

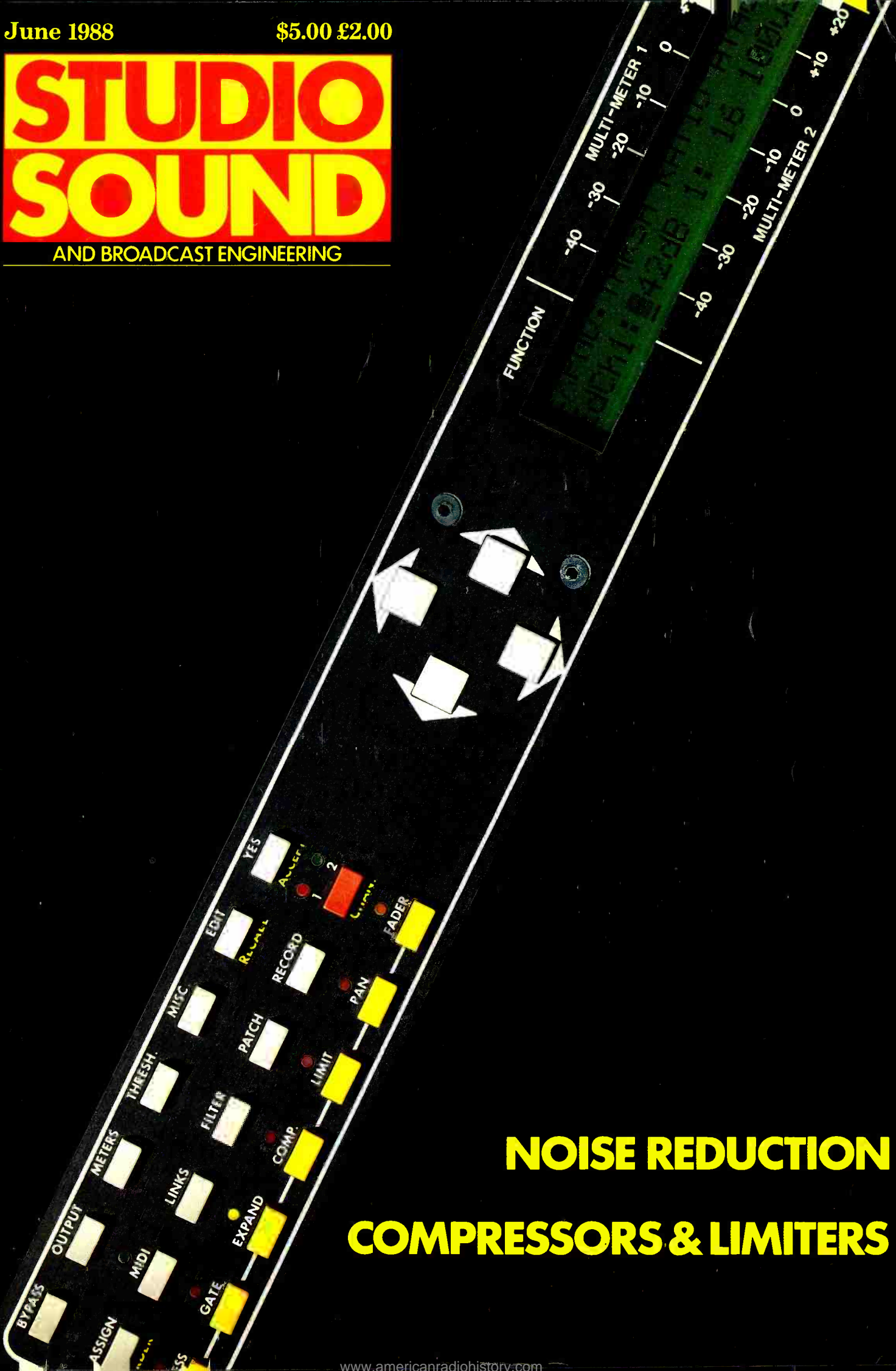
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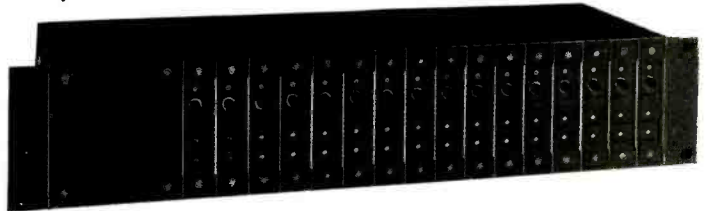
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# STUDIO SOUND

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# STUDIO SOUND

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# EDITORIAL

I very clearly remember looking forward to the arrival of digital audio and it was not for any possible improvement in sound quality but for far more practical reasons. I hoped (and I was not alone) that its arrival could remove the need for many of the restrictions on dynamic range that analogue recording imposed. As analogue recording quality improved during the '70s, the usable 'noise-free window' for acceptably quiet analogue recordings became smaller and the desire for higher and higher level tapes pushed us into areas of tape recording compromise with printhrough becoming a first casualty. As one who was battling this situation while spending most of the latter half of the '70s recording music with high dynamics, I know very well what I wanted from digital audio. We were forced to use types of noise reduction systems that meant we were often faced with compatibility problems when recording only parts of external projects but the most widely accepted noise reduction system just did not offer enough noise reduction capability.

Further, I felt that often it is the early attempts at a take that capture the required performance and a recording media that assists by allowing a lower recording level still to be usable in noise terms would be very welcome. Any recording system that reduces artistic compromise has to be welcome. I had also hoped that the arrival of digital audio would reduce the need for compression and limiting except for effect in the recording process. In other words I looked forward to the dynamics of real life.

Of course I was to be disappointed—but perhaps not for the same reasons. The arrival of the compact disc a few years ago showed that in many cases a wide dynamic range was not always desirable for listening in practical situations (but surprisingly there is still only one CD player that addresses this problem). Also, we realised that unless digital tape was properly loaded with level, we were missing out on most of the advantages of the medium but worse—if we put too much level on tape, rather than our comforting analogue overload distortion we were into something far more serious.

And I am afraid it has not ended there. All-round improvements in the sound chain from high output condenser mics with far higher max SPL levels and transient response has stressed other areas in the sound chain. Higher headroom throughout the complete pre-recording signal chain has meant that we are largely back where we started.

So the need for dynamic control has not ebbed but the variety of possible control units has increased dramatically. However, for those of us who are not over fond of dynamic control, there does appear to be an answer coming—digital dynamic control. Having had the opportunity to play briefly with about three different digital audio dynamics processing devices, I can only say that I am very impressed. All the unpleasant aspects of analogue limiting and compression are far less obvious, distortion does not increase with the more extreme settings. As a result of the exhibition demonstration of an 8-band digital compressor I am looking to such devices for some quite dramatic uses—many far from the obvious. Part of the demonstration included the processing of an old recording using the system and the resulting sound was impressive and would seem to present fresh opportunities in CD mastering of older recordings—certainly to levels that appear to be obtainable with most of the digital noise-removing systems currently available.

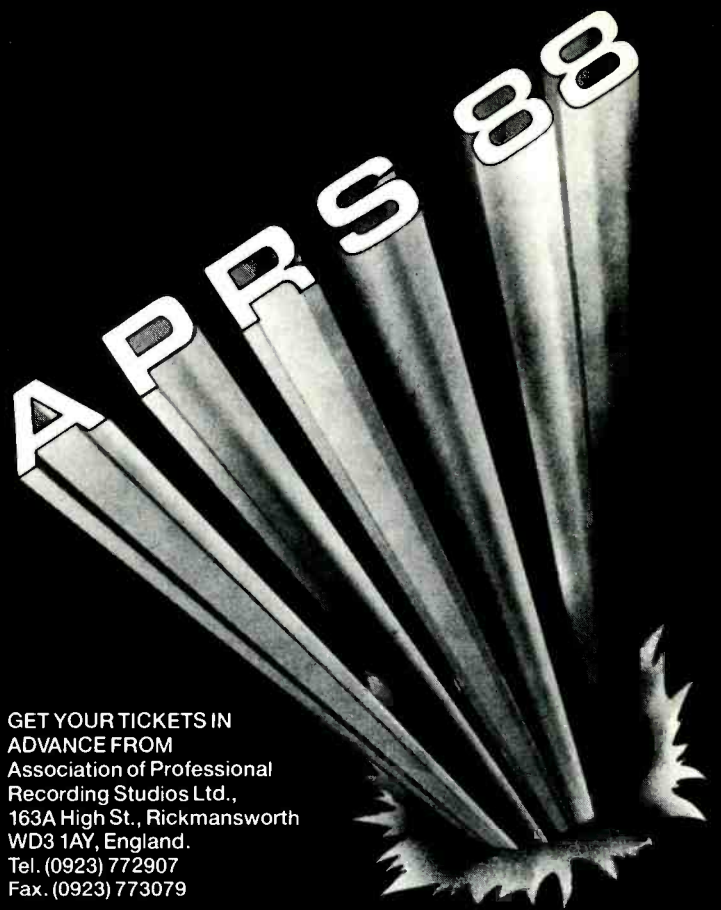
On the noise reduction front, digital audio has stimulated more interest in analogue noise reduction techniques. Dolby SR and ANT *telcom* are both becoming viewed as serious alternatives on multitracks to a full digital machine. Dolby were quoting figures of 300 SR-equipped 24-tracks in use worldwide during the Paris AES in March. During the Digital Information Exchange in November last year, Cary Fisher of Sony was quoting a figure of 500 digital multitracks worldwide inclusive of all types. You will have to draw your own conclusions from these figures but this could be the pattern to be set for the rest of the century when both analogue and digital audio live symbiotically entwined.

