 hour session. However, we discovered to our horror when copying the DAT master to a backup Betamax as before, that all of the edited tracks were in mono! So another trip to Keele was organised. On receiving the Betamax tape after the third visit, there was a very loud glitch on one of the tracks. Although the glitch was not on the DAT tape, it would have only been picked up by a validation listen to the Betamax tape. Of course, you can't perform off-tape monitoring from a *701*, therefore, it went unnoticed during the copy. So a fourth visit was organised."

*SoundMaestro* editing offers a split screen on which one views and listens to the recorded waveform of the two different takes that are being edited together. In practice, Martin had a problem, "One can preview, say, 5 seconds of one take joined to a similar timescale from the second take. The program then allows you to listen to a continuous preview of both takes, in the middle of which will be a non-intrusive edit, you hope. If this is successful, then the edits are saved and an alternative screen allows you to play the whole piece of music comprising all the takes as one complete take. Our problem was that using the latter screen menu, you could clearly hear the edit point, whereas on the preview screen, one couldn't. I should be interested if any other users have experienced this problem as we do not have an explanation." □



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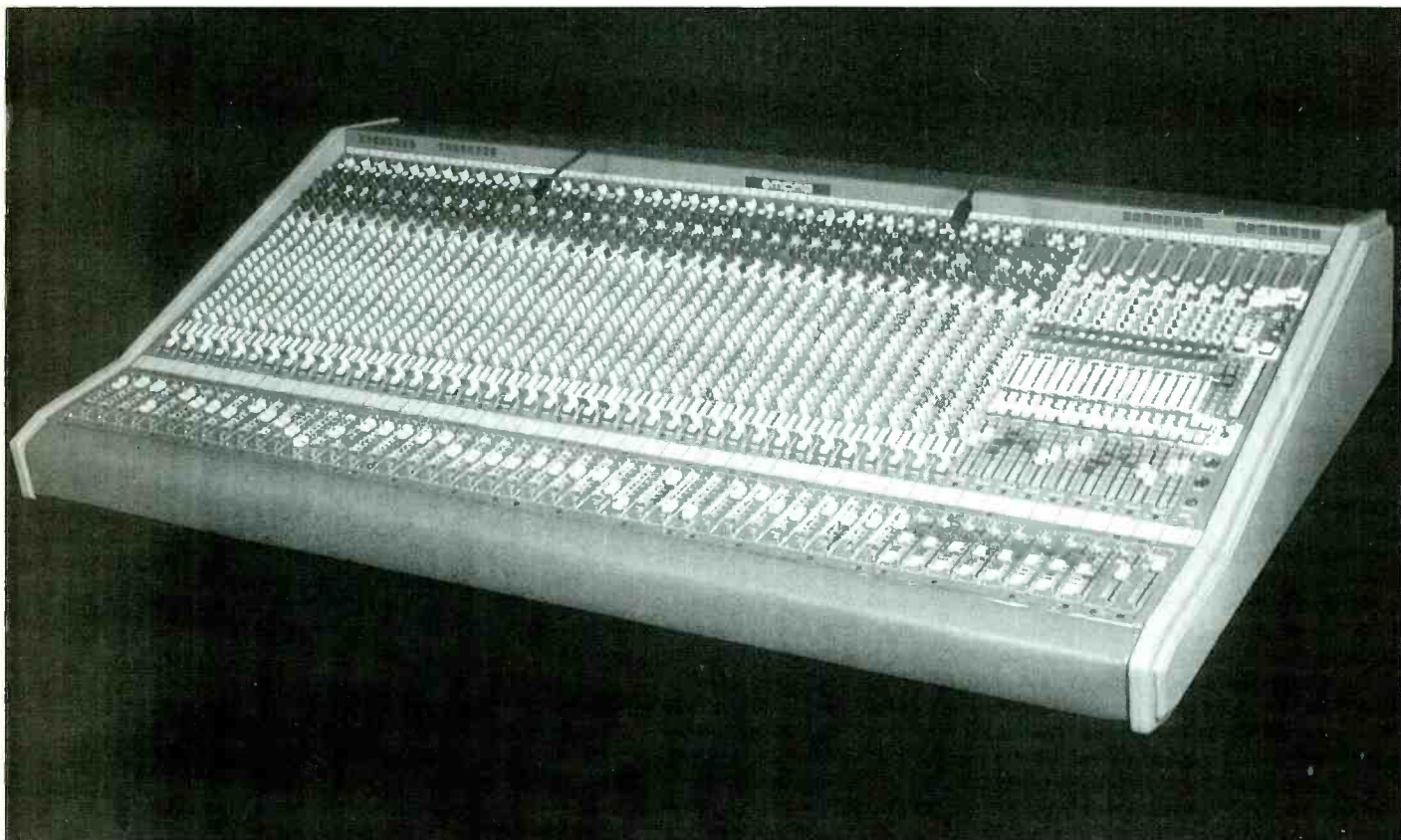
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# MIDAS XL3

David Mellor takes a look at Midas' live performance console. With front-of-house, monitor and theatre applications, some interesting new ideas are brought into the audio arena

**A**s Midas became part of DDA and in turn Klark-Teknik, who have themselves become part of Mark IV, one may wonder how much of the Midas heritage remains. The answer is that the *XL3* has been designed from the ground up by Klark-Teknik's engineers. The *XL3* departs from run-of-the-mill console design by doing away with auxiliary sends completely. Or if you look at it another way, it's not the auxiliaries that have been dispensed with, it's the groups. But it's better to think of the *XL3* as a console designed from scratch rather than an amendment or improvement on existing ways of doing things. Once upon a time a console would have a number of groups, which were the main outputs, and a couple of auxiliary outputs, which were extra ways of getting the signal out of the console for foldback or effects. It was a natural development as productions became larger and more demanding that manufacturers would respond by providing more groups (often with switched rather than patched subgrouping) and more auxiliaries. Now we have got to the stage where a rethink is

appropriate. The problem with having a large number of groups is that if you're not using them all, it's difficult to use spare groups as extra auxiliaries because the send from the channel fader to all the groups is identical. Conversely, if you have spare auxes, it's not desirable to use them as groups because the aux masters are on rotary controls rather than faders (and aux buses can be noisier on consoles that don't provide an Off switch on each channel's aux send).

Klark-Teknik's answer to this is to combine the function of groups and auxiliary sends into what they call 'Mix Groups' and to achieve not only a 'best of both worlds' solution but also give the console an integral matrixing system (which aux sends inherently are anyway), plus desirable extras such as an additional matrix and versatile soloing, muting, VCA grouping and monitoring systems.

## Mix groups

Once you can get hold of the idea of a console

without the normal bank of routing switches, it's not hard to understand the logic of the *XL3*. There are still routing switches but they are not all grouped together, they are distributed up and down the channel module each with a level control. The *XL3* looks at first as though it has 16 conventional auxiliary sends, each with an On and Pre/Post switch. The On switches can be considered as the routing switches on this console. Following the red-capped Mix 1 (instead of Aux 1) control across the console we find a fader, also with a red knob, which is the Mix Group 1 fader. So, we can route the signal from Post the channel fader to the Mix Group (like normal group routing or post-fade aux) or Pre the channel fader to the Mix Group (like a prefade aux). This can be an output from the console to FOH sound reinforcement, stage monitoring or effects. Also, it can be a subgroup feeding into the master faders. Routing the mix group to the master faders is a matter of going through On, Pre/Post, Level and Pan controls, which is remarkably like the way the signal got to the mix groups in the first place, with the addition of the pan between left and right masters, so the logic of the system is carried right through to the console's main output. As an aid to finding your way around all those knobs and faders quickly, the sends are colour-coded in pairs, red-green-yellow-blue to match the colours of the mix group faders. In practice, it's no problem putting your hands on the right knob or fader instantly.

It is immediately noticeable that there is no control to pan the signal between mix groups. This could be considered an inconvenience but I found that with a little practice I could pan quite happily by adjusting the relative levels of the sends to left and right designated mix groups. The method I used was to decide which way I wanted to pan the signal and set the level of the corresponding send to 0 dB gain. Then, I adjusted the level of the other send up from  $-\infty$  until the signal was at the position I wanted in the stereo image. This takes precisely twice as long as using a normal pan

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control, but it works and the console has other advantages that outweigh this small drawback.

## VCA's, muting, solo

Like all good live sound desks, the *XL3* has VCA subgrouping for the channels, and as a bonus has VCA's on the mix group outputs as well. There are eight VCA group faders, to which channels are assigned by the row of eight pushbuttons, with LED indicators, next to the channel fader. These are rather too intrusive into the fader area for my liking but they do, of course, have to go somewhere. (The LEDs are also rather sharp-edged but that won't matter to operators with road-toughened hands.) The two extra VCA's are grand masters for the mix groups. Next to each VCA group fader there are buttons to assign either of the two mix groups in the module to either of the grand master VCA's — or to both if you can think of a suitable use. Sensibly, as well as VCA assignment switches, every channel, VCA group and grand master fader, has an On switch so the assignment can be killed without disturbing carefully worked out routing.

There are eight mute groups on the *XL3*, which work on the channels and mix groups. Each Automute button, as they are called, has an adjacent LED to show which mute groups the channel or mix group is assigned to. On the channels, there is an internally selectable option to have the mute work either pre- or post-fader. On each of the mix groups there is a Mute Safe button, which in theory ought to prevent you muting something you didn't want to in a sudden attack of panic. Whether or not this is actually useful is debatable but it can't hurt to have it there. Each channel, mix group, master and matrix output also has its own large Mute button, which illuminates whether it is pressed itself or activated by the mute group system.

The local monitor works purely in conjunction with the solo system. Until a Solo button is pressed there is no signal on either the local output *XLRs* or the headphones. Both PFL and AFL are available on all channels, mix groups, matrix outputs and master outputs, as well as on the direct inputs to the matrix. The mix groups can also be monitored in stereo, where odd numbered mix groups are sent to the left monitor and even numbered mix groups to the right. On the main outputs solo-in-place is available, which is protected by a master switch with a flip-over cover. Solo-in-place is, of course, invaluable during soundchecks but potentially disastrous during the gig. If I had my way I would provide a more substantial cover for the solo-in-place master switch because I don't think the existing one is going to last very long.

## Channel module

At the top of the channel, it will come as no surprise to find the input gain control. There are options here and you might find yourself operating a console with a single mic input padded down by 30 dB for line, or a mic input and a separate line input without gain control, or where you have both mic and line with control over gain. Balancing may be electronic or transformer on both mic and line inputs. An interesting button in this section is the Earth Lift, which disconnects Pin 1 of the input *XLr* from the console earth and will come in very handy for solving the hum problems that follow SR systems around. (In case you are wondering, you can't disconnect phantom power by pressing the

Earth Lift button because the two are interlinked to prevent this.) Another equally handy switch lower down the module can bypass the insert point. This offers the advantage of being able to switch out an unruly compressor or gate at a moment's notice, and also the possibility of using the insert as an extra switchable line input. The inserts, unlike those on some other consoles, are electronically balanced, which cuts down the possibility of interference entering at this point.

You might expect Klark-Teknik to produce a good equaliser section on this console, indeed they would be in big trouble if they didn't! This EQ has all the knobs and buttons I like to have before me except two — bell/shelf switches on the HF and LF sections. But apart from that it has a sweep frequency control on the high end (2 kHz to 20 kHz) and on the low (20 Hz to 200 Hz). The mid bands have variable Q, here presented as bandwidth from 0.1 to 2 octaves, as well as frequency and gain controls. There are certainly no problems with this equaliser. From a physical point of view, I did find the EQ knobs too close together and had to grip the knob at its very top with my fingertips. If I gripped lower down, my fingers tended to get stuck between two knobs. As well as the EQ proper there is a separate highpass filter with variable cut-off frequency from 20 Hz to 400 Hz, which not only helps get rid of low frequency rubbish but also lets you use it in conjunction with the LF EQ to boost bass at just the right frequency without boosting very low frequencies that do little for the sound but send the loudspeaker cones on day trips rather than more useful excursions.

Moving on from the EQ we come to the aux sends, more properly called Mix Sends, which have been covered in some detail already as have the muting and soloing functions. One point, however, is that although the 0 dB point and +6 dB (full scale) points are indicated, there are no other gain calibrations apart from  $-\infty$ . I know it's a small knob but I would have preferred a little extra information in this important part of the signal chain.

Just beneath the PFL button is a small LED bargraph, which very usefully indicates the presence of a signal and its level within the module. A clever touch is that this meter monitors both the pre- and post-EQ signals and shows you the higher of the two. For instance, if you were cutting heavily on the EQ you would still be informed if your gain control were set at a level too high for comfort. Likewise, you will be shown whether your EQ boost is too much and the gain control needs to be turned down. There is an option to provide an off switch or dim for all LEDs on the console. This is of special interest to theatre users where too many flashing lights can be distracting to an audience.

## Mix group module

Each Mix Group module handles two channels and also deals with matrixing. At the top are two 20-segment LED peak reading bargraph meters calibrated from -36 dB to +21 dB. Below the meters are two direct inputs, one into each of the mix groups in the module. These are intended for linking two consoles together, or for adding an extra 16-channel line level source to the console. Use the direct inputs as you will, they are a very valuable feature to have, especially with muting and PFL functions.

Most of the rest of the module has been described already so we will look at the matrix. Klark-Teknik already have an interest in matrixing with

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the Midas XL88 8/8 matrix rackmount unit. Here, we have something rather more modest but still very usable, and will do the standard matrix jobs and also provide that handy matrix function of getting you out of fixes you didn't realise you were going to get into when you took the job on. Looking across the eight twin Mix Group modules we can see a 16/2 matrix. Each Mix Group has two pots to vary its contribution to Matrix Outputs 1 and 2, with Pre/Post and On switches close at hand. The matrix feeds into two matrix master faders above the stereo master faders in the last module of the console. Before these faders, however, are the matrix insert points, which are switchable and electronically balanced, as are the stereo master faders in the last module of the console. Before these faders, however, are the matrix insert points, which are switchable and electronically balanced, as are the stereo master faders in the last module of the console. Before these faders, however, are the matrix insert points, which are switchable and electronically balanced, as are the stereo master faders in the last module of the console. Before these faders, however, are the matrix insert points, which are switchable and electronically balanced, as are the stereo master faders in the last module of the console.

## Communication and master modules

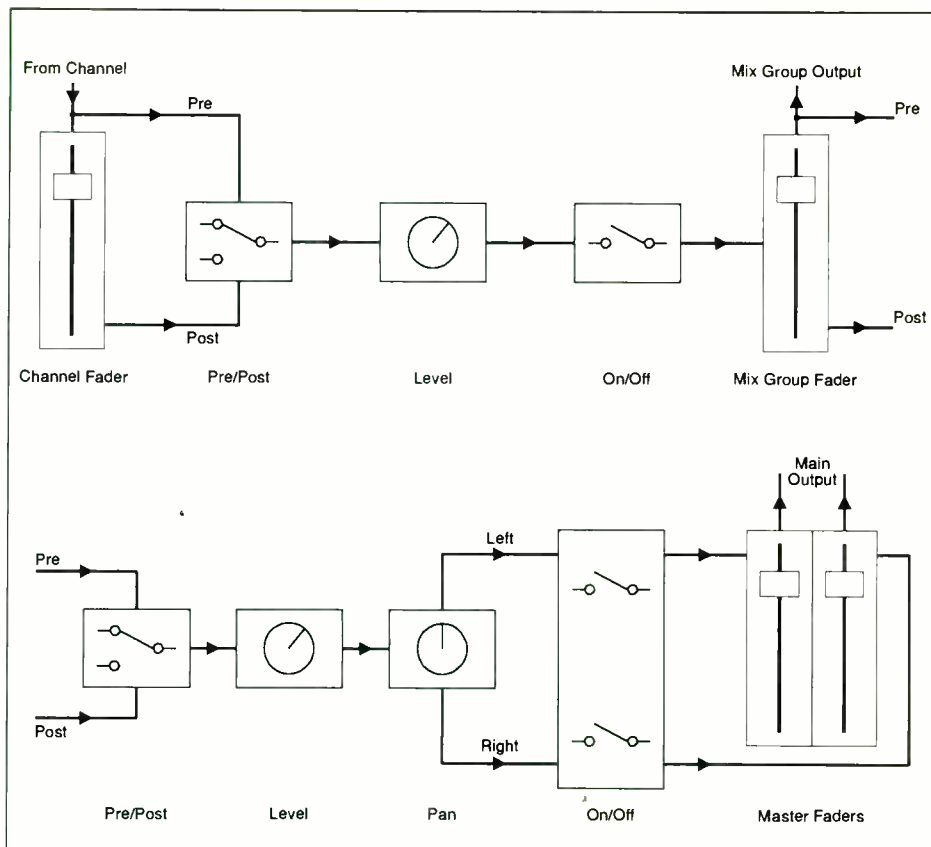
The communication module contains more than just that and Klark-Teknik say they have incorporated an intercom into the XL3 they claim will be compatible with all commercially available three-wire systems. This should certainly prove handy since you'll always know where your comms station is when you need it: not 'around here somewhere' but right in front of you in the console. Talkback can be assigned to any of the main outputs with separate level controls for mix group, matrix and master outputs. As an alternative to talkback there is a pink noise generator, which shares the same controls and functions. Having the noise generator in the console is a great convenience in comparison with having to plug in an outside source. The console doesn't have a sine wave generator, which doesn't matter so much for sound reinforcement but which could have been arranged so that it was useful for putting tones onto a multitrack tape being used for a recording of the concert.

The meter on this module is versatile, covering the PFL level on the left, and the local output level (summed into mono) on the right, in one mode. With the meter changeover switch pressed, it can also show the stereo solo level on both bargraphs. Also on this module are the eight mute master switches, local monitor and headphone level controls.

On the master module the master and matrix master faders are complete with a mute switch for each fader. The meter can read the stereo master level or the matrix level, according to the position of a switch legended C/O — 'changeover'. This means that you have to remember which position is which when it would have been better to have the switch labelled properly so that you could be sure of what you are metering. Also on this module are the matrix and master PFL buttons and insert point switches, also the solo-to-masters switch with its safety cover. One extra provision is a separate stereo output, derived from the masters, for a stereo tape recorder. This has its own level control and a non-latching button that allows the level to be metered.

## Construction

A live sound console obviously needs to be constructed to a more robust standard than a studio-bound desk, and the XL3 does appear to be



Signal path from channel fader through the mix group to the master faders

fairly solid. Starting with the modules, the pots are attached directly to the front panel and wired to the printed circuit board, which removes one potential source of stress. At the other extremity of the module, the board slots into a substantial connector on the mother board, rather than the current practice of using a ribbon cable bus hopping from module to module via IDCs (Insulation Displacement Connectors). The frame itself is constructed from plated steel box sections and appears to have the necessary degree of rigidity.

At the rear of the console we find Neutrik XLRs, which are unfortunately riveted rather than screwed into position. A nice touch is the provision of a bantam jack patchbay, for the large number of insert points on the console, which is half normalised. Also on the rear panel are XLR3 connectors providing power and fixing points for desk lights. Somewhere down towards floor level we might expect to find a power supply, and Klark-Teknik give the customer a unit that can automatically switch over to a spare PSU if a

failure occurs. I tried shutting off the active supply with audio coming out of the desk and found that I wasn't inconvenienced in the slightest — not a click to be heard. Above the console, a vu meter module can be mounted which attaches via two heavy-duty multipin connectors.

## Conclusion

With the construction and sound quality being at the standard expected of a console bearing the Midas brand, the key question is going to be whether the facilities offered are the correct ones. I think that for a given console size, Klark-Teknik's idea of using mix groups as an alternative to groups and auxes makes the desk much more versatile in front-of-house, monitor and theatre applications. The one drawback is the lack of a pan control between mix groups, but you can get round that quite easily as I explained above. My verdict is that the Midas XL3 has thrown some valuable new ideas into the audio arena. □

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Sony finally announced Mini Disc just as Matsushita (Panasonic/Technics) was finally announcing that it would back Philips' DCC. The grapevine had been buzzing with half stories on MD since last year; it had also been an open secret that Matsushita was a co-developer of DCC, but Matsushita backed out of a formal announcement scheduled for the Consumer Electronics Show in Las Vegas in January. Formal commitment had been put on hold because of political pressure in Japan to keep a brave face on the future of DAT. And without formal commitment from Matsushita, the largest manufacturer of consumer electronics in the world, smaller Japanese companies have been playing a waiting game.

Remember how it was the backing of Matsushita on CD 10 years ago that finally got the ball rolling. Until then the company had been pretending support for their subsidiary JVC's VHD and AHD capacitance disc systems.

The party lines are now emerging. DAT is accepted as dead for the domestic market, except as an 'audiophile' product. DAT is for pros and semi-pros, and top end hi-fi buffs.

Matsushita see DCC as the next consumer format. Sony, who were last year on the verge of committing to DCC along with Matsushita, are now testing the music industry water with demonstrations of Mini Disc. It is unlikely that WEA, BMG and EMI will ditch DCC in favour of MD, and it is too early to say whether they will risk undermining credibility of DCC by hedging bets with a fall back commitment to MD. As part of a public truce CBS/Sony have said they will support DCC with software when there is hardware in the market, and Philips/Polygram have said they will support MD when that format goes on sale.

So far the only press and open trade demonstrations of MD have been in the US and Japan, and they have relied on prototypes, which are well behind DCC in development. But DCC is a new technology that builds on the old cassette transport mechanism, with the new complexity hidden in the chips (for data compression coding) and in the thin film heads (for recording nine narrow data tracks in the space normally occupied by a stereo pair). This is what appeals to the record industry. DCC is not the kind of radically new concept that scares off executives and marketing people. It looks the same and fits the same sales racks but carries the magic label 'digital'.

Mini Disc is radically new technology, which will require new understanding, new thinking and new racks in the shops. It will not be ready until after DCC (late 1992 instead of the Spring launch promised by Philips) but it represents the bottom rung of a ladder to a new future. This is what has been secretly worrying Philips, who first learned of MD around April 1990 and have been pushing DCC through at breakneck speed to try to hold the industry initiative.

Although Philips see DCC only as a replacement for conventional analogue cassettes, MD is more than a rival to DCC. It is a long term threat to CD, too.