Keith Spencer-Allen

Cover: Drawmer M500 dynamics processor photographed by Tony Petch

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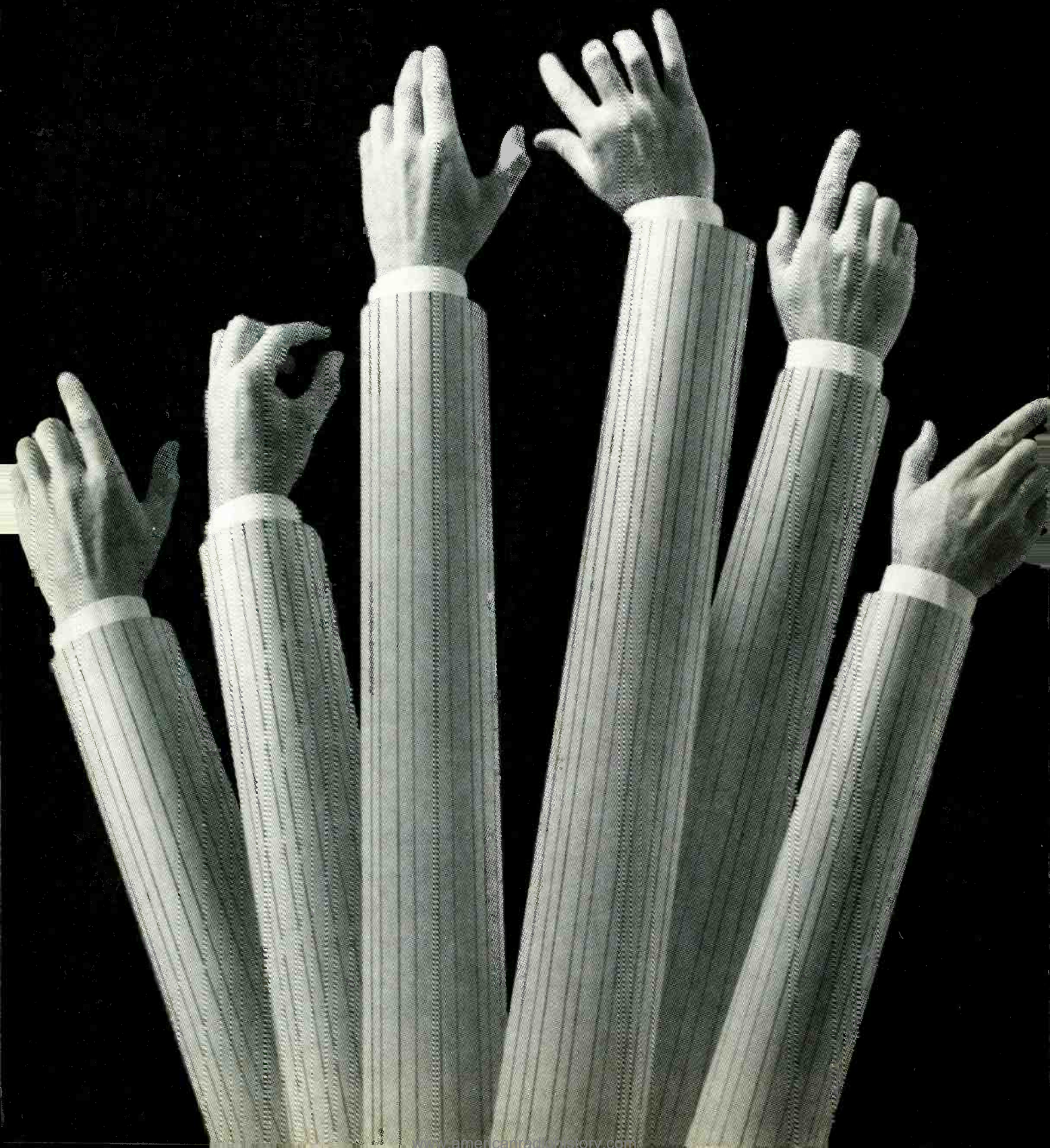
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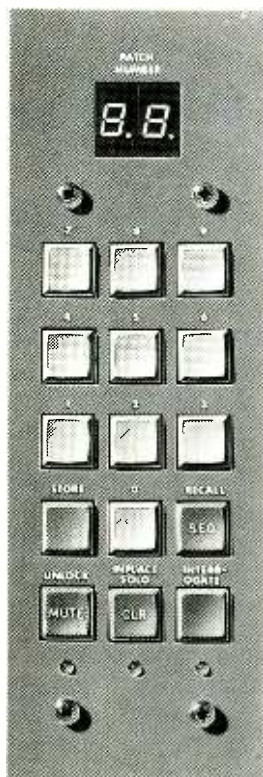


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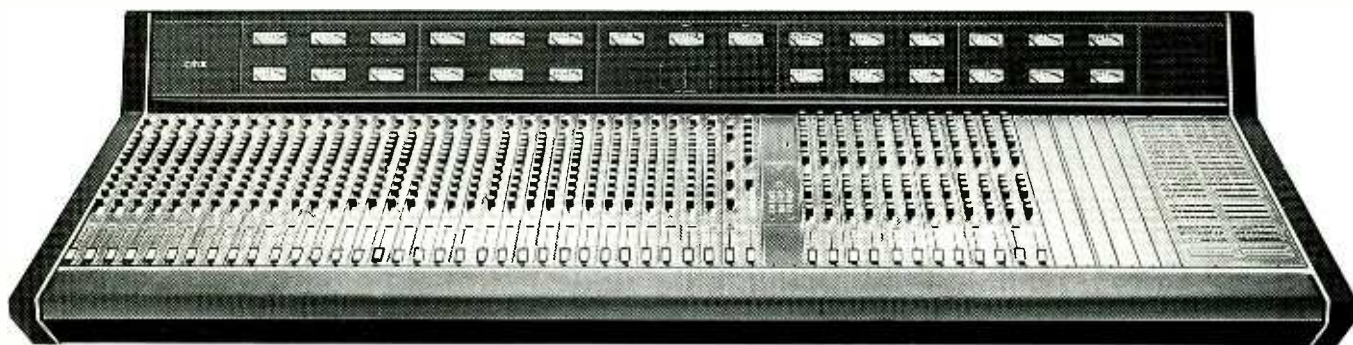
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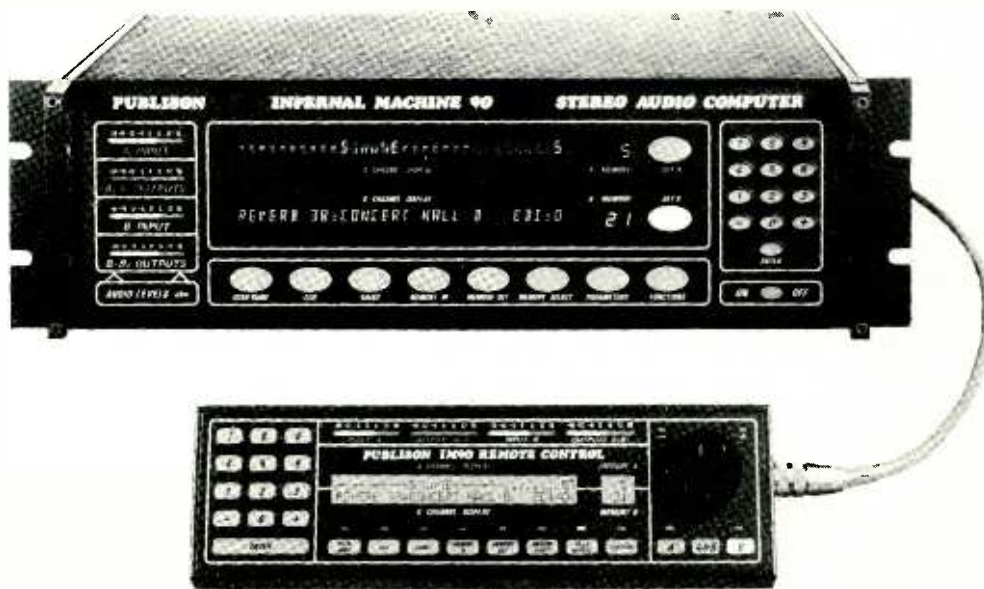
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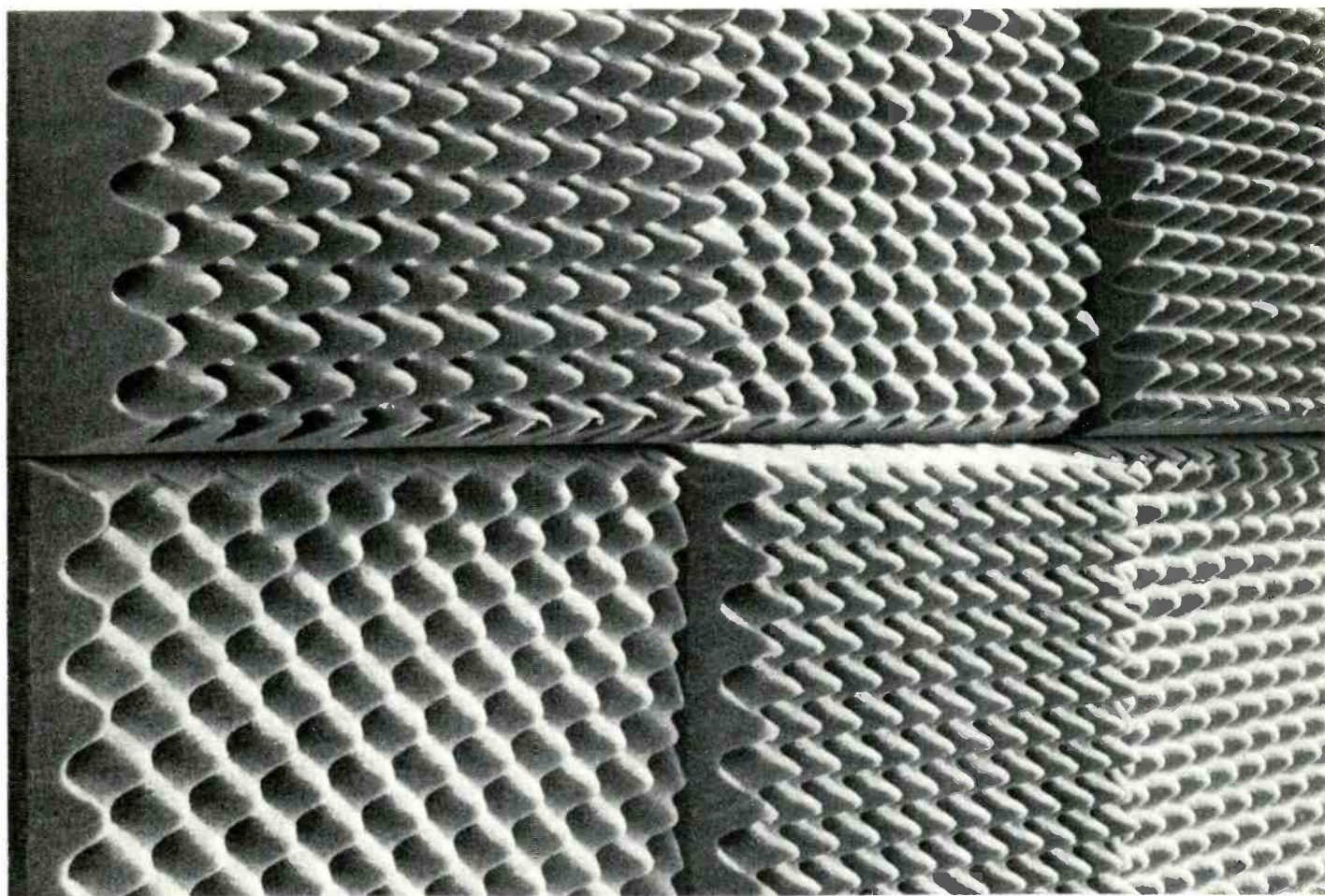
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# NEWS



## Beyer Dynamic drum microphones

Beyer Dynamic have added to their microphone catalogue a range of five mics specifically designed for use with drums. The range comprises a fig-of-8 bass drum mic, the *M380*, the small diaphragm *M422*, the *M420* with a tight cardioid pattern to assist separation, the *M201*, said to be a versatile all-rounder, and the *MC713*

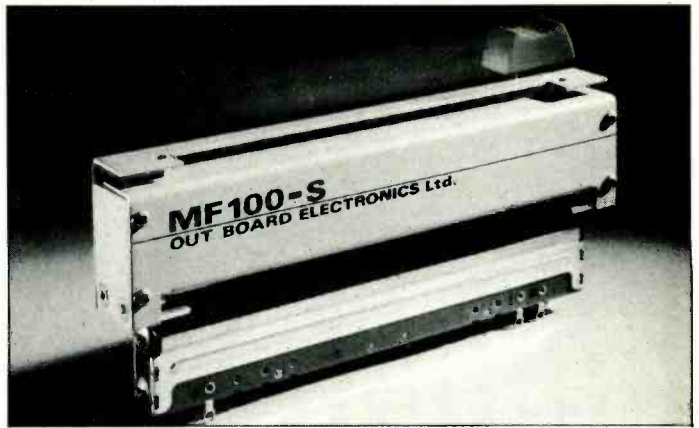
condenser microphone.

**Eugen Beyer Elektrotechnische Fabrik GmbH, D-7100 Heilbronn, West Germany, tel: 071 31 617-0.**  
**UK: Beyer Dynamic (GB) Ltd, Lewes, Sussex BN8 6JL. tel: 0273 479411.**  
**USA: Beyer Dynamic Inc, Hicksville, NY 11801, tel: (516) 935-8000.**

## Lab Gruppen SS 1300 power amplifier

The latest addition to the Lab Gruppen product range is the *SS 1300* power amplifier. Only 2U high, the amp provides 2x650 W into 4  $\Omega$  (2x325 W into 8  $\Omega$ ) and features two proportional speed fans, power supply stabilisation, which maintains

output power even when the AC mains voltage drops to 180 V and a weight of only 9 kg.  
**Lab Gruppen AB, Lilla Verkstadsgatan 7, S-434 00 Kungsbacka, Sweden.**  
**Tel: 300-168 23.**



## Out Board Electronics MF100-S motorised fader

Sellmark Electronics are now handling worldwide marketing of the Out Board Electronics *MF100* motorised fader. Although no details are given of its operational principles, the fader is said to dispense with pulleys, drive belts, springs, strings and clutches to provide a motorised fader with a low inertia such that the presence of the motor is undetectable in manual operation. It is designed to retrofit to

almost all existing audio and lighting control systems, and requires a bi-directional DC drive and 3-wire servo track connection for position feedback to the control system. Sellmark's *SV10011S* 100 mm fader is the first to incorporate the design.  
**Sellmark Electronics, Rockwood House, Barn Hill, Stanley, Co Durham DH9 8AN, UK. Tel: 0207 282880. Fax: 0207 232023.**

## Studio Master Plus with CCL

The *Studio Master Plus* is a hardware/software package providing comprehensive logging of virtually all aspects of a recording studio's activities, from EQ settings to track sheets to studio logs and invoices. The main novel aspect is Console Control Logging, the use of spectrum and level analysis to determine the settings of each channel on a desk; the effect produced by the EQ and level controls on a given test signal is stored on disk, enabling the settings to be reproduced later by nulling the screen display. This should make the system portable from desk-to-desk since it does not record actual settings, only the effect

created by those settings.

More familiar logging functions include maintenance logs, session logs, master studio logs, and track sheets, and the system will also provide tape labels, graphic representations of outboard gear control panels, automatically-timed bills and word processing facilities. The package requires a *Macintosh* or *Macintosh Plus*.

**Studio Master Systems, 229 Sunny Isles Boulevard, N Miami Beach, Florida 33160, USA. Tel: (305) 945-9774.**

**UK: The Home Service at SSE, Unit 2, 12 William Road, London NW1 3EN. Tel: 01-387 1262.**

## Ariel SYSid acoustic test instrument

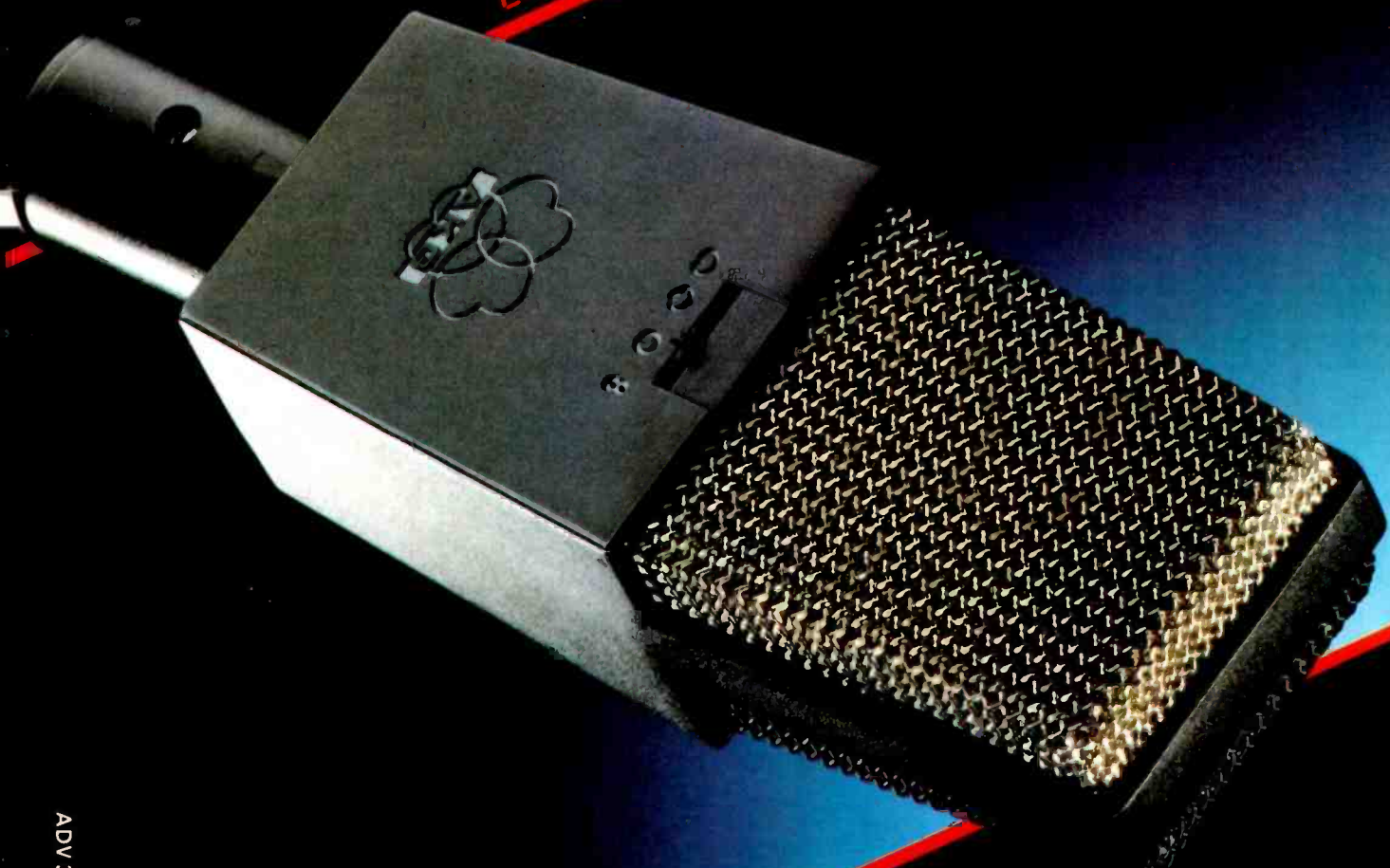
The Ariel Corporation have launched their *SYSid* (SYStem Identification) system, a hardware/software product for the *IBM PC* providing sophisticated audio test facilities including transfer function, distortion, impulse response and noise floor measurements. It provides a variety of signals for equipment test including chirps, impulses and

tones, and its test input uses 16 bit 50 kHz A/D conversion. The system will handle two audio channels simultaneously and provide hard copy on laser or impact printers, as well as providing disk storage of results for later comparison.  
**Ariel Corporation, 110 Greene Street, Suite 404, New York NY 10012, USA. Tel: (212) 925-4155.**

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# NEWS

## New Studer products

Studer Revox, in conjunction with Philips, have announced the launch of the first professional CD player capable of handling 3 inch CD singles. Designed for broadcast use, the player, the *A730*, features several cueing aids including a frame-accurate dial, a disc recognition memory with space for 100 CDs, cue memories and automatic cueing on modulation start and end. Also new from Studer is the *DE4003* digital editing system, for CD mastering from DASH machines. It allows the use of two playback machines, one of which can be analogue, and can incorporate the new *LHH 3050 PQ*

editor, also developed with Philips. This Philips PC-based system gives comprehensive handling and checking of PQ data before or during CD mastering, and handles U-matic recorders as well as Studer DASH machines. It also operates with the Sony *DAE 1100*.

**Studer International AG,  
Regensdorf, Switzerland, tel:  
1 840 29 60.**

**UK: FWO Bauch Ltd, Borehamwood,  
Herts, tel: 01-953 0091.**

**USA: Studer Revox America Inc,  
Nashville, TN 37210, tel: (615)  
254-5651.**



## Valley International Micro FX series

Valley International have introduced a range of small budget effects devices, which they say employs the same circuitry as their more expensive signal processors. The Valley *Micro FX* range so far consists of the *Micro FX Compressor*, featuring threshold, ratio, release and gain controls, a 7-LED gain reduction meter, Valley's 'Linear Integration

Detection' circuitry, a stereo linking facility and an automatic expander that tracks compressor settings.

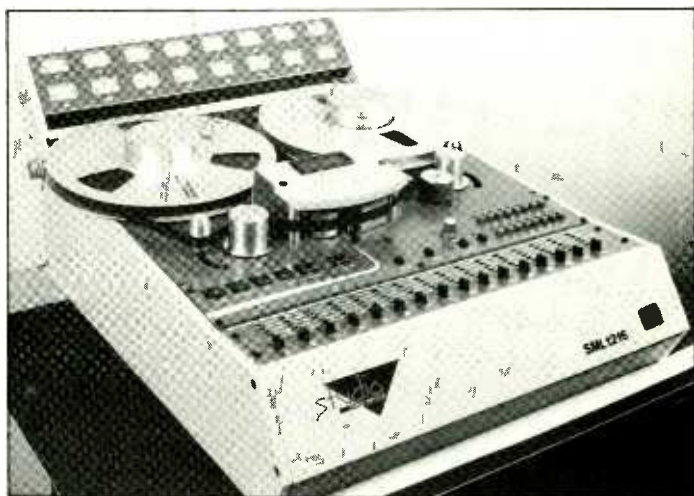
**Valley International, Nashville,  
TN 37204, USA, tel: (615) 383-4737.  
Export: Gexco, Jersey City NJ  
07306, USA, tel: (201) 653-2383, fax:  
(201) 653-2386.**

**UK: Stirling/ITA Ltd, London NW6,  
tel: 01-624 6000.**

## Concept Design Digital Audio Analog Duplication system

Concept Design, the cassette duplication equipment specialists, have announced their *Digital Audio Analog Duplication* system, which uses digital storage of the master material to eliminate the problems inherent in conventional analogue duplication masters such as tape wear, azimuth shifts and other mechanical headaches. Its storage capacity is equivalent to a C100 cassette and digital data is accepted via two AES/EBU ports with a direct interface to Sony 1610/1630

processors. Additional digital ports allow high speed (10:1) loading of digital library material. Copying speed is selectable with plug-in modules; 80:1, 64:1 and 1:1 are available as standard, with others on request. Sections of audio can be monitored at any time in realtime, even when the system is running. **Concept Design, Rt 8 Box 215-A,  
Burlington, NC 27216-0215, USA.  
Tel: (919) 229-5559. Fax: (919)  
228-1409.**



## Studio Magnetics 1216 mk 2 16-track recorder

The *SML 1216 mk 2* is a small, lightweight yet ruggedly constructed 16-track recorder. Aimed at the budget studio, it has 1/2 inch transport with electronics built into the cabinet and a hinged meter penthouse. Standard speed is 30 in/s with wide ranging varispeed, and the machine's weight is only 60 kg. Connectors are 1/4 inch jack and a 37-way prewired

connector is provided. Channel electronics are located on individual PCBs that plug into the main chassis behind the removable front panel. **Studio Magnetics, Shrewsbury,  
Shrops SY1 4NJ, UK, tel: 0743  
236672.**

**USA: Power Studio, Cleveland, OH  
44136, tel: (216) 238-9426.**

## Stage Accompany computer network

Stage Accompany have now released the computer hardware and software necessary for the realisation of their *SANet* system, which they have been incorporating into their products for some time. This multipoint network provides central control of up to 250 remote devices with cable runs of up to 500 m, and uses a modified Synchronous Data Link Control (SDLC) running at 375 kbit/s.

SA's range already includes programmable equalisers, power amplifiers and active loudspeakers,

and their controlling computer is an IBM PC-compatible machine with a special interface board. SA see an important application as being the control of large loudspeaker clusters, bringing system directivity under network control by adjustment of relative levels and polarities.