The Mini Disc unit will be small enough to fit in

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## Barry Fox

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# Mini Disc technology versus Digital Compact Cassette; sound reinforcement at the Royal Festival Hall

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a vest pocket and it does two things: it can make, playback and erase recordings of up to 74 minutes on a 64 mm magneto-optical disc; and it can play back factory-pressed music CDs of the same size. Sony claim that existing factory presses, designed for 120 mm CDs, can easily be modified, just as they were modified to press 80 mm CD 'singles' carrying 20 minutes of music.

When the unit is playing an MO disc, the optical pick-up detects changes in the polarisation of light reflected off the MO disc surface. For pressed discs, the same pick-up senses the amount of reflected light. For MO read-out, the two diodes work separately, to sense the difference in polarisation direction. For pressed-disc read-out they work together, sensing the total amount of light reflected.

In a conventional magneto-optical recorder, as used for storing computer data, a coated disc spins under a laser. Heat from the laser makes the coating temporarily lose all magnetism. As the coating cools it picks up magnetism again from a surrounding field. Switching the laser on and off thus creates a magnetic pattern of spots. The recording is read by a laser because the spots change the polarisation of its light. To make a new

recording the previous recording must first be erased by the beam of a constant power laser. Either two lasers must be used (which is expensive) or the same laser must be constantly switched between erase and record modes in separate passes (which increases the time taken to make a recording).

Sony's MD 'overwrites' previous recordings in one pass with one laser, by switching the magnetic field instead of switching the laser. While the laser beam's at constant power, the magnetic field switches polarity. This is done with a magnetic head on the opposite side of the disc to the laser.

The breakthrough that makes it possible to design a very small battery-powered portable is the use of a new magnetic coating mix, or terbium ferrite cobalt, which needs only around one-third the magnetic energy needed to switch conventional MO discs. Previous coatings have wasted power as heat.

Because the surface of the disc is easily damaged, MD must be housed in a protective caddy. This, and the impossibility of reading an MO recording with laser optics designed to read pressed discs, explains why Sony made MD quite a different size from any existing CD.

Like DCC, MD uses digital data compression to reduce the number of bits recorded to one fifth the number needed for conventional CD. This gives the tiny disc the same playing time as a full size CD.

Equally important, the MD player plays a very clever trick to make it a head-on competitor with DCC and score points over CD. The MD pick-up reads information from the disc at a rate of 1.4 Mbit/s, but the decoder needs only 0.3 Mbit/s for playback. Data coming off the disc is fed into a 1 Mbit memory chip, which stores around 3 seconds worth of information.

Under normal playback conditions, the pick-up temporarily stops reading every time the information dam is full and then starts again when there is room in the memory chip for more data. But if the pick-up suddenly stops reading, because the player is jogged, the data keeps streaming out of the dam for 3 seconds.

The recording contains positional information buried in the data stream. This continually tells the pick-up where it should be on the disc. If it is jogged out of position, the pick-up immediately recognises that it is getting the wrong positional information and immediately seeks out its correct position again.

As long as the pick-up returns to its correct place on the record within 3 seconds of a jog, the listener does not hear any break in the sound because the player keeps running on the reserve data coming out of the buffer store. Sony claim that for the first time a disc player will be as resistant to jolts as a tape player.

To woo the record companies, Sony have promised that MD, like DAT, which Sony now see only as a semi-professional product, and like DCC, will use the SCMS (Serial Copy Management System) to prevent digital cloning.

Sony will not introduce Mini Disc until the latter half of 1992, probably autumn. Demonstrations now being given are clearly intended to steal record company commitment away from Philips

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**DCC is not the kind of radically new concept that scares off executives and marketing people. It looks the same and fits the same sales racks but carries the magic label 'digital'.**

**Mini Disc is radically new technology, which will require new understanding, new thinking and new racks in the shops. But it represents the bottom of a ladder to a new future**

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DCC, even though Sony's official line is that they are still interested in joining Philips on DCC.

The way it looks is this. If Sony win support from the record companies, and other Japanese hardware companies, Sony will not commit to DCC. Instead they will go ahead with MD production and launch the format in direct competition with DCC. But if there is no backing for MD, Sony can still back DCC.

Sony say they have already received "positive responses from major international record companies" but do not name them. This suggests the record companies, too, are hedging their bets on both DCC and Mini Disc.

Philips' secret fear is that if the public get a taste of a tiny disc with as much playing time as a full sized CD, most people will accept the slight compromise in sound quality that comes from the compression on which MD relies. The difference is similar to that between 14 bit and 16 bit PCM. Popular acceptance of MD would effectively kill the long-term prospects of full size CD.

Although the compression system Sony uses for MD has a new and impressive name, Adaptive Transform Acoustic Coding, ATRAC, it is just another variant of the MASCAM, MUSICAM and ASPEC systems, which have been developed for digital audio broadcasting and modified by Philips for use with DCC, under the name PASC,

**It can be argued that solo guitar needs some lift in a hall the size of the RFH.**

**But for Pena's solo performance the RFH whacked up the level so that the speaker source dominated his guitar**

Precision Adaptive Sub-band Coding. ATRAC, like PASC, relies on masking effects.

Sony admit that they are experimenting with Trister for MD. This technique, for reducing laser spot size, would increase the disc bit capacity by a factor of six. This would extend playing with compressed sound, or make it possible to record a full 75 minutes of 16 bit PCM. Remember that the disc reads at 1.4 Mbit/s, and wastes 75% of the data on jog protection.

**I**n mid June, Nimbus sponsored the world premiere of Flamenco guitarist Paco Pena's *Misa Flamenca* at the Royal Festival Hall in London. The work, which mixes guitars, solo voices and choir, has one sure-fire hit, *Santo*. This

is a catchy mix of cross rhythms and the producers had already shot a promotional video in Spain.

How will Nimbus cope with a *Top of the Pops* chart hit, I wonder?

It was lucky for the RFH concert management that some of the more outspoken musical souls from Nimbus were not present at the concert. There could well have been some interesting scenes.

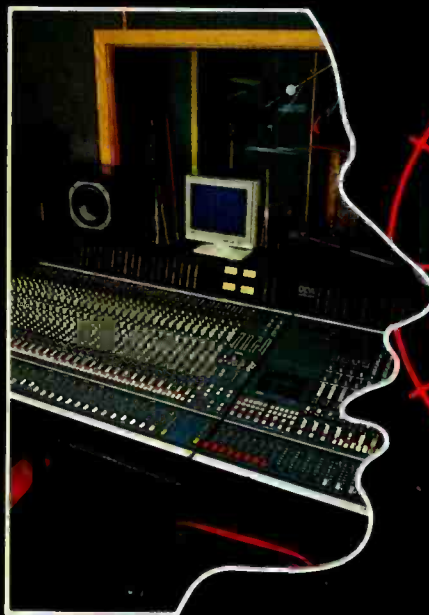
The Nimbus philosophy is that recordings should "capture and truthfully recreate sound exactly as experienced in a fine concert hall".

The RFH is a pretty fine hall and Paco Pena plays some pretty fine guitar. So what did the RFH management do? They stuck a Shure SM58 on Pena for his solos, and fed the sound through two Altec Lansing 1204s, one each side of the stage firing at Pena.

It can be argued that solo guitar needs some lift in a hall the size of the RFH. I have heard Quad electrostatics used in this way, and John Williams uses slight lift for his solo guitar. But for Pena's solo performance the RFH whacked up the level of amplification so high that the speaker source dominated his guitar. So what we heard was the sound of a pair of Altec Lansings.

The second half of the concert was better, perhaps someone got to the system in the interval, but I have heard this happen many times at the RFH. Will they never learn? □

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## INPUTS

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People are talking about how the demise of the long-playing record (LP) from European Community, American and Canadian record store shelves has not brought the expected windfall of greater space devoted to the stocking of compact discs in real catalogue diversity. Instead, the typical shopping mall or High Street record retailer has used the space left by the euthanasia of vinyl records for peddling movies/music videos and/or for selling a broad array of blank media and recording accessories. It is in fact, the rare shop indeed, that has used the opened up space for music stock.

This is especially fascinating since both the record manufacturers and the record store owners justified the relatively painless death of our old friend the LP by saying that increased inventory of compact discs would result. There was much shedding of crocodile tears about how the expense and logistics of pressing and maintaining a dual inventory of LPs and CDs was more than the recorded music marketplace would bear. Lo and behold, the shock caused by a recent survey of record stores: almost all (78%) had increased their stock of movies, music videos, blank media and recording accessories. The majority of the remaining 22% of the stores, had simply opened up the 'look' of the store with the added space.

To some extent, one can see a positive marketing position in carrying music-related video tapes like great music-video hits such as Michael Jackson's *Thriller* and current movies like Oliver Stone's hit about The Doors. But a complete stock of all Sandra Dee's *Gidget* movies, as was found in one store, does not enhance music sales. *Gidget Does Tirana* may indeed be a big mover in Albania, but research studies in multiplicity show that movies do not 'turn' as fast as recorded music — in a record store.

More difficult to deal with, however, is the provision of all the tools necessary to make illicit copies of the records sold in the store. Every record store on the planet seems to offer blank tapes of various quality and price, patch cords of every configuration, headphones, head cleaning paraphernalia, degaussing devices, etc. It is extraordinarily paradoxical that the self-same record industry and record retailers awash in agonised cries of severe injury from home copying practices — offer the public everything in supplies needed to copy. It would be as if your local bank had a robber's boutique located just inside the front entrance. The boutique would stock a nice range of Smith & Wesson and Beretta handguns, ammunition, masks, a line of cleverly printed hold-up notes and sturdy cloth bags to carry away the booty.

The bottom line is that the record industry promised to use the space from the obsolescence of the LP record to 'open up' the stock of recorded music carried. In fact, on average that has not happened and the space serves for a number of different uses — not all appropriate to the retailing of music to the broadest constituency. It is an extreme curiosity that the demise of the LP finds less music available in categories other than mainstream 'pop'. The average mall or High Street shop devotes on average less than 20% of the total

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## Martin Polon

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### Our US columnist reports a crisis of consumer confidence in the audio industry

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space to so-called 'other' music. There are megashops with many tens of thousands of CDs in all categories but they are the exception and not the rule.

Several recent surveys of shoppers over the age of 30 on both sides of the Atlantic revealed that they gave a very low preference rating to record stores. When asked to identify which stores were most attuned to their needs and wants, the shoppers gave very high marks to book stores and chemists/pharmacies, medium marks to video stores and athletic supply shops and low marks to record stores and fast food vendors. When asked to elucidate as to the reason for the indicated disdain for recorded music emporiums, the over-30s most frequently cited the lack of music in stock that was of interest to them. Since this demographic constitutes nearly two-thirds of the population and controls three-quarters of all discretionary spending, it seems wildly inappropriate to throw away the music of choice for this group along with the medium of their choice...the LP.

People are talking about another survey in America, which asked several thousand people to give the interviewers a 'wish list' of devices or appliances they wanted for the home. Interviewing only those who either rented or owned a house, apartment or condominium, the survey team found that the majority of those questioned did not place any audio or audio-related devices as their first five choices for the wish list. In fact, the audio device most desired was a compact disc player at number six. Many indicated that if they had the option of including devices used outside the home, a better auto sound system and an improved portable 'walk' type unit would be put on the list. The surveyors reported that most people felt content with the consumer audio devices they already owned. It was felt that relative saturation had taken place as far as home audio products were concerned.

Stereo television, which had scored well on previous surveys, did not register as strongly this year. With the apparent purchase saturation of those most interested in stereo television having taken place, many consumers mentioned confusion over the role and high cost of surround sound and home theatre. DAT systems were not requested with any predictable frequency, either. Consumers feel confused with all the magazine and newspaper reports about the anti-copying system and the royalty issues. They are also

disappointed that there is no musical software available.

The most fascinating information gleaned from the survey was the prominence of the electronic pocket diary. It would be safe to say that the pocket diary was the conventional consumer electronic item that the interviewed public exhibited the highest degree of interest in. Though not strictly a home use item, it was included in the survey due to the percentage of total usage (nearly 50%). Diary owners indicated they turned their diaries on in the home. Equally fascinating was the confirmation that today's consumers consider kitchen and household electronics to be in the consumer category. That explains the strong interest in state-of-the-art vacuum cleaners and in convection/browning ovens with or without built-in microwaves. Those surveyed indicated that almost everybody had a good stereo system but few had a vacuum or convection oven — items they felt could really improve their quality of life.

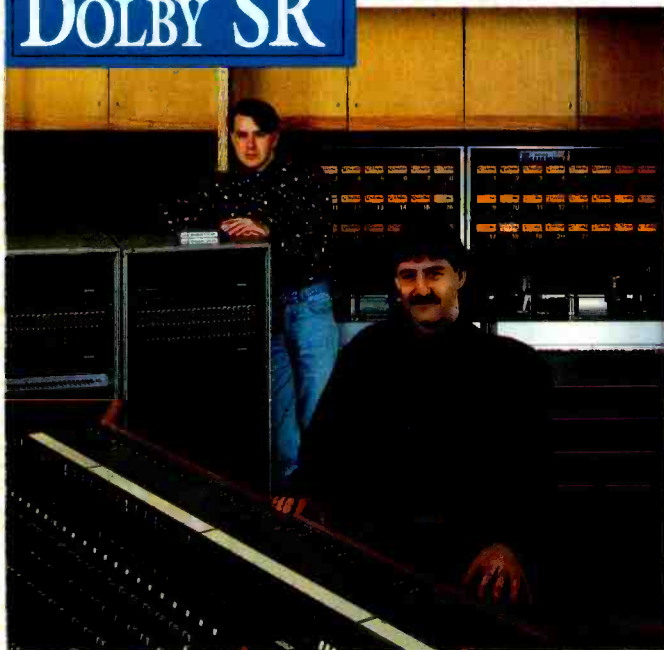
People are talking about the public confusion as to the presence of stereo sound in motion picture theatres. It seems that for some time, the penetration of Dolby stereo equipped theatres — some with high quality *HPS* or *THX* sound systems — has been on the considerable increase. Nevertheless, the theatre owners have been equipping only a percentage of their theatres or 'screens' with stereo in multiplex screen complexes and an even smaller percentage yet with high quality speaker arrays. Speaker systems of reasonably high quality of any kind — new high quality units, less expensive new units, revamped older systems, enhanced existing systems — are estimated to exist in less than 20% of all screens found in the western world. Some would argue that those figures are generous, at best. There are theatres, especially in the early multiplex complexes and the older large theatres recently divided up into smaller ones, that have less than optimum acoustical characteristics for motion picture reproduction in stereo. Occasionally, the purveyors of the high quality speaker systems have had to refuse to install at a particular screen site because of these acoustic deficiencies. Add the complexity of surround and rear loudspeakers and it is not always guaranteed that discernible surround stereo will be provided to the audience.

The technical differential is only a small part of the problem of ascertaining if a picture is actually being exhibited in stereo surround as promised. Despite the existence of some theatres with good sound capability, the film advertising process defeats the attempts of many viewers to ascertain if a film is in stereo and what theatre it is in. It is a common practice for the theatre group or chain to advertise the presence of a particular film in its group advertisement in the newspaper, covering all similarly owned theatres. These are small blocks within a larger space; each giving generally only the theatre name, telephone number, the address, the picture being played, its suitability rating, the presence of a matinee and listing of the show times. That is a lot of information in a relatively small space. The studio or organisation that is distributing the film to all of the theatres

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will take a larger display of space in the papers. This large ad will contain artwork from the picture, a list of cast and credits, the studio name, perhaps some snippets from favourable press reviews and usually the identification that the picture is being presented in Dolby Stereo and frequently these days in Dolby SR. Such an ad will also list the name and locale for the theatres playing that film.

Although there are many opportunities in the newspaper section devoted daily to film advertising, to indicate if a particular theatre is exhibiting a particular film in stereo — it frequently does not happen. For example, on a given Friday in Boston in April of 1991, 21 films had specific advertising displays in the *Boston Globe*. Friday is the beginning of new theatre ‘week’ in Boston and films that have just been released will usually open on that day. On April 12th, 1991, approximately three weeks after the Academy Awards, of the 21 ads placed in the film section of the *Globe*, only 13 indicated the presence of Dolby Stereo ‘In selected theatres!’ Two of the 13 were running films with the SR process. Many of the display ads were small and the Dolby logo even smaller. More than half of the ads required a magnifying glass to see clearly if it was the Dolby emblem and/or Dolby SR or a blotch of ink from the printing process.

Of the literally hundreds of screenings during that day, only 15 were advertised as being in stereo and only one mention was made of the kind of sound system in use. All but one of those 15 screens belong to one theatre group. The other two major groups and almost all of the independents simply do not identify the presence of stereo. Of the 15 films indicated as being in stereo, only three were local to metropolitan Boston and reachable via public transport. The ads were larger and the Dolby information more visible in the Sunday paper, but everything else remained the same. Since most motion picture attendance occurs on Friday and Saturday nights, the Sunday display advertising remains just a curiosity for most film viewers.

What is most curious about all this is the fact that almost all, if not indeed all, of the films being screened in the Boston area were produced with Dolby Stereo — a virtual standard at this point in the movie industry. Similarly, a large number of the screens listed non-committally are actually equipped for stereo exhibition — some very well equipped indeed. And this phenomenon is not limited to Boston alone. It is found in most major cities today. That the process of advertising the screening of films remains purposefully non-committal in terms of sound modes is not accidental. The profit relationship between the movie studios acting as distributors and the theatre owners acting as exhibitors is a very fragile affair. The process requires a maximum of flexibility to take advantage of the potential for certain films to do better than expected and certain films to perform below expectations. That means a modest film that ‘catches fire’ and ‘has good legs’ such as the 1990 Christmas smash *Home Alone*, will be moved from a small room in a complex to one of, if not the largest theatre in the facility. The problem is that another picture was in

the large space, quite possibly with a big budget and a big sound reputation. That picture will be kicked back to a smaller space, especially if it does not perform up to expectations.

The Dolby Stereo system and the enhanced speaker arrays are not put into the smaller rooms in an exhibition complex: they go into the rooms with the largest seating capacity. Therefore, a film frequently scheduled to be in one of the big rooms because of sound quality will end up in a smaller room. The big room is used frequently to accommodate a big money maker. Obviously, if the newspaper advertisements were to be very specific, the public could take umbrage. Unfortunately, the public instead attends a movie not sure if a picture is or is not in stereo. This state of confusion is not helpful to our industry as a whole since the confusion stays with the consumer and affects attitudes towards stereo TV, home theatre and other consumer stereo formats.

People are talking about how the various issues raised in this column, plus several others similar, constitute a veritable crisis of confidence in the audio industry. Granted this is on the consumer side, but the net effect is felt throughout the professional end as the total effect of audio hardware and software sales to the consumer is always passed up the 'pipeline'.

Consider the issues. The public has a memory like an elephant. The promise that the demise of its favourite software medium for nearly 40 years, the LP, would be marked by the increased availability of all music on CD has not been kept. Bombarded by continuous claims for advancement in sonic quality of audio at home, the public prefers to improve its quality of life with labour saving appliances. After many trips to the movies to hear so-called stereophonic sound, the public frequently finds itself confused and angry.

Add to these some of the industry's perennial problems: buying music on disc, the public can end up with a new and modified performance by the old artist; an old and modified performance by the old artist; variations of the above by new artists; re-issued and 'juggled' collections of works by artists, already owned by the consumer; new artwork with old re-issues; artists who don't or can't sing on their own disks, etc. We still find poor cassette duplication practices, the continued stocking of CDs produced from old or bootleg tapes in Canada or Italy, high retail prices for CDs, and other similar problems. The net result is a real decline in public attitudes towards the record industry. Not to mention current public perceptions, fuelled by a recent volley of news about Federal investigations, concerning the continued involvement of organised crime 'families' in the record business in the US.

Consider the position of those who sell consumer audio equipment. The surveys that regularly measure public respect for those who 'service' them, have seen stereo store sales people drop below the level of respect shown for used car salesmen — white suede shoes and all. The stereo store staff rank at the lowest end of the public's respect spectrum. They are at least somewhat motivated and relatively well paid. Consider the public's reaction to those who sell records.

Frequently paid at a minimum wage level, they are often not knowledgeable about music. It is not unusual for record store staff to be unable to leave the cash register. Helpful behaviour is not easily obtained under those circumstances.

Now, the record industry usually challenges the viability of the surveys cited by any critics of the industry. The fact is that the people who survey consumer responses are interested in making a profit and avoiding being labelled as charlatans. They are most usually trying to obtain information over a broad range of issues and stumble on 'dumb luck'. Stereo hardware retailers know they have a problem. Their industry trade publications are full of articles and columns about improving training, motivation and service to the customer. The constant complaint among consumer audio hardware and software retailers is that the discount stores are stealing away their profitability. In fact, consumers say again and again that if they are to be subjected to poor or non-existent service in record stores and the adverting hucksterism found in many 'hi-fi' stores, they would rather take the discount.

The final issue is raised regularly as these occasional columns slide into the province of consumer audio affairs. The first part of the conundrum is to ask why we should care at all. The answer is easy. Our industry is all connected and right now, the consumer crisis in industry confidence is creating a bottleneck. We have reached commodity status in consumer electronics, with audio equipment right up there in television sets. Record sales are pointed at a declining youth market — relatively ignoring the large, affluent and knowledgeable older consumer. Music industry revenues remain strong because prices remain high and the cost of re-issuing existing catalogue is low. But all this is felt in the recording studios. Fifteen years ago, 80% of the revenue at an average recording studio came from recording music for eventual issue to the public. Today the average is about 25%, up a bit from the 20% of 18 months ago but buoyed by efforts for small independent labels — many of whom cannot obtain effective distribution in the record stores.