**Stage Accompany, LJ Hoorn, The  
Netherlands, tel: (0) 2290-12542,  
fax: (0) 2290 11192.**

**UK: Stage Accompany (UK) Ltd, Ely,  
Cams, tel: 0353 2278.**



# Contracts

- **Audio Kinetics** are to supply three audio post-production control systems to the Finnish Broadcasting Company. The system will comprise over 30 of the new *ES 1.11* ESbus synchronisers from AK, three *ES SSU* ESbus system service units and three *ES Eclipse* controllers. Off-line work will be done on IBM PCs with data transferred from there to the *Eclipse* systems.
- **IPK** have completed the refurbishment installation of Studio Four for Central Independent Television in Birmingham, UK, in three weeks. The single camera studio, primarily for Children's TV, incorporates a 16-input video mixer and 24-channel stereo sound console.
- Canadian Comfort Sound have installed a 50-input **Neotek** console in their 24-track mobile.
- **EFX** systems of Burbank, California, have installed four **New England Digital Corporation** post-production systems in their film and television post-production studio. They are now capable of performing every phase of audio work, from prelay to mixing entirely in the digital domain. The systems include two *Synclavier* digital audio systems, one *Direct-to-Disk* digital multitrack recorder and one custom optical disk sound effects storage and retrieval system.
- John Keeble of Spandau Ballet has bought the first **Simmons SDX** 16-bit drum kit in England from The Synthesizer Company. TSC has also sold the first *Fairlight Series III* of 1988 to the Pet Shop Boys.
- **Magna Tech** have supplied Power Plant Studios in Australia with **Audio Kinetics MasterMix** computer assisted automation. This joins their recently acquired *Pacer 2*-machine synchroniser, Sony *Profield* monitor and Sony *V09600* U-matic and Super Betamax and a National VHS supplied by Selcom.
- **Neve** have supplied *V60* consoles with *Necam 96* moving fader automation to Studio Polygone in Toulouse and Studio Artistic Palace in Paris. Dyam Music (also Paris) has taken delivery of two *DTC-1* consoles.
- **AVM Ferrograph** have supplied the *Model 9500* digital cartridge recorder to the Royal Shakespeare Company to produce sound effects for their London production of *Les Miserables*. The New York production of *Les Miserables* and Los Angeles production of *Chess* are also using the unit for their cued audio.
- The new audio post room at HBO Studio Productions cable network post-production centre in Manhattan, New York, is being equipped with a **Solid State Logic SL-6000 E** series console. It is in a 48-input frame fitted 32 input/outputs, and equipped with *G* series fader automation, *Total Recall* automation, programmable

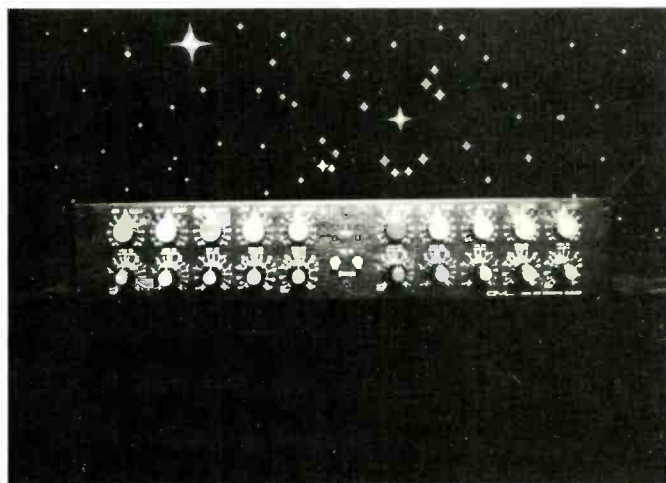
- EQ, bargraph metering and multi-machine timecode synchronisation system.
- London studio Orinoco has taken delivery of the first *Optifile 2* automation system to be installed in the UK on their **DDA** mixing console. The system provides 64 SMPTE locked automated channels for mixdown, each with full EQ and effects sends, visual display of VCA and fader levels and off line mix joining facilities. Orinoco has also installed Dolby *SR* noise reduction.
- Paul Farrah Sound have installed a **Nexo System** at Grosvenor House, UK, comprising two Nexo *MSIC* speaker cabinets powered by C-Audio *SR 808* power amps. These join the 48 channels of Soundcraft, a portable Martin CX2 system and the C-Audio amplifiers all supplied by PFS.
- The Fairfield Concert Hall, Croydon, UK, has recently undergone refurbishment with the installation of a 24-channel **BSS MSR-604** active microphone signal distribution system. The installation was carried out by BSS Audio distributor Wigwam Acoustics.
- London's Capital Radio have taken delivery of three further **Lyrec FRED** audio tape editors for their Talks and News department.
- **GeorgeTown Masters** of Nashville digital-to-analogue LP mastering facilities and mastering house have purchased **Monster Cable Alpha Genesis 1000** phase corrected moving coil cartridge. The facility is already wired entirely with Monster high performance audio cables.
- **Gauss** have recently sold high speed cassette duplicating *2400* systems to eight music and record companies in five different East European countries.
- **Dolby** have supplied 24 *SR* modules to Genesis for their Fisher Lane Farm Studios. The new modules update their existing 48-track Dolby A-type installation. The equipment was supplied by HHB.
- **Atlantic Studios** New York have installed a **George Massenburg Labs** moving fader automation system in their Studio A *Neve 8078* console.
- The new Gateway Studio at Kingston Polytechnic has recently been equipped with a **Soundcraft TS12** console. Soundcraft has decided to support the educational studio complex and Gateway in its turn has purchased a *Saturn* 24-track recorder. The *TS12* will be updated regularly and will serve as a product assessing and field testing base in a professional environment. Soundcraft Australian distributors Jands have supplied a special monitor version of the series *8000* desk to EXPO 88 in Brisbane, and a *200 SR* 8-channel rack mount console to New South Wales Art Gallery.

# Analogue INPUTS

At Syco, we have assembled a range of high-quality analogue signal processors to provide a choice of input signal paths, each different in character.

Regardless of whether the recording medium is analogue or digital tape, hard disc or the memory of a sampling device, the audio must first pass through an initial analogue stage. This will consist of either a microphone and mic pre-amp or a line amp and perhaps an equaliser, and it is these signal paths which define the basic character and quality of the sound.

**Comprising B & K, API, EAR and GML, we think this is the most exciting range of input devices in the UK...**



**George Massenburg Labs 8200 Parametric Equaliser**

## GML

George Massenburg Labs 8200 Parametric Equaliser is a dual channel, five band parametric whose quality and versatility has made it an industry standard. The 8300 microphone pre-amplifier, available in either 2 or 4 channel versions, uses the same design philosophy and provides similar throughput quality.

## B & K

Bruel and Kjaer's range of 4000 microphones now comprises four omni's and the new 4011 cardioid. The careful attention paid to optimising both on- and off-axis response results in a sound which is clean, transparent and well-balanced.

## API

Renowned during previous decades for their "proportional Q" equalisers and mixing consoles, API has launched a new range of products built to the same specifications as the originals. Amongst the range is the 3124 mic/line pre-amp, 3124M mic/line mixer and 5502 two channel, 4 band equaliser as well as the famous 550A parametric and 560A 10 band graphic.

## EAR

Esoteric Audio Research manufacture a range of valve products which includes the 822Q programme and 822MQ mid equalisers, based on Pultec's EQPIA and EQP3, and the 660 Limiting Amplifier based on the Fairchild 660. EAR's models benefit from transformer enhancements and improved signal-to-noise ratios without altering the character of the sound.

# Syco

Syco: Conduit Pl. London, W2 Tel: 01-724 2451 Tlx: 22278 Fax: 01-262 6081

# NEWS

## Allen & Heath equipment stolen

Allen & Heath experienced what must be every exhibitor's worst nightmare at the end of the AES Convention in Paris when, no sooner had they finished loading their equipment and stand into the truck, somebody stole the lot. The police were immediately informed and Interpol involved but the truck and its contents have never been found.

Allen & Heath, like many others, were setting off for Frankfurt Messe and faced the prospect of an empty stand. Intense work in the UK and invaluable assistance from PA Sound

of Frankfurt enabled them to get replacements for the various pieces of equipment—including a second specially constructed Audio Kinetics *Reflex* fader automation system, the prototype of which had been fitted to a *Sigma* console.

They were, however, unable to replace the one and only prototype of their SRC series console due to be launched at the Messe. In spite of orders inevitably lost by the SRC's absence, the console is now in full production.

## Exhibitions and conventions

June 22nd to 24th APRS '88, Olympia 2, London, UK.

June 24th to 26th NAMM Expo, Georgia World Congress Center, Atlanta, GA, USA.

August 16th to 18th 3rd Regional AES Convention, Melbourne Hilton Hotel, Melbourne, Australia, Convention Charman: Brian Horman. Tel: 03-329-0162. Fax: 03-328-1424.

September 8th to 12th 22nd SIM-HI-FI-IVES, Milan Fair Pavilions, Milan, Italy.

September 23rd to 27th International Broadcasting Convention '88, Metropole Conference and Exhibit Centre, Brighton, UK.

September 29th to October 3rd International Broadcasting and Telecommunications Show, South Pavilion, Milan Trade Fair, Italy.

September 29th to October 3rd MITAS '88 Show of Technology, Equipment and Services for Entertainment (including discotheques, ballrooms, theatres, cinemas, congress centres and organisations), South Pavilion of the Milan Trade Fair, Italy.

September 29th to October 3rd MeM—Mediterranean Market

(International Market of Audio/Video Programs and Services), South Pavilion of the Milan Trade Fair, Italy.

September 30th to October 9th BBC Radio Show, Earls Court, London, UK.

October 11th 13th Sound Broadcasting Equipment Show, Albany Hotel, Birmingham, UK. Admission by invitation. Contact: Point Promotions, tel: 0734 583086.

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

1989

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

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

June 17th to 23rd ITS Montreux, Switzerland.

1990

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

## Bruel & Kjaer go on the road

The Bruel & Kjaer Engineering Clinic roadshow is touring the UK from June 6th to 17th. The themes being covered include design verification using intensity techniques (introducing the B&K frequency analyser); structural testing and engineering design; noise assessment in industry and the environment; and automated test and calibration systems.

The representations are informal

with opportunities for engineers to discuss specific measurement problems with B&K's local area representatives and their colleagues. The venues are Weymouth, Eastleigh, Heathrow, Hatfield, Bexley, Warrington, Preston, Wakefield, Sandiacre and Coventry.

Further information is available from John Shelton at Bruel & Kjaer Ltd, 92 Uxbridge Road, Harrow HA3 6BZ. Tel: 01-954 2366.

## Joiner-Rose in New York

The Joiner-Rose Group Inc has opened a production office in New York to provide audio visual and TV system design with associated architectural support.

The company comprises six former employees of the Wilke Organization. The Group offers consultancy in acoustic technologies, with

headquarters in Dallas, specialising in architectural acoustics and noise control, recording and broadcast studios, sound and A/V systems design, environmental noise and industrial noise control.

The New York office is at 8-10 West 19th Street, New York, NY 10011, USA. Tel: (212) 633-1759.

## Address changes

• Sony Belgium have moved their offices and warehouse to new and larger premises at Luchtschipstraat 55, B-1130 Brussels, Belgium. Telephone, fax and telex numbers remain 02 721 49 50, 02 721 38 43 and 62686 respectively.

• Rebel Audio Pty Australia have moved to new premises on 286 Great North Road, Five Dock NSW 2046.

Tel: 02 713-6866, Fax: 02 713-1727, as before. The new offices provide much more space enabling the incorporation of a new showroom, demo room, office suites and warehousing.