The second part is to ask, "Why us?" and "What can we do in the professional audio industry?" The answer is that we can do a lot. Our influence is considerable. We work with, and increasingly are, the musicians who make the music. This is a wonderful business. We are all being paid to bring the pleasure of music into people's lives. Many of us wonder if we shouldn't have to pay someone rather than be paid ourselves for the extraordinary careers we have. There really is not so much wrong in the audio industry — it just all faces the consumer head on. An industry-wide campaign to focus on what is right in audio will reach the consumer and achieve a turnaround in perceptions. That will translate into sales and be felt at all levels of the industry. What we must do is to see that all the music desired by the consumer, reaches the consumer. We must also make sure that when we say stereo — it is stereo. When audio products are sold to the public, they must be the best that money can buy. We will all benefit from that. □

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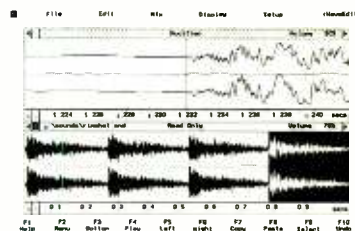
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# Fostex G24S

## A technical report by Sam Wise on Fostex's 1 inch multitrack

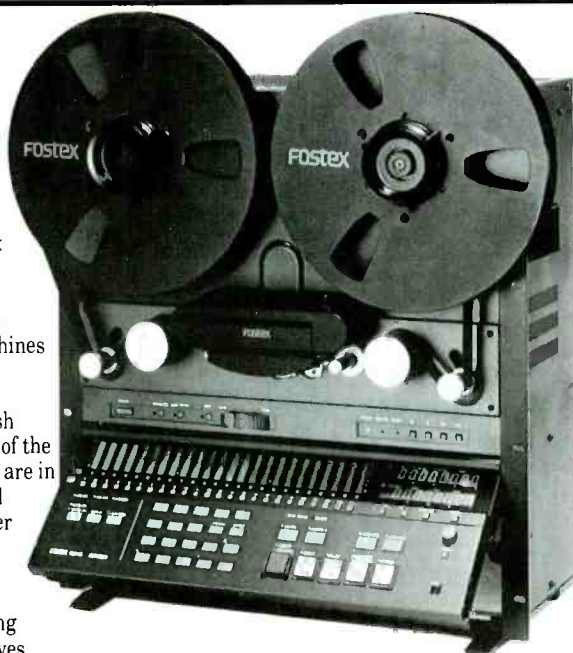
Within the last few months, the small studio has been presented with a wealth of products intended to provide them with virtually all the facilities of the big boys at an affordable price. Among these products are several new multitrack machines — with the Fostex G24S and Tascam MSR24 as market leaders. Here the performance of the individual G24S will be compared to its manufacturer's spec, other similar machines and their 2 inch format big brothers.

The Fostex G24S looks like a serious machine. Its muted grey and black finish reflects its 'professional' intentions. All of the usual 'quality' tape machine mechanics are in evidence: tension guide rollers with ball bearings; rubber covered, grooved flutter roller; nicely machined tape guides and large(ish) capstan/pinchroller.

But, where is the third head? In a machine of this price, perhaps something must be lost, and saving a head also saves one set of Dolby processors. We will see whether the performance compromise in this is serious later.

The machine comes with tough rackmounting ears, which can be removed. Carrying handles are built into the sides and, though heavy, it can be handled safely by one man for portable use. A set of stabilising feet are provided to prevent the machine falling forward when used in the vertical position. Deep rear-mounted rubber feet are designed to hold the machine and phono connectors clear of the surface when it is used in a horizontal position.

The main control panel on the lower front of the machine can be unlocked by pressing a front panel lever and can then be tilted to three different operating positions. It can also be removed and used as a remote control at the console — a nice



feature. All that is required for remote use is an optional extension cable. Even when the control panel is removed, basic transport controls are available on the machine front panel, though the buttons are rather small.

All machine electronic set-up controls are located at the bottom front of the machine beneath the control panel, which thankfully locks open, minimising crushed fingers.

## Construction

Heads are easy to access, requiring only loosening of two screws to remove the plastic head cover. Head wiring is connected by dual in-line headers and the two head mounting plates are each retained by two further screws. These are rather

flimsy in construction (you can waggle them about with the forefinger) and crude in adjustment. Fortunately, on this narrow track format, modest azimuth error will not cause as great an HF loss as on wider heads, however, track-to-track phase will suffer unless care is taken.

Removal of six Allen-type screws, plus the two tension arms and pinchroller allows the complete front cover to be removed, a process that can be completed in about three minutes. This provides access to the brakes, shared pinchwheel/brake solenoid mechanism and various bearings. Interestingly, the tape lifters are activated by a set of gears driven by a small motor rather than the traditional solenoid. An eccentric driven by this motor also locks the pinchwheel into position. One advantage of this system is that the solenoid can be depowered after operation, reducing heat generation within the housing and enabling the use of a relatively small power transformer.

The internal metal parts resemble those of a domestic machine rather than one of the larger professional ones, consisting mainly of bent steel and a few springs, very simple in construction and easy to service. The chassis front plate is of 6 mm thick aluminium, mounted on a rectangular formed steel chassis.

Transport control and optional synchroniser electronics are accessed through the rear panel, which is also easily opened by removing four screws and two feet. A further four screws allow the synchroniser to be extracted, revealing the drive motors and their protective fuses. The reel motors appear small for a 1 inch tape machine but showed no signs of difficulty when handling full tape spools. The capstan motor is rather larger and has its drive control electronics mounted on the back. The motor electronics PCB is a fairly complicated assembly, easing the job of synchroniser control, and contains jumpers which hint at tape speeds variable from 3/4 to 30 in/s. Perhaps a pair of these machines could form a programme logging system with a 48 hour (stereo) or 96 hour (mono) reload cycle.

Construction is the typical Japanese nest of wire interconnecting multiple PCBs, all having connectors for ease of maintenance. The main audio electronics are housed in modular form in a card frame accessible from the front of the machine beneath the control unit. The front accessible alignment controls are very small single-turn pots with no endstop. These were delicate to set up and, due to lack of endstop, it was difficult to see where they were set. Also, due to the single record/playback head, record alignment was difficult and time consuming. The record, rewind, play, guess adjustment and repeat cycle is not too bad on a consumer 2-track machine but with 24 tracks? — you get the idea.

## Operation

Turn-on is most entertaining. The LED level meter display goes through a self test by flashing each bar in turn and then displays in glorious red and green that the machine is a G24. Actually, the owner can program the machine to display a series of up to 32 characters at this point. The tape path

## Manufacturer's specification

**Tape:** 1 inch/25.4 mm  
**Track format:** 24-track  
**Reel diameter:** 10 inches  
**Tape speed:** 15 in/s or 38 cm/s,  $\pm 0.2\%$   
**Pitch control:**  $\pm 12\%$   
**Line input:** -10 dBV (0.3 V), impedance 30 k $\Omega$ , unbal  
**Line output:** -10 dBV (0.3 V), load impedance 10 k $\Omega$  or higher, unbal  
**Equaliser:** 35  $\mu$ s/IEC 38 cm/s  
**Recording level:** 320 nWb/m  
**Wow and flutter:** 0.05% peak wtd (IEC/ANSI)  
**Start-up time:** <0.5 s  
**Fast forward time:** <140 s (for 740 m reel)  
**Frequency response:** 40 Hz to 18 kHz,  $\pm 3$  dB  
**S/N ratio:** 88 dB CC1R ARM wtd, re: 3% THD at 1 kHz

**THD:** <1% at 1 kHz at 320 nWb/m  
**Erasure:** better than 70 dB (1 kHz)  
**Crosstalk:** better than 55 dB (1 kHz)  
**Power:** 120/220/240 VAC, 195 W  
**Dimensions:** (whd) 19 $\times$ 19 $\times$ 9 inches/482 $\times$ 488 $\times$ 230 mm  
**Weight:** 77 lb/35 kg

**Fostex Corp, 560-3 Miyazawacho, Akishima, Tokyo, Japan.**

**UK:** Fostex UK Ltd, Unit 1, Jackson Way, Great Western Industrial Park, Southall, Middx UB2 4SA.

**USA:** Fostex Corp of America, 15431 Blackburn Avenue, Norwalk, CA 90650.



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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.

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STUDIO

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is easy to lace.

If the tape is not taut, the machine refuses to enter PLAY mode, so tape snatch is prevented. The first time the tape is played, the machine carefully takes up tension, then engages PLAY. Following operations are virtually instantaneous. Tape motion sensing is used to good effect and reel motors are the principal braking elements, the actual brakes being applied only when the tape is nearly at rest. The machine also senses the rotation speed of standard NAB spools, slowing automatically as the tape ends. Likewise the machine takes up slowly at the start of wind at either tape end. Constant wind speed is maintained over most of a spool, with end-to-end wind time of a 2400 ft spool being 1 min 20 s, well within spec. Tape handling was good with moderate tape weave on fast wind.

## Built-in autolocator

A full set of LOCATE functions are provided with 10 locate memories, plus ZERO LOCATE. In addition, the machine remembers the tape position where the LOCATE function was last initiated. In AUTO RETURN mode this last position can be combined with a LOCATE position to allow automatic rock and roll recording or mixdown, where the machine will play (or record), forward this stop position, then automatically rewind to the LOCATE position and stop.

The LOCATE system provides two time/position displays. The upper one displays the present tape position, while the lower one is used for memory functions. Of course, the present tape position can easily be transferred into the memory display. A wide range of locate and memory operations are provided and are generally easy to use, however, there were times when the system proved a bit awkward and it was difficult to, for example, reset the zero position. Fostex have admitted that initially there is sometimes confusion but they say that practice makes perfect.

The top display is also used to give alpha-numeric messages to the user. Since it is a seven-segment display, it cannot accurately represent the whole alphabet, so a mixture of upper and lower case with some peculiar coded representations of letters are used. This also is intelligible with practice.

## Meter display modes

In addition to acting as standard dynamic level meters, the meters have several other operating modes. Peak hold can be left in PERMANENT mode where the largest peak is permanently displayed

using one bar on each meter. TEMPORARY mode is the same, except peaks are only retained for about 1 sec. CALIBRATION mode decreases the display range while keeping 0 vu constant to allow the internal meters to be used for accurate machine set-up.

## Variable speed

The tape speed or pitch can be varied over a  $\pm 12\%$  range. Speed is set by a rotary control, and activated using the PITCH CONTROL button. The actual speed variation can be displayed on the memory display.

## Footswitch

For the home studio musician, foot controls of two key functions are provided. PUNCH IN/OUT can be selected by one footswitch, while a second allows PLAY or LOCATE to be activated. These are very useful for the keyboard or guitar player with both hands full.

## Track selection

RECORD-READY track selection can be made in two ways: 24 track selection buttons allow individual selection, but groups of adjacent tracks can also be selected together using the numeric keypad together with the SAFE/RDY and -/PREROLL buttons. It is easy to run a finger across individual RECORD-READY buttons to select a group of tracks, so most people will probably use these. A master CLR button places all tracks into SAFE condition.

## Winding speed

Two speeds are provided in WIND mode. Standard wind is achieved by just pressing and releasing the appropriate button. Keeping a WIND button depressed reduces wind speed sufficiently to allow cueing and pressing the PLAY button at the same time will drop the tape lifters to allow tape listening. Maximum winding speed can be adjusted electronically using the machine's second function facilities enabling a very even wind to be achieved. The tape may also be cued by pressing the EDIT key and using the adjacent variable speed control to wind the tape forward or backward. An extended depression of the STOP button releases the back tension, allowing easy two-handed tape rocking or manual winding off.

## Zone limit

The machine uses its knowledge of tape base

thickness, hub size of the selected standard hub and the reel rotation speed to work out how much tape is left on the supply and take-up reels. This permits the machine to warn the user that tape is running out and to slow the tape automatically at the end of the spool. The amount of tape to be left on the spool can be preset by the user.

## Noise reduction

The 'S' of G24S refers to the Dolby S noise reduction system, which effectively combines the sliding bands of the original Dolby C system with some properties of Dolby SR. The overall result is said to provide noise reduction below 200 Hz of 10 dB, and up to 24 dB in the region above 400 Hz. In addition, the system is supposed to be more tolerant of record to replay gain errors than previous systems.