• Stirling Audio's new Studio Centre has a new 12-line telephone number: 01-624 6000.

## Japanese awards for Celestion

Celestion have been presented with three top Japanese awards: Component of the Year Award 1988, HI-VI Grand Prix Award 1988 and the MITI Award.

The first has been won by the company for the second year running and was achieved with the SL700 loudspeaker. The HI-VI award is for high quality A/V products. The SL700 loudspeaker was given the

award for the speaker that is most suitable for high end audio visual systems. The MITI is given by Ministry of International Trade and Industry to Celestion's Japanese importer and distributor Y Narikawa and Co Ltd of Osaka, for commendable efforts and contributions made for the expansion and improvement of the imported trade into Japan.

## Courses and seminars

June 3rd to 5th Special Effects Seminar, Pinewood Studios, UK.

June 13th to 24th 9th Annual Seminar in Audio Recording University of Iowa. Tel: (319) 335-1664.

June 23rd to 24th Syn-Aud-Con, Toronto, Canada.

June 27th Institute of Acoustics one-day meeting 'More About Noise Control in Factory Buildings',

University of Salford, Salford M5 4WT, UK.

June 28th to 29th Syn-Aud-Con, Syracuse, USA.

September 20th to 22nd Digital Processing of Signals in Communications, Institution of Electronic and Radio Engineers, Loughborough University of Technology, UK.

# People

- **Amber Technology Pty Ltd** of New South Wales have appointed Karl Seglins as general manager—professional audio. One of the company's founding directors, Seglins has worked in the industry for 12 years. In his new position he will be overseeing day-to-day administration and operations of Amber Technology.
- Jenny Brown has joined the **Canford Audio** sales team. Formerly with British Aerospace, she takes on responsibility for export marketing as well as helping with telesales. Steve King has been promoted to sales manager with specific responsibility for special products.
- Martin Brady, formerly with Casio Electronics, has been appointed by **Celestion International** as export sales manager. His responsibility embraces hi-fi and professional audio products, initially concentrating on Europe. He has been a director of the Musical Industries Association as well as working in production in recording studios.
- Clive Bradbury has become sales and marketing manager for professional audio products. Bradbury was formerly sales and marketing director for both HH Electronic and Carlsbro Electronics during the past 14 years.
- **CTS Studios** have taken on three new recording engineers. Jonathan Miller—most recently working with Pete Willis at Blue Room and the Kinks at Konk Studios—will also be helping with marketing and promotion. Steve Price and Sean Cotier have been promoted from assistant engineers at CTS where they have worked for the last three years on a variety of film, TV and rock projects.
- **Studer Revox America** have announced reorganisation of their sales and administrative support staff in both the Studer and Revox branded lines. Chris Ware has been appointed manager of direct sales; Bill Muggler, executive vice-president, is now heading overall sales and admin. Thomas E Mintner (formerly vice-president and general manager) has resigned to pursue other activities.
- **Electro Sound** have announced the appointment of Bob Wortsman as manager of special projects. He will be working with clients on non-standard applications of ESI products as well as liaising with raw materials manufacturers and suppliers to the audio cassette industry.
- Greg Speer has been appointed vice-president and general manager of ElectroSound LA. He has managed record and tape plants for the past 12 years and will be taking over as director of manufacturing at Memory Tech compact disc plant in Plano,

- Texas. Memory Tech is owned jointly by Mitsubishi of Japan and ESG.
- **Audio Rents'** technical team is to be managed by Steve Culnane, formerly studio and technical manager of Westside Studios. Culnane trained with the BBC and worked at Air London and Montserrat, as well as Wessex studios.
- **AKG Acoustics** have appointed Kenneth Barnsley promotions manager. He will be introducing new professional products directly to artists, their producers and engineers, rehearsal studios and PA companies as well as seeking joint promotional opportunities.
- Geoffrey S Morris has been

- appointed production manager of **Advanced Assembly Services** PCB and cable forms assembly company. His responsibilities include planning and overseeing all manufacturing aspects of business. He joins AAS from Focusrite.
- Steve Gunn has recently joined the **Paul Farrah Sound** sales team working alongside Kevin Swain, Chris Gilbert and Trish Ashton. He joins PFS from Soundcraft Electronics where he was UK sales manager.
- **Diploma Studios** have appointed Mark Cunningham to head their JIWO Production Company as well as look after the day-to-day promotion of the studio itself. His production credits to date include Dave Gilmour,

- Bronski Beat and the remake of the Beatles' *Sgt Pepper* album for Essex Radio.
- **Balance Sound Studios** have promoted John Biehl to chief engineer, appointed Steve V Johnson as new studio manager as well as taking on Jacquire King as engineer.
- Dr Elizabeth A Cohen has joined the acoustical consulting firm of **Charles M Salter Associates** as principal consultant. She is known for her research in psychoacoustics, music perception and engineering of music technology environments.
- **The School of Audio Engineering** have appointed Mr C Camilleri as senior audio lecturer at their London facility.



PE-1A PROGRAM EQUALIZER

Both of these excellent Tube-Tech units are modern reproductions of classic valve technology, offering an unparalleled warmth and natural quality to your recordings, without maintenance or reliability problems.

**PE-1A Equalizer** – The Tube-Tech valve equalizer has been built to emulate the 'PULTEC' equalizer of the 1950's and 60's. The PE-1A not only looks like its classic predecessor it also gives the same superb quality of sound (like PULTEC, Tube-Tech even wind their own chokes!)

**ME-1A Mid-Equalizer** – also available

**CL-1A Compressor** – Like the PE-1A, the CL-1A Compressor has been built to accurately reproduce the sound of a classic from the 1950's and 60's, 'The Fairchild'. Now the Tube-Tech CL-1A offers the same superb dynamic range control, and maintains the natural warmth and feel for which its classic forerunner was so revered.

Please contact us for further details or a demonstration.



CL-1A COMPRESSOR



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# *The best studio pa have a spare room,*

*On the face of it, a spare bedroom in Pimlico and the biggest studio development to take place in Britain this decade may not have a lot in common. But they do.*

*Each was meticulously planned, from the drawing board to the final dab of paint. Each was designed to allow people to do their jobs, not only with efficiency, but creative brilliance. That's why our Martin Westwood looks exhausted, but pleased, in Willy M's 'home' studio. That's why Ian Davidson and Alan Douglas can afford to relax in the control room at Olympic Studio One. All three completed their complex projects, brilliantly.*

*Making music demands the right kind of atmosphere. You can't build an environment that stimulates creativity and musical inspiration with bricks and mortar alone. So, when Willy wanted to utilise the convenience and reassurance of his own home as a composing and demo studio for his 'Londonbeat' band, we understood. When the Virgin Group chose a building*

*already steeped in recording legend as the springboard for further chart success, we knew it made perfect sense.*

*Willy chose HHB to help him design and plan his whole studio. Virgin Studios turned to HHB to supply the bulk of their equipment needs at Olympic. Both knew we had the skill, experience and expertise to make it happen on time.*

*But whether you are planning the outboard and digital recording gear for a spare room or an 18,000 sq ft complex like Olympic, the same rules should always apply. At HHB they always do.*

*Qualified, considered advice, based on over a decade of practical experience in studio and live recording. The largest and most reliable selection of equipment from the best manufacturers in the world. An ability to supply, implement and commission on time with little fuss. The professional skills to complete a project against tight budgetary constraints. And of course, the guarantee of service back-up, long after the gear*

is up and running.

When we realised that Willy and 'Londonbeat' had less than 80 sq ft to play with – you can bet some serious planning was required. This led us to design a complex central patchbay linking twenty midi keyboards with a range of signal processors from Lexicon, Drawmer, Yamaha and Amek. It also led to a decision to standardise on Sony DAT for two-track digital mastering.

Getting one studio up and running on schedule is difficult enough, to attempt three at once was precisely what Alan, Ian and their team had to do with the Olympic complex. With the facility booked up with major recording projects from its scheduled opening in February, the last thing they wanted to worry about was coping with shifting delivery dates from dozens of different manufacturers. HHB took the strain and made it happen – bang on schedule.

Equipment supplied by the company included several

professional Sony DAT mastering recorders; a Sony CD mastering system; stacks of Dolby SR; Westlake studio monitoring in each control room; extensive Amcron amplification and a vast array of outboard gear from AMS, Bel, BSS, dbx, Lexicon, Urei and Yamaha. Headphones, microphones and near field monitors from every manufacturer you might expect and even Chinagraph pencils.

So as you can see, at HHB, there's nothing we don't know about devising relevant studio packages for professionals. As well as being Sony Pro-Audio's leading independent distributor, we are now the exclusive UK outlet for the superb range of Amek mixing desks, including the stunning G2520. Yet, for the cost-conscious, we also carry the same console manufacturer's big value TAC line. Whatever your budget, we really can provide all the options.

So, if you feel a package coming on, whether its 16 tracks of analogue or 48 tracks of digital, HHB is the only name to call.

# ckage, whether you or room to spare.



# NEWS

## Harman buy Soundcraft

On April 7th Harman International Industries announced their intention to acquire Soundcraft Electronics Ltd in the UK. The agreement is due for completion at the end of Harman's fiscal year in June.

This move follows the acquisition of Soundcraft USA and Mexican distribution by Harman's JBL Professional division in January 1986. Soundcraft's 1987 worldwide sales figure was approximately \$20m.

"We have always had great respect and admiration for Soundcraft," commented Dr Sidney Harman, chairman and chief executive officer of Harman International. "Their approach to business is compatible with ours. Soundcraft design and

manufacture their own products, and those products exhibit a high level of quality and innovation. The Soundcraft line has been a most natural companion to our own products in the United States. We are confident that Harman International and Soundcraft will continue to build this association around the world in the years ahead."

Soundcraft will continue to operate autonomously under the present management. Chairman Phil Dudderidge commented that both he and technical director Graham Blyth intend to see Soundcraft continuing to grow through innovative design.

## Agencies

- **Ferroglyph** have appointed three new distributors. France: Publison, 18 Avenue de la Republique, 93170 Bagnolet, Paris. Tel: 1 43 60 84 64. West Germany: Audio Export, Georg Neumann, Bad Str 14, Heilbron 7100. Tel: 7131 82275. Italy: Audio International SRL, 100 Via St Maria, 20090 S Maurico Al Lambro, Milan. Tel: 2 25390121.
- Call Out is a new UK distributor and service centre for **Publison** products, located at 29 Hollyfield, Hatfield, Herts AL10 8LW, UK. Tel: 07072 61659.
- HW International of London have taken on the marketing of **Carver's** range of professional amplifiers. HW International, 3-5 Eden Grove, London N7 8EQ, UK. Tel: 01-607 2717.
- Studiotec have been appointed by **Dolby Laboratories** to distribute their studio and cinema products in Finland. Studiotec, Kuusiniemi 2, 02710 Espoo, Finland. Tel: 090 592055.
- German cable manufacturers **Klotz**, have appointed Brian Latham as UK sales director although Cable Technology will continue as main

- suppliers to the studio and A/V market. Latham may be contacted on 01-681 0726.
- Hayden Labs have been appointed sole UK distributors of **Gale** loudspeakers, handling all sales and servicing. Hayden are offering a lifetime guarantee to the original purchasers of all Gale loudspeakers they sell.
- **Fane Acoustics** have formed a Chicago based US subsidiary company and are setting up a comprehensive sales network covering the whole country. The company is headed by Bob Fink, 535 E Oakton St, Des Plaines, Chicago, IL 60018, USA. Tel: (312) 298-9270. Fane have also decided to market direct in the UK rather than through distributors. Fane are at 286 Bradford Road, Batley, West Yorks WF17 5PW, UK. Tel: 0924 476431.
- **Fairlight Instruments Pty Ltd** have appointed Stirling Audio Systems sole UK distributors, providing full sales and service for all products. Stirling has also announced availability of **Mogami** high quality studio cable.

## News from the AES

News this month of two future Lectures and a Technical Visit. On Tuesday June 14th Peter Mapp (Acoustic and Sound System Design Consultant) will talk about **State of the Art Sound System Design and Assessment**.

Sound system design is fast becoming an exact science whereby it is possible to model and accurately predict the potential performance of a sound system. This lecture will discuss the requirements for good speech intelligibility and systems performance illustrated with real measurements of typical sound system components—both good and bad—which may help to explain why so many PA systems are so poor.

The use of computer modelling techniques and some of the latest software capabilities will be discussed and demonstrated as will a number of recent (and future) measurement and assessment techniques including the objective of speech intelligibility measurement.

A number of recent installations in which Peter has been involved will be presented including one of the world's largest computer controlled systems.

On Tuesday July 12th Laurie Fincham, Technical Director, KEF Electronics Ltd will discuss the **Design of a Miniature Wideband Coincident-Source Loudspeaker for Psychoacoustic Investigations**.

A major psychoacoustic project to simulate the response of a

loudspeaker in a room requires a number of loudspeakers having small size, very flat response over a wide bandwidth and symmetrical polar response. KEF have designed a loudspeaker system to meet these requirements using new technology in a spherical enclosure of 280 mm diameter. A new coincident source is used in which the drive units are effectively both coaxial and coplanar.

Each system is driven by a 2-channel amplifier incorporating low level active crossover network and drive unit equalisation.

The lecture will present the background to the psychoacoustic simulation project, the design criteria for the new source, its construction and measurements of its performance. This project has a bearing on future studio and domestic loudspeaker designs.

Meetings start at 7.00pm (coffee at 6.30) and are held at the IBA, 70 Brompton Road, London SW3 1EY.

Our next Technical Visit in early June is to **London Weekend Television** on the South Bank.

The AES publishes many books on audio related topics as well as Convention Preprints, Standards, etc. Two of our members have just written books: John Borwick *Loudspeaker and Headphone Handbook* and John Watkinson *The Art of Digital Audio*.

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

## In brief

- City of Sheffield's employment department has opened its **Audio/Visual Enterprise Centre**—complex of recording studios, photographic gallery and top quality film studio. It is a co-operative venture between the City Council and a number of commercial companies and organisations involved in A/V. Human League and the Comsat Angels have each built their own 24-track recording studios within the complex. Aid from the British Film Institute has enabled Sheffield Independent Film to build a film, video and sound studio linked to a Super high-band edit suite within the complex.
- The BAFTA Award for Film Sound and all five nominations for Academy Awards for Achievement in sound went to films made in **Dolby** stereo. *Cry Freedom* was chosen for the BAFTA award. The Academy nominations were for *Empire of the Sun*, *The Last Emperor*, *Lethal Weapon*, *RoboCop* and *The Witches of Eastwick*.
- **Ampex** Golden Reel awards have been presented to: Bananarama for their *Venus* album; Dr and the Medics for *Spirit in the Sky*; Chris de Burgh for *Into The Light* and Valerie Day and John Smith for their album *Poolside*.
- **Yamaha** have opened the Yamaha Communication Center Show Room (YCC) in New York, in the Metropolitan Tower at 142 West 57th, near Carnegie Hall. This is the company's first permanent facility in Manhattan and features the full range of musical instruments and professional audio equipment. There is in addition a musical instrument R&D unit designed to enable professional people to participate in development of new instruments and audio equipment.
- **Sony** have announced renewed digital fervour in the USA, following sales of over 25 *PCM-3324* digital multitracks in Europe in recent months. This has been due to re-structured pricing and improved operating software.

## Contracts

- **Mitsubishi** have supplied *X-850* 32-track digital recorders to Revolution Studios, Manchester and Music Factory Studios in Cardiff. They have also delivered a 36-channel *Westar* console with PC automation to Magritte Studios.
- **Fazioli** have announced orders from Iceland, Taiwan, and Japan as well as the UK, all completed during the Frankfurt Music Messe. Recent contracts include Surrey County Council and the Royal Academy.
- **Amek, UK**, have recently supplied an *Angela* recording console to Bruce Springsteen to be used for on-the-road recording during his US tour. The 56-input console had to be customised with special back panels. The order included all custom racks and cables to complete the recording package, specially assembled at the Amek factory in Salford.
- **Windmill Munro Design** completed design and installation of a 5-way fully active monitor system for Paris studio Plus Trente. Four 470 mm LF drivers provide dedicated sub bass system below 100 Hz enabling four standard 390 mm bass units to maintain phase linearity throughout their bandwidth with dramatic increase in transient performance. Maximum output level is quoted in the region of 130 dB at 3 m. Powered by two phase linear and three Carver amplifiers with BSS *FDS360* crossovers the system incorporates custom designed phase compensation circuits enabling channel matching to within 5°, giving accurate and stable stereo imaging in the LEDE-type room.
- **Dire Straits** members Mark Knopfler and Alan Clark have both recently been supplied with **Soundtracs** *PC24* mixing consoles by Don Larking Audio Sales for their home studios.
- **Lyrec** have supplied a second *TR533* multitrack machine to MIDI Music Centre in Copenhagen, through distributor AB Music, Aarhus.
- Recent **DDA** contracts have included a brand new 16-input *S* series to a museum in Tel Aviv Israel—as part of the sound system in its concert hall. *D* series sales include desks to Korea, Germany and Italy. Joe Cocker's German tour is utilising

a 40-input console; in the UK, **TVS** has ordered a custom 8-input version for use with grams. **B+H Sound Services** have bought a 24-input console for live recording, and in Spain sound reinforcement company **Triple Onda** has ordered four large *D* series to complement its existing seven. The *DCM 232* has been in demand from Norwegian recording facility **Rainbow Studio**, **Revox Japan** (who are incorporating a 32-channel *DCM 232* in their demonstration studio), **Park Lane Studios** in Scotland, and **Random Access Studios**, London.

**Stirling Audio Systems** have sold a *36/24 DDA AMR 24* recording console to **PWL Studios**, UK. The company has also recently sold *AMR 24s* to **Simple Minds**, **Brian Bennett** and **Pacific Studios** and a *DCM 232* to **Park Lane Studios**, Glasgow.

- **Sony** sales: **Studio Davout** in France have ordered two further *PCM 3324* digital multitracks, bringing their Sony machine complement to six in their three studios. Following the Paris AES Convention in March over 30 *DAE-3000* digital editors were sold into the USA and Europe. The *PCM-3402* twin-DASH machine has also not been without its customers: these include **Ultrasound** (London), **BFI** (Germany), **BRT** (Belgium) and **Gostel Radio** (Moscow).

- **Otari** Japan have contracted to supply UK video duplicating facility **TapeTech Ltd** with seven (plus optional further two) *T-700* Thermal Magnetic Duplicators and two **Mirror Master Recorders**—marking the first major commercial installation of this new high speed video duplicating technology in the world. **TapeTech's** investment will also include 13 **Tapematic** winding machines to facilitate the new process.

- **Harman UK** have supplied and installed a new monitoring system (**UREI 809s**, powered by **Rauch DVT 508** amplifier) at **Triple X** studios, London. The studio have also equipped a new MIDI pre-production suite as well as adding several items to their outboard complement.

- **Celestion** have supplied their new **SRI PA** cabinet to **T'Pau** who are using it on their European tour.

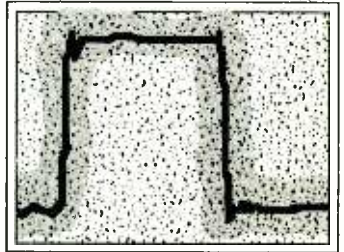
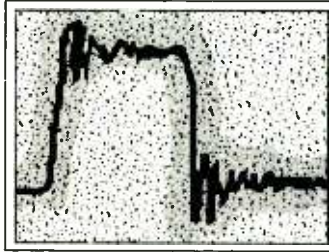
## Video tape specification agreement

**Sony Corporation** have concluded a specification agreement for a future high band recording option with **Hitachi**, **Matshushita** and seven other Japanese electronic and tape manufacturers for 8 mm video.

This is in answer to market demand for high resolution video formats such as **ED-Beta** and **S-VHS**. It will be offered as an option to

standard 8 mm. **Sony** have been exploring the 8 mm high band technology and claim performance matches that of **S-VHS** in terms of resolution. They anticipate the new high band 8 mm video cassette will be equipped with a special detection hole to enable automatic identification by a **VCR**, and will be upwardly compatible.

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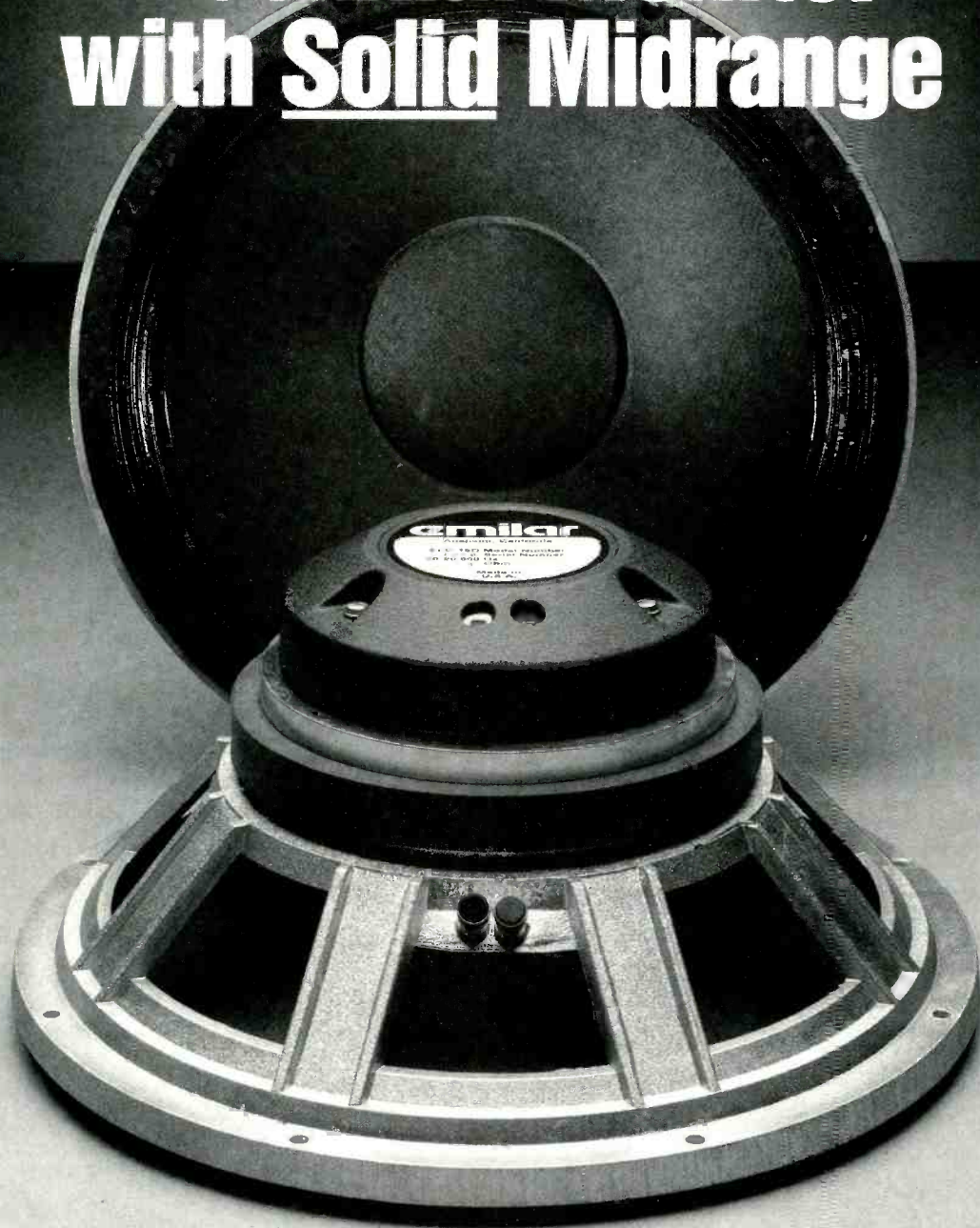
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# NEWS

## Training

Network Studios, Yorkshire, UK, can now offer a range of courses in sound engineering, production techniques and music technology. They range from short introductory courses, to in-depth training for budding sound and recording engineers. The courses are structured to give students a balanced mix of theory lectures and practical hands-on time. Visits to other recording studios are planned as are lectures by visiting industry experts. A placement service will be operated for professional level graduates.

Media Production Services are currently conducting an intensive one-year full-time diploma course covering most aspects of analogue and digital recording and production techniques. The course is of a modular structure so each three-

month module is a separate course. The sessions are entitled Analogue Sound Recording and Production Techniques, Digital Sound Recording and Production Techniques and Creative Music Recording and Production Techniques. The courses offer hands-on experience in Media's own 24-track studio as well as lectures from some of the leading experts in the British audio industry and some practical recording experience in a 32/48 digital sound studio.

Network Studios, 46 Auster Road, North York Trading Estate, Clifton, York YO3 8XA, UK. Tel: 0904 691761. Media Production Services, Bon Marche Building, Ferndale Road, London SW9 8EJ, UK. Tel: 01-737 7152 or 01-274 4000 ext 328.

## Fostex and Gateway seminars

The Fostex/Gateway Roadshow is once more underway. Taking in venues nationwide, the seminar team has already visited Bristol, Liverpool and Wakefield. Five further dates remain: Saturday 21st May at the Albany Hotel in Glasgow (hosted by dealer Sound Control); Sunday 22nd May at Newcastle University is being hosted by Rock City; on Saturday 4th June they will be at Birmingham University being hosted by Musical Exchanges and the tour finally comes to rest in Dublin at Music Maker's premises.

The all-day sessions (1000 to 1700 hours) are designed to expand the

horizons of multitrack users at all levels, from musician to post-production, from *Multitracker* to 16-track. The morning sessions will be concentrating on EQ and reverbation with *EQ—Add Sparkle to your Recordings* and *Reverb—How Much and When*. Afternoon sessions are as follows: *Microphones—Live up Your Recordings*; *MIDI The Future of Music*; *Video—Unlock the Secrets of SMPTE*. The day rounds off with an open discussion.

Tickets are £10 either from Roadshow Ticket Sales, Harman UK Ltd, Mill Street, Slough, Berks SL2 5DD, or from the host dealer.

## People

● Carlsboro Electronics have appointed Mrs Lesley Pashley marketing manager. Pashley was previously with a subsidiary of BP Chemicals.

● Max Hoskins joins the Harman sales team in London. Hoskins has worked for a number of years as an audio editor on films and TV productions.

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# NEWS

## 9th Annual Seminar in Audio Recording

The University of Iowa is hosting the 9th annual Seminar in Audio Recording from June 13th to 24th 1988. Principal instructors are Jerry Bruck (president Posthorn Recordings, New York), Robert Ludwig (vice-president/chief engineer Masterdisk Corporation, New York) and Lowell Cross (professor of music and director of recording studios at University of Iowa School of Music).

Topics and equipment being featured include stereophonic and

ambisonic mic techniques, microphone comparisons, D/A and D/D comparisons, noise reduction systems, preparation of tapes for CD and stereo LP mastering.

The course fee is \$144 (undergraduates) or \$226 (graduates).

Further information is available from Professor Lowell Cross, Recording Studios, School of Music, University of Iowa, Iowa City, IA 52242, USA, Tel: (319) 335-1664.

## Literature received

• BSI have announced the publication of *BS 6840: Part 12—Sound system equipment Part 12, Specification for applications of connectors for broadcast and similar use*. This is identical to *IEC 268, 12* and supersedes the earlier standard *BS 5428 Part 4, Section 5.4.1981*. It specifies the application and contact arrangement designations for circular and concentric connectors used for the interconnection of sound systems components for broadcast. Copies (price £16.20 or £6.48 to BSI

subscribing members) are available from BSI Sales, Linford Wood, Milton Keynes MK14 6LE, UK.

• The 1988 Publications Catalogue from the **Institution of Electrical Engineers** has been published detailing books, conference proceedings and journals available from IEE, as well as new titles due to be published this year. Copies are available on request from the director of publishing, IEE, PO Box 8, Southgate House, Stevenage, Herts SG1 1HQ, UK.

## Home taping in Canada

Canadian Independent Record Production Association has published a study, which they say illustrates the threat of home taping to the music industry.

The report has been prepared by Music Copyright Action Group. It finds that 63% of Canadians home taped in the last year, each using an average 9.5 cassettes. The estimated loss to the Canadian music industry is over \$600,000,000/year, while blank tape sales have improved by nearly 50% between 1983 and '86. It also noted that in Canada, penetration of high speed dubbing recorders has reached 40% and dual dubbing machines 55%. Associate director general of IFPI noted in her report for the EEC, "In most European countries, over 60% of

households have at least one tape recorder and the UK has the highest saturation level with 73%."

CIRPA recommends a royalty to compensate creators to be levied on blank tapes and recording hardware. They also recommend the introduction of legislation making it a mandatory requirement for all new recording equipment for domestic use to contain an anti-copying device.

The report concludes a correlation between the upsurge in home taping and decline of the recording industry. European countries such as Germany, France, Portugal and Spain have implemented legislation for royalties on blank tapes and/or hardware. Belgium, Italy and the Netherlands have legislation in progress.

## Sound library distribution

Studer International are distributing the Production Music and Sampler Libraries from Sound Ideas worldwide with the exception of USA, Canada and Australia.

The Production Music Library comprises 25 CDs with original music themes created for A/V, broadcast, film and commercial productions. Each is accompanied by a 30 second and 60 second mix prepared for

commercial TV blocks. It contains a variety of styles and categories.

The Sampler Library is a collection of over 3,100 digitally recorded notes and sound effects on six CDs. 135 instruments, ensembles and orchestras, percussive and vocal sounds as well as synthesiser samples are provided along with 375 sound effects. Each has been digitally recorded.

## People

• Richard Frankson has been appointed marketing manager for **Turbosound**, London, replacing Tim Chapman who recently moved to Expotus. Frankson has 10 years pro-audio experience in production, sales, product management and marketing, and comes to Turbosound from Future Film Developments.

• Jeremy Bancroft has joined **Digital Audio Research** of Surrey, UK, as sales manager. Bancroft has previously been with AMS and Ferrograph.

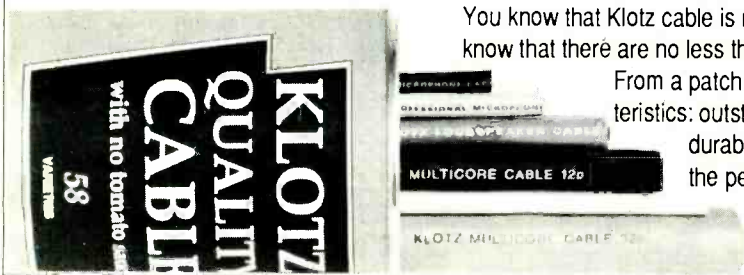
• New marketing manager at **Soundcraft**, UK, is Alison Brett who was previously with venture capital company 3i.

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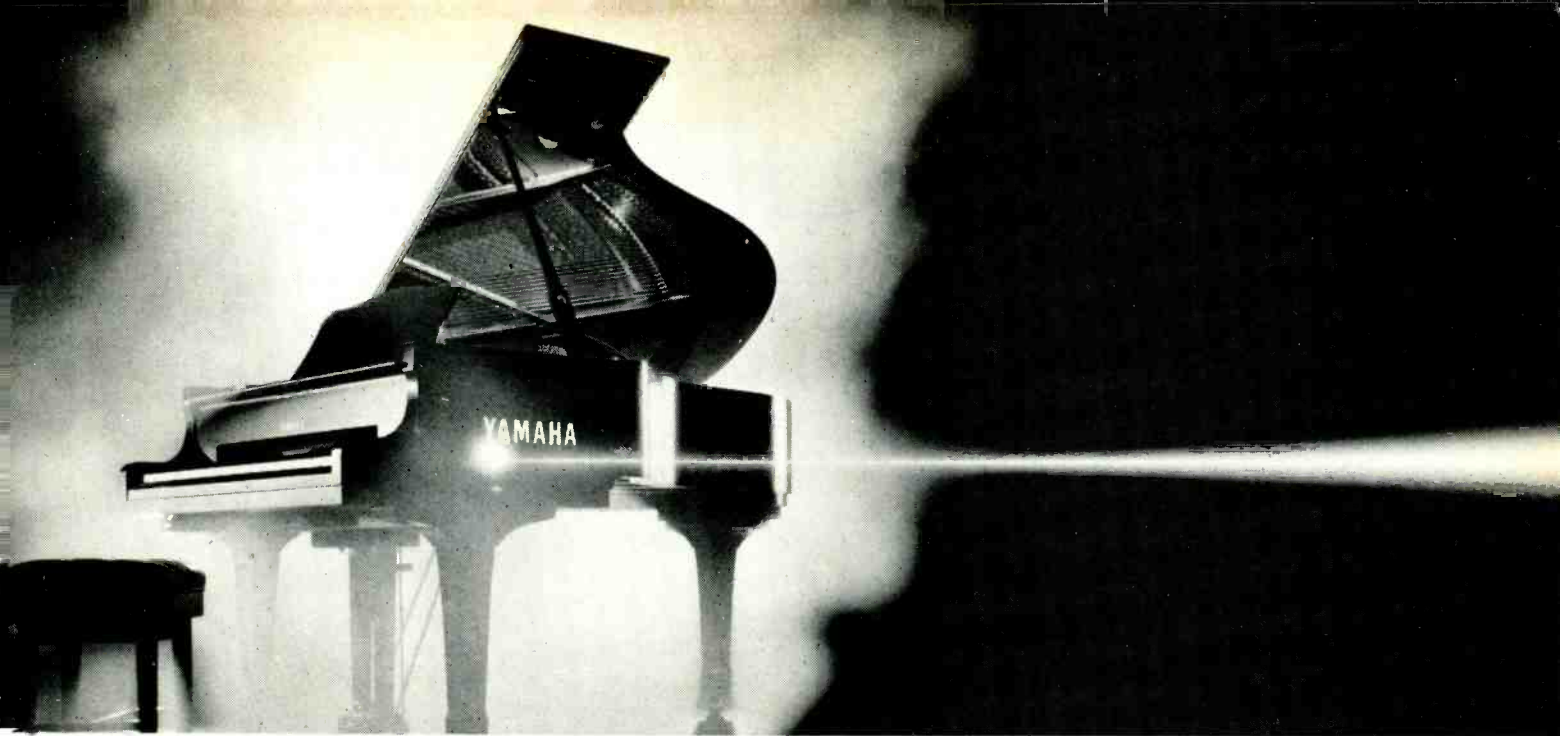
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Name: \_\_\_\_\_ Address: \_\_\_\_\_

# MUSIC NEWS

## Mellotron MUART 4-port MIDI interface

The Mellotron Digital Corporation have announced the introduction of the *MUART* 4-port MIDI interface. In conjunction with *Spirit*, an expanded version of the Robert Keller 48-track *PC II* sequencing software, *MUART* provides discrete 4-track MIDI sequence recording. Running on an IBM *PC*, this expansion of the traditional MIDI ports into four ins, four outs and four thrus allows simultaneous independent recording of MIDI information from four sources, with full editing facilities on each of the resulting tracks. Thus, for example, a

band comprising two keyboard players, a MIDI-equipped guitarist and a drummer with an electronic kit could all record live to the sequencer and edit performances individually without committing anything to tape.