Noise reduction can be selected to be active on all tracks, active on all but track 24 for timecode operation, and off. The switch is on the rear panel, so is intended to prevent accidental alteration.

## Monitoring

Having a shared record/playback head reduces the monitoring options — off-tape monitoring while recording is impossible, however, many people have lived with this situation since it reduces the purchase cost of Dolby systems.

Activating INPUT MON places all tracks into INPUT MONITOR mode, regardless of their SAFE/RDY condition. Two different input monitor modes can be selected for general use. One allows input monitor to be retained in PLAY in the run-up to a drop-in, the other mode more conventionally allows the input to switch between tape on playback and input on record.

## Synchroniser

The test machine arrived fitted with the Fostex 8330 synchroniser. This is a self-contained, metal enclosed unit which mounts in the left rear of the G24S. It provides slave synchronisation to SMPTE timecode, MIDI Timecode (MTC) or MIDI Direct Timecode (DTC). Both relative and absolute offsets are provided. The upper or tape position display is used to display synchroniser information. In addition to proper timecode data, the 8330 can operate on video sync pulses or internal tape counter information.

Unfortunately, due to lack of time it was not possible to fully test this system but the function of some front panel buttons alters with its installation and this creates some of the operational confusion when using the locator.

## Inputs and outputs

All inputs and outputs are unbalanced phono (Cinch) connectors, operating at a semi-pro -10 dBV reference level. Machine tracks 13 to 24 are internally normalised from inputs 1 to 12, allowing easy connection to 16-track mixing

## Test Results

consoles. Plugging into inputs 13 to 24 overrides these connections. Input impedance is high, measuring more than the specified 30 k $\Omega$ . Output

impedance is not specified but is sufficiently low to drive the specified 10 k $\Omega$  load without error.

Using a 320 nWb/m 15 in/s IEC (35  $\mu$ s) test tape gives an output of -10 dBV at 1 kHz. Applying a signal to the input and monitoring it directly gives an electronics only overload point of about +13 dBV, a more than sufficient electronics



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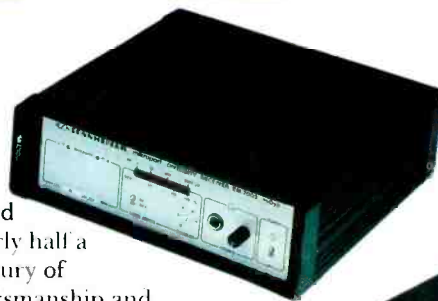


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headroom of 23 dB above reference level as shown in Fig 1. Machine set-up controls make it difficult to independently measure input and output overload points. As expected, Dolby selection has no effect on overload levels, since the circuitry is bypassed in input monitor mode.

## Frequency response

As received from Fostex, the machine tended to show a rising HF replay characteristic, the rise varying between 0.5 and 2.5 dB depending on

which track was measured. A new Weber IEC test tape was used for replay measurements. Following replay alignment the frequency response from 500 Hz to 16 kHz could be maintained within  $\pm 0.5$  dB. Fig 2 compares before and after alignment results. The HF difference may be due to a worn test tape in the Fostex service department or errors in the new tape used for the review but the former is most likely. Note the falling bass response, which is typical of all channels. However, typical low frequency 'bass wobbles' seem to be missing. HF replay equaliser adjustment range will allow satisfactory

adjustment for almost any incoming tape, however, record HF EQ adjustment seems limited.

Record to playback response is very flat, as shown in Fig 3, being within  $\pm 0.5$  dB from 50 Hz to 20 kHz at all levels up to 0 dBV. At high recording levels, without noise reduction the expected tape saturation fall-off at high frequencies is evident, however, with Dolby S active the HF remains flat even 10 dB above 320 nWb/m at an input level of 0 dBV.

## Noise and distortion

Wideband noise performance is given in Table 1, while Fig 4 shows the  $\frac{1}{3}$ -octave noise spectrum for these same measurement conditions.

This shows that the machine's basic electronic noise performance is good, being limited entirely by the tape and recording chain. It can also be seen that the Dolby S system is giving a wideband unweighted improvement of about 8 dB, probably

Condition	22 Hz to 22 kHz RMS (dBV)	A-wtd RMS (dBV)	CCIR 468-3 (dBV)	CCIR ARM 2 kHz (dBV)
Input monitor	-101.9	-105.7	-92.7	-103.7
Bulk erased tape—NR off	-63.6	-72.4	-61.0	-72.1
Bulk erased tape—NR on	-70.0	-88.8	-81.7	-93.2
Bias recorded tape—NR off	-61.7	-68.0	-55.4	-66.2
Bias recorded tape—NR on	-70.0	-80.7	-76.7	-88.0

TABLE 1 Wideband noise performance

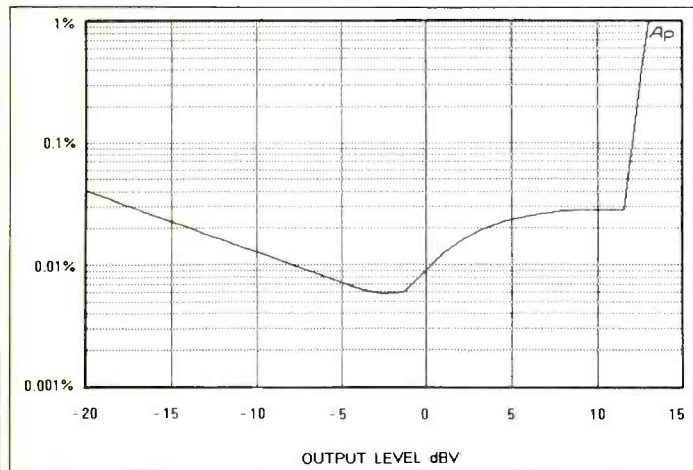


FIG 1: Input monitor THD+N vs output level (-10 dBV) Channel 1 with noise reduction. Without noise reduction and other levels similar. 80 kHz measurement bandwidth

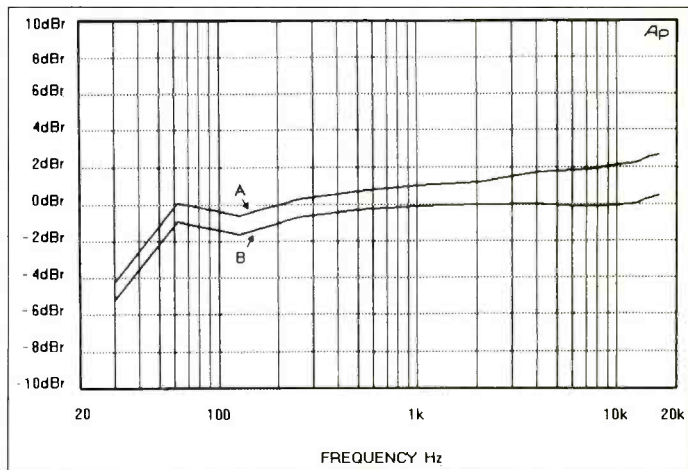


FIG 2: Replay only, frequency response, Channel 1. A = as received from Fostex. B = following alignment with new Weber IEC 15 in/s test tape. Level referred to -10 dBV output, 320 nWb/m test tape

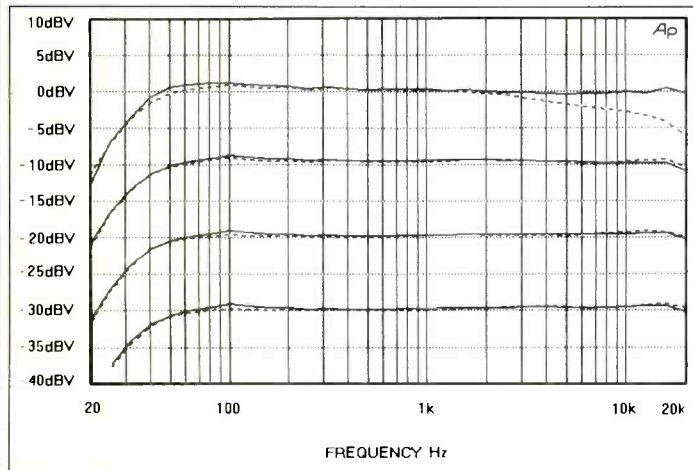


FIG 3: Record to replay frequency response, Channel 1. Input level at -30 dBV, -20 dBV, -10 dBV and 0 dBV. --- = no NR; — = with Dolby S

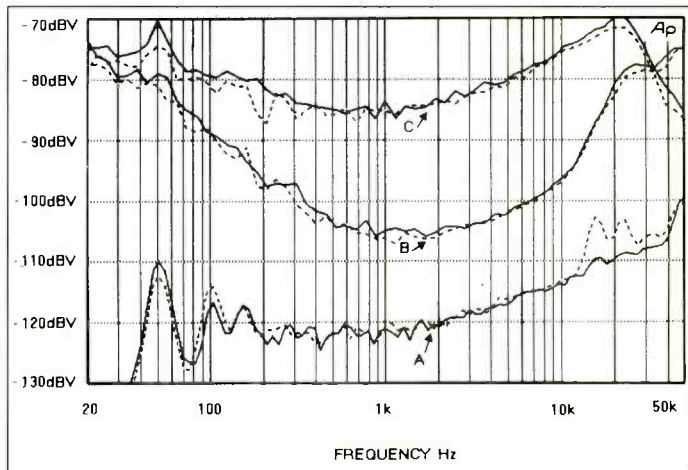


FIG 4: Record to replay noise. Channels 1 and 8 measured — both very similar. A = bulk erased tape with or without Dolby. B = recording with no input signal, with Dolby S. C = recording with no input signal, no Dolby S

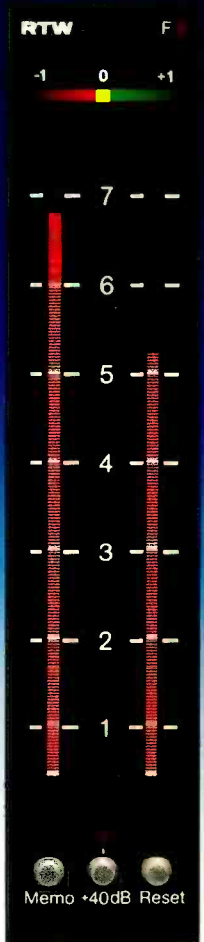
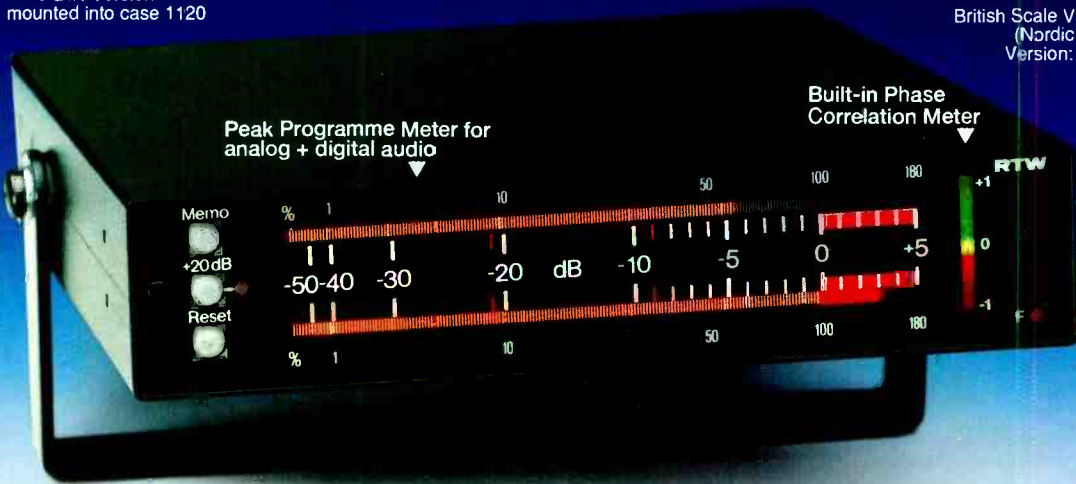
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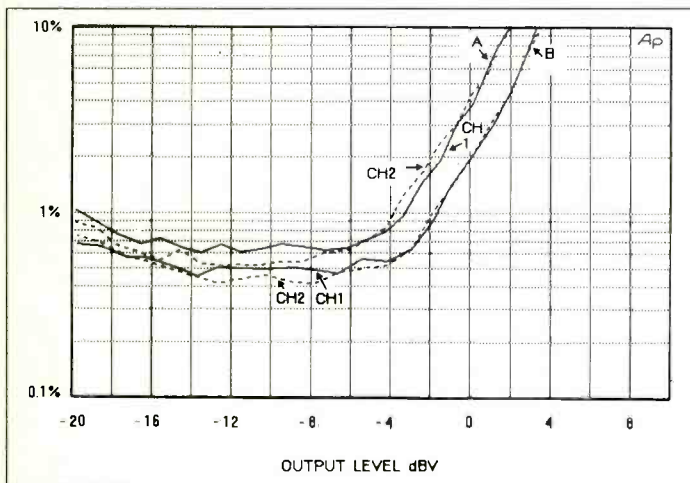
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limited by the intrinsic noise performance of the replay circuitry, but for weighted signals the improvement rises to 20 dB, and this is more like the improvement we would hear. Machine bias

and erase noise degrades the intrinsic tape noise by 2 to 6 dB (depending on noise measurement method). The cause of this was not examined but it probably could be improved.



**FIG 5: Record to replay THD+N vs output level (-10 dBV)**  
 Frequency is 1 kHz  
 -10 dBV corresponds to a tape level of 320 nWb/m  
 80 kHz measurement bandwidth  
 A = no noise reduction  
 B = Dolby S active

Fig 5 shows the record to replay THD versus level distortion characteristics with and without Dolby S. Without Dolby, the 3% distortion level is at 0 dBV and with Dolby, at +2 dBV. This gives a dynamic range of about 62 dB unweighted/66 dB CCIR ARM without Dolby and 72 dB/90 dB respectively with Dolby. The manufacturer specifies the latter as 88 dB and is therefore in specification. This is certainly a respectable performance.

For comparison, consider the recently tested Saturn 2 inch 24-track, which

managed a dynamic range of 75 dB unweighted at 30 in/s with no noise reduction, but with four times the tape cost and several times the purchase price. The Saturn could be expected to turn in a dynamic range performance 6 to 10 dB better than the Fostex at 15in/s using the Dolby S system, or approximately 12 dB better at 100 dB using Dolby SR. But that said, the G24S certainly offers good noise performance in its price range.

The Dolby S system also improves low frequency distortion performance at high levels.

Note Fig 6, which shows THD+N versus frequency at a level of 0 dBV, our nominal 3% distortion level. At 100 Hz without noise reduction THD+N is about 3% but with Dolby active it dives to 0.3%, a 20 dB improvement. Users have commented on the 'tight bass sound' they heard when Dolby was active on this machine.

Distortion of the electronics-only chain is generally below 0.02%.

## Crosstalk

Crosstalk was tested from one track to an adjacent track, and also on one track surrounded by two adjacent tracks, ie a worst possible case. Fig 7 reveals that the increase on the surrounded track is almost exactly the theoretical 6 dB compared to

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crosstalk on one adjacent track. Single track-to-track crosstalk in mid-band is about -58 dB, worsening below 300 Hz as expected due to tape fringing effects. This compares well with the specified -55 dB at 1 kHz and to about -66 dB achieved on the 2 inch Saturn machine at 30 in/s. The use of noise reduction will also benefit track-to-track crosstalk performance.

## Other matters

To measure erasure, a sweep was recorded at -10 dBV, then erased. The resulting 1/3-octave noise spectrum is shown in Fig 8. Erasure depth varies from about 62 dB at the band ends to 71 dB at 1 kHz. This is slightly better than the specified 70 dB at 1 kHz.

Wow and flutter performance is shown in Table 2 and is better than the manufacturer's specification. The Saturn 2 inch machine for comparison had wow and flutter figures of about half this.

The varispeed (pitch) operation was found to give a range of +23.9% to -13.1% compared to the specified ±12%. Speed accuracy was not tested due to lack of an absolute speed test tape.

Fig 9 shows the drop-in transition from a 500 Hz original tone to a 1 kHz replacement tone. The complete drop-in transition takes about 80 ms and results in a minimum level about 10 dB below recorded level. The drop-in sounds very smooth, with no disturbing noise changes or clicks.

adjustment presets.

Aside from ease of adjustment, the only penalty of the two-head design seems to be the loss of off-tape monitoring while recording and a bit of excess noise compared to the theoretical optimum. Record to replay frequency response is excellent and uncompromised.

Would I buy a G24S to replace my aging Tascam 8-track? It would certainly get consideration, while a full sized machine is out of the question. Though a 1 inch 24-track cannot be expected to perform as well as a 2 inch machine, for many the purchase and operating cost savings will make a machine like the G24S the way to go. □

## Conclusions

The Fostex G24S is a machine with many carefully designed features. Tape handling is good, and the design of the front panel as a removable remote control is very useful. The locator system is versatile and works well, though a little practice is needed to interpret the display at times. The only real complaint concerns difficulty of alignment, partly a result of the cost saving two-head design, and partly due to the quality and choice of

Standard	Position on tape		
	Front	Middle	End
NAB wtd	0.040%	0.025%	0.040%
NAB unwtd	0.073%	0.051%	0.073%
IEC wtd	0.035%	0.045%	0.044%
IEC unwtd	0.075%	0.121%	0.132%
Scrape — highband	0.108%	0.114%	0.130%

TABLE 2 Wow and flutter performance

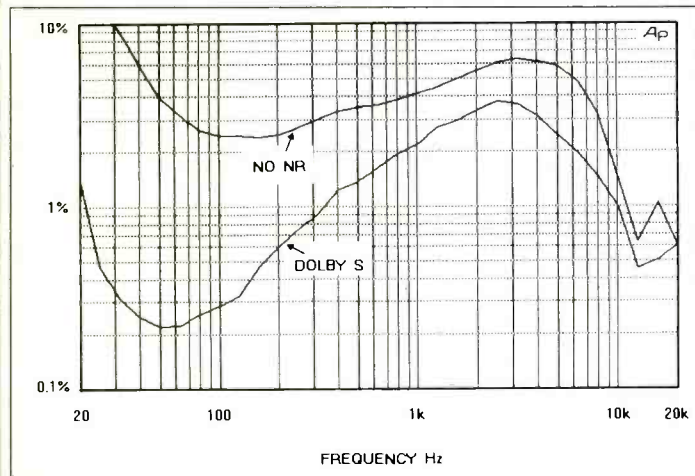


FIG 6: Record to replay THD+N vs frequency, Channel 1 Input level 0 dBV (10 dB above 320 nWb/m) 80 kHz measurement bandwidth

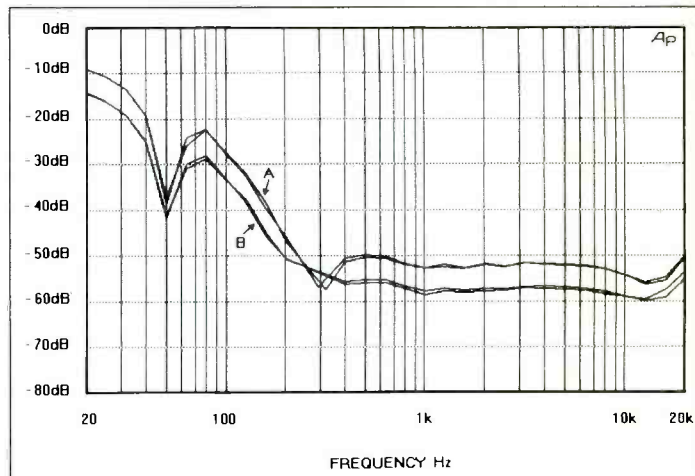


FIG 7: Record to replay crosstalk A = Channels 6 and 8 recorded, replay from Channel 7 B = Channel 8 recorded, Channels 7 and 9 measured — both very similar Input level -10 dBV (320 nWb/m) without noise reduction

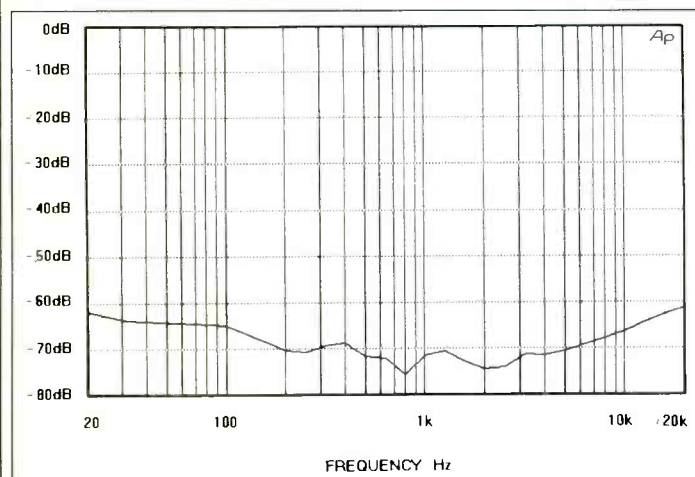


FIG 8: Erasure residue, Channel 8 Channel 8 recorded with -10 dBV (320 nWb/m) and then erased residual level measured. Without noise reduction

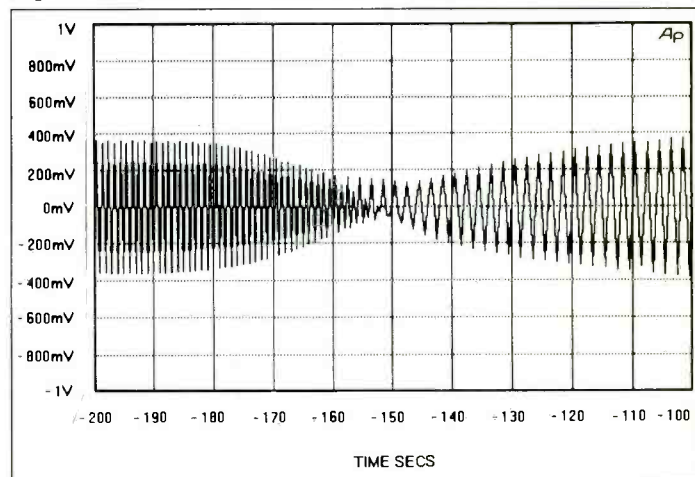


FIG 9: Time response image of drop-in from original 1 kHz signal to 500 Hz replacement signal Both at -10 dBV input levels