The interface comes complete with a PC controller card, the *MUART* 12-port junction box, the new *Spirit* software and cable.  
Mellotron Digital Corporation, 36 Main Street, Port Washington NY 11050, USA. Tel: (516) 944-6789.  
UK: Synchrotech Sales Ltd, 66 Rochester Place, London NW1 9JX. Tel: 01-267 4202.

## Kurzweil EGP

Kurzweil Music Systems have introduced the comparatively budget-priced *Ensemble Grande Piano*, incorporating some of their famous sampled sounds in a preset instrument. The *EGP* features a weighted, velocity-sensitive, 76-note keyboard and, despite its name, contains 100 preset sampled sounds including many orchestral and other acoustic instruments and synthesiser samples of various kinds known collectively as Wave Shapes. The samples are apparently to the same quality as the Kurzweil 250.

The instrument is entirely preset—user adjustment of the on-board sounds is restricted to the addition of chorus, tremolo and vibrato—and the use of the usual pitch bend and modulation performance controls (both wheels). The *EGP* is of course MIDI-equipped and operates in stereo, through built-in speakers if required.

Kurzweil Music Systems Inc, 411 Waverley Oaks Road, Waltham, MA 02154, USA. Tel: (617) 893-5900.  
UK: Syco Systems Ltd, 20 Conduit Place, London W2. Tel: 01-724 2451.

## E-mu Systems Emax SE

The latest addition to the E-mu systems product line is the *Emax SE* (Synthesis Enhanced) Digital Sampling System. This features Spectrum Synthesis, where harmonic building blocks, or spectra, are chained together in time using interpolation to produce a time-varying timbre. Spectra may be drawn from the instrument's library of 99 preset spectra or defined manually, and up to 24 may be incorporated in a single sound, placed at any of 24 Time Slice locations. Conventional additive synthesis is also available by defining pitch and amplitude contours for each of 24 harmonics. The resulting synthesised timbres can be mixed with each other

or with sampled sounds and the resulting voice can then be processed using the *Emax*'s Analogue Processing facilities.

A new feature called Transform Multiplication allows new sounds to be produced by computation on two existing digital sounds, and a Preset Stack Mode allows up to four presets to be stacked up on one key for richer sounds. The *Emax SE* will also interface with the *CDS3* CD-ROM disk from Optical Media International.

E-mu Systems Inc, 1600 Green Hills Road, Scotts Valley, CA 95066, USA. Tel: (408) 476-4424.  
UK: Syco Systems Ltd, 20 Conduit Place, London W2. Tel: 01-724 2451.

## Lyre FDSS studio additive synthesiser

Among several products exploiting the new accessibility of additive synthesis brought about by more powerful computer techniques, one of the most ambitious is the new *FDSS* (Fourier additive Digital Synthesiser System) from Lyre Inc of Canada.

The *FDSS* provides control of 128 harmonics, subdivided into up to eight voices (more with add-on expansion), with extremely fine control of the envelope of each harmonic giving up to 128 segments in each envelope. In addition, it uses the MIDI sample dump standard to digitally download sounds from outboard samplers, which can then be analysed in terms of harmonic content with respect to time and re-synthesised with or without user

modification. Hardware requirements are an IBM *PC* or compatible with high speed serial link or a *Macintosh*, and a controlling MIDI keyboard.

Not long ago additive synthesis on anything approaching this scale, despite its enormous potential, would have been virtually unmanageable but Lyre claim their software for handling the power offered by the *FDSS* is optimised for the non-technical user and to this end it uses very graphic screen displays under mouse control. Independent voice outputs are provided, using 16-bit D/A conversion at 44.1 kHz with oversampling.

Lyre Inc, 1505 ch Ste-Foy, Suite 101, Quebec, Canada G1S 2P1.  
Tel: (418) 527-6901.



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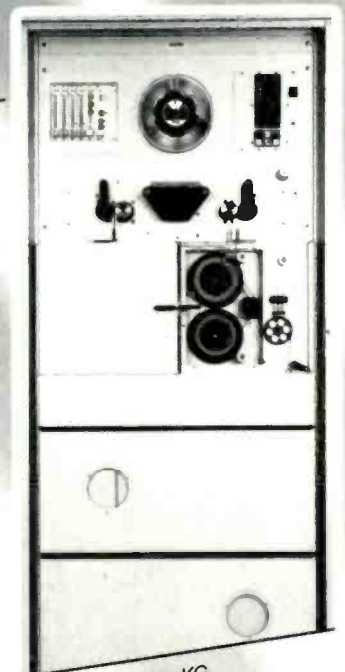


The newly developed ASONA 301 Twin Slave Unit is equipped with an advanced studio type transport mechanism with electronic control of the capstan and reel motor. For use with Asona high speed Loop-Bin for a duplication ratio 1 : 32.

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# FOREMAN'S REPORT

*Magazines always seem to look at the glossy side of studio construction, particularly in exotic places. The truth is that the realisation of these projects may be far from easy. This is an extract from a foreman's log for one such project. . .*

Fri 9th Jan

Arrived on site and shown around. Total chaos! Work area in almost total darkness. Materials stacked all over work area, in places 5ft high: all thrown together in a heap. Timber improperly stacked - much wastage. Sheet materials damaged or broken.

Attempted stocktake, and organised proper stacking of materials.

Sat 9th

Continued to clear working space. Discovered concrete floor already poured to same height as control room floor. Was informed that this had been done to Dick Chalmers' instructions. (Floor falls 3 inches over 20 ft.) Began setting out for perimeter walls and cutting sole plates to size, fixing  $\frac{1}{2}$ " rubber, etc.

Mon 11th

Fixed sole plates down around perimeter. Then informed by client that studio floor had been poured directly on top of original floor. Ripped up sole plates. Organised labourers to dig 7" down around perimeter.

Tues 12th

Continued digging & cleaning of rubble from site. Laid down soundboard/soundboard in perimeter ditch. Used old plastic sandbags as vapour barrier. Poured concrete on top and bedded timber plate into this level all round studio.

for sound ducting and so that this can be put into floor. (Control room has no sound ducting whatsoever, nor any reservation made for it).

Mon 15th

Finished erecting ceiling trusses. Scaffolding very cumbersome, dangerous and slow to move around.

Tues 16th

Flanking out and cladding between ends of trusses. Began cladding ceiling with plasterboard. Aircon contractor arrived and specified his proposals for ducting.

Wed 20th

Continued cladding of ceiling leaving reservations for ducting as arranged. Electrician arrived and began work for control room lighting.

Thurs 21st

Fixed ceiling plate to concrete wall above control room and clad this end of ceiling. Carpenters very slow.

Fri 22nd

Constructed studwork to control room end of studio, trimming for viewing panels, etc. Carpenters finding anything to do with angles or bevells very complicated - constant mistakes.

Wed 13th

Continued as above. Began erecting frames and bracing plumb.

Thurs 14th Jan

Continued erecting perimeter frame and bracing plumb. Began making up ceiling trusses. Carpenters very slow and very limited understanding of job in hand.

Fri 15th Jan

Continued making up trusses. Shortage of plywood necessitates 2ft trusses at 4ft centres.

Sat 16th Jan

Finished making trusses. Arranged very primitive scaffolding available and began erecting trusses.

**\* NOTE \***

Have informed client that there are not enough materials on site to build isolation room, and that he should do something about this. Also that broken sliding panel to control room should be repaired. Also will need additional glass sliding panel if he insists on iso room. Also that airconditioning contractors must come up with some plans so that I can accommodate the ducting. Also that electrician must discuss with me re: power sockets & lighting and that proper temporary lighting is needed on site because I cannot work in constant twilight. Also that I need plans

Sat 23rd

**\* Started on drum cage trap, studwork and insulation.**

Mon 25th

Discovered that client had brought in labourers on ~~Saturday~~ Sunday to dig up entire studio floor. Obviously they had succeeded in digging up almost only  $\frac{1}{4}$  of it. Therefore continued with this work and clearing rubble from site.

Aircon contractors failed to arrive as promised.

Tues 26th

Marking out for, and pouring floating strip to carry iso room wall. Continued also clearing rubble from site. Decided that drum cage floor should be stepped up, joisted, and packed with sand under.

Wed 27th

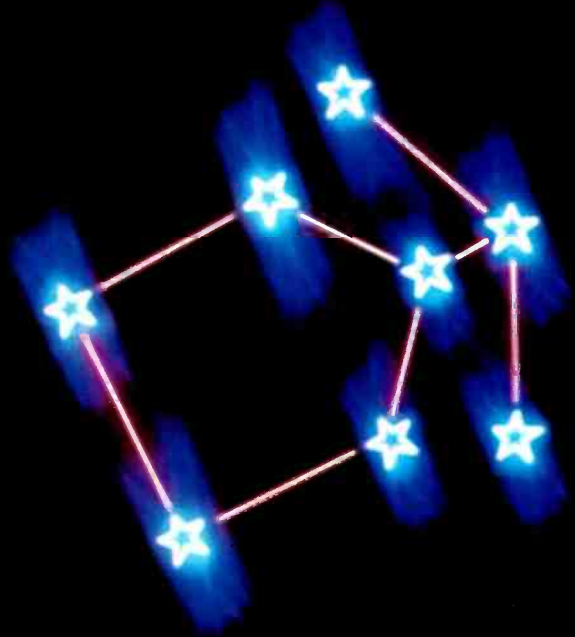
Poured new iso room floating floor and began studio floor.

**\* NOTE** Airconditioning contractor has now changed his specification 3 times, and in any case never shows up to actually do anything.

Thurs 28th

Continued pouring studio floor - very very slow. (Concrete brought in on shallow 'headpans' and 'levelled' with hand trowels.) Constant supervision required.

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# FOREMAN'S REPORT

Aircon contractor changes specification for the 4th time. Almost impossible to communicate with, I don't have a clue what he is doing re control room despite several discussions.

Had requested 2 carpenters while masons were busy on the floor, to work on ceiling for aircon ducts. Client, however, put them on a shuttering job outside and in the afternoon took them to a different site!

Decided therefore to install aircon return ducts singlehanded in roof space and afterwards found aircon workers asleep.

Fri 29th

Continued studio floor. Carried on cladding ceiling. Cannot trust carpenters to take measurements or cut sheet materials, and must do it all myself, leaving them to nail it.

Very slow progress.

Sat 30th

Continued on ceiling. Constantly delayed by having to move scaffolding.

Sun 31st

I have been constantly advising client to organise sound cable ducting. Explained that ~~the~~ sound cables ~~are~~ are not the concern of the electrician - several times.

Today client brings electrician to see me and discuss sound cable ducts! After we have all been speaking together for 1/2 an hour, client asks "What is a duct?" Impossible to deal with this man!

Mon 1st Feb

Continued & finished ceiling cladding. Time taken by 3 carpenters to put up 8 sheets of soundboard - 4 hours.

Labourers insulate stud walls.

Began wall cladding at iso room/drum cage end. 2 plasterboard and 1 soundboard. Still cannot trust carpenters to measure anything.

In the p.m. client took labourers