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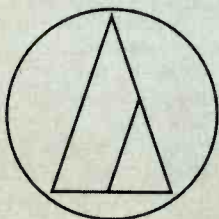
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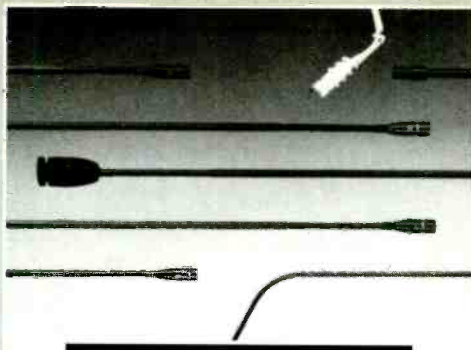


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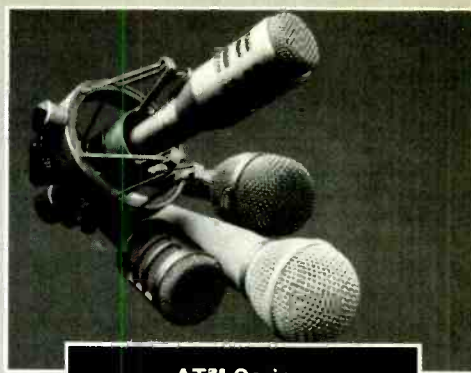
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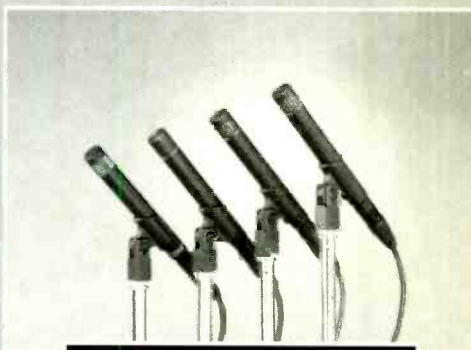
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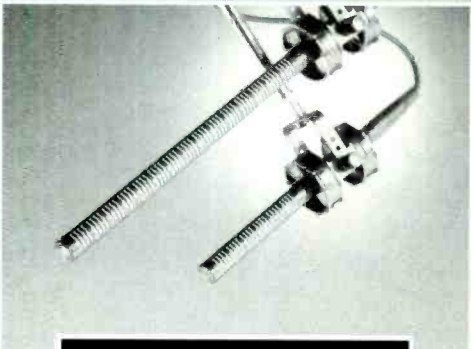
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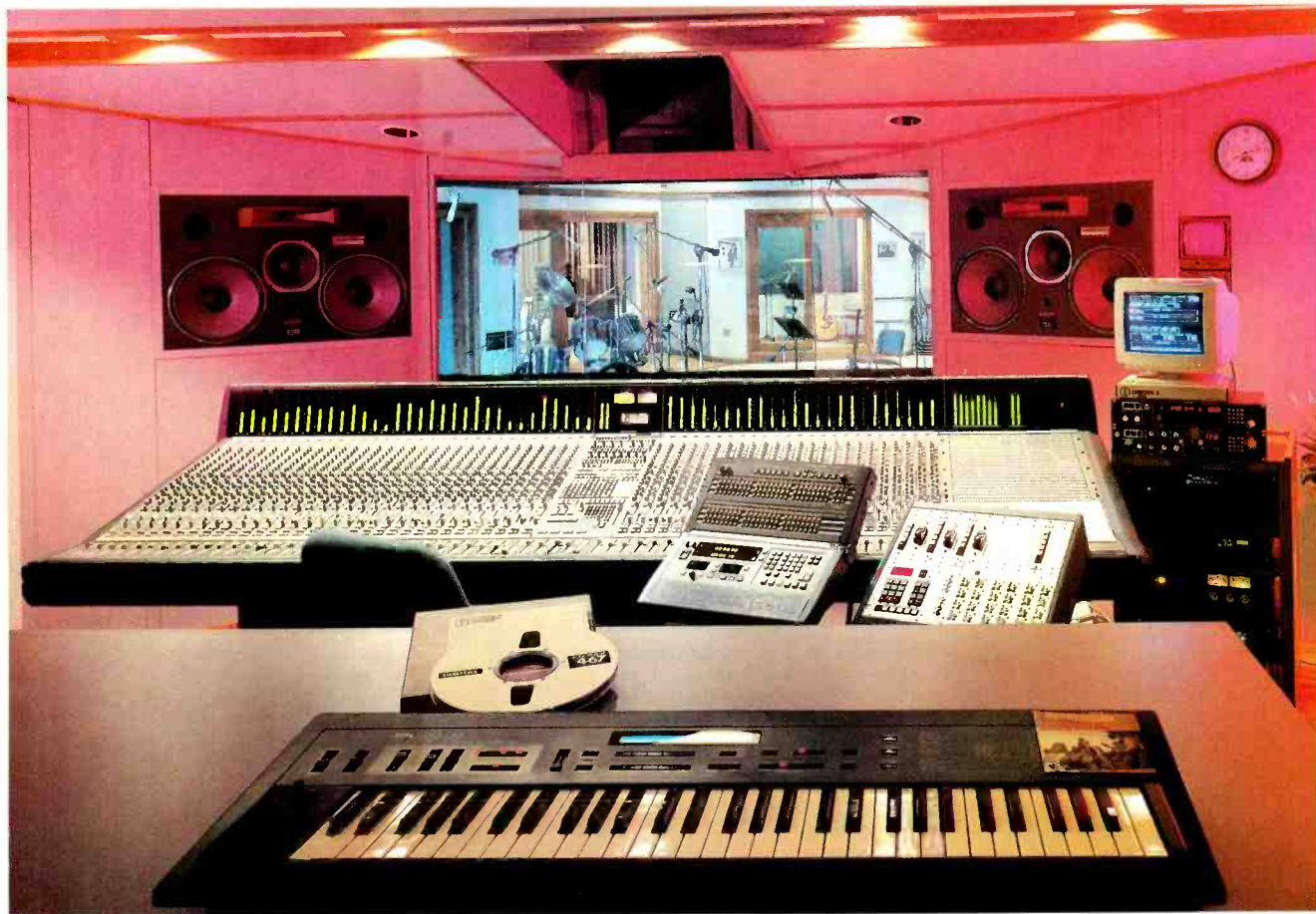
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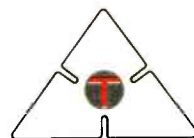


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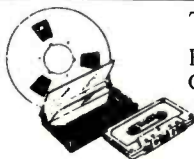
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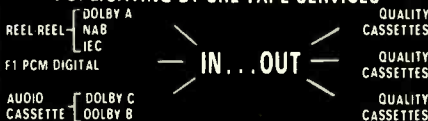
1x Sony 3348 Digital Multitrack, low hours, superb condition	£P0A
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AND BROADCAST ENGINEERING

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### SPREADSHEET SYSTEM

SR6000's revolutionary auxiliary system allows the 8 send busses to be split between left and right sides of the console, giving the engineer 16 auxiliary paths for large, effects-heavy mixes.

### COMPACT SIZE

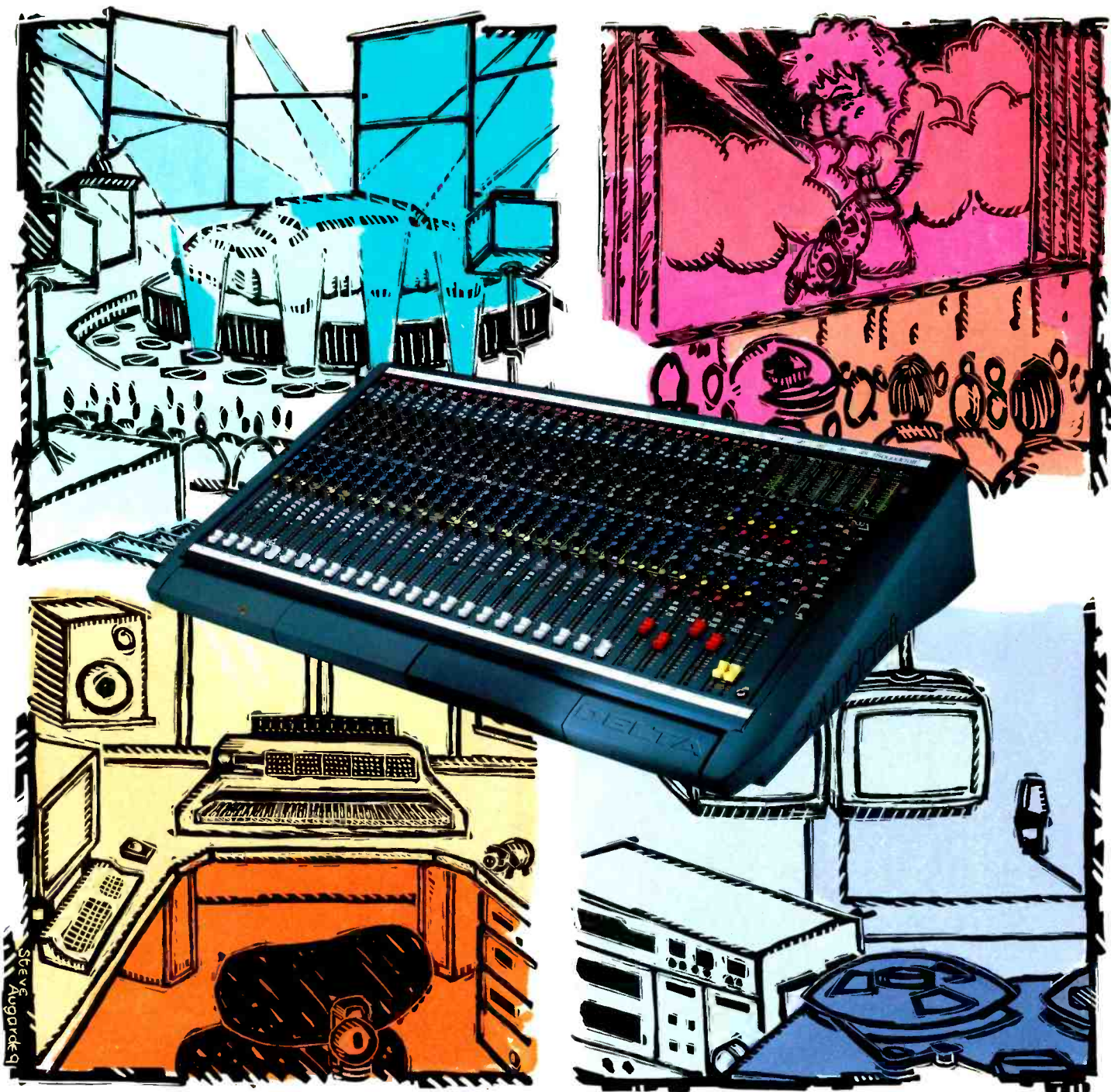
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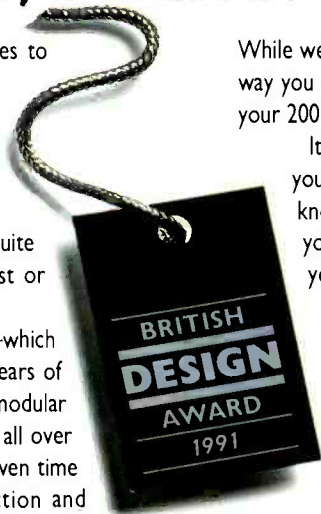
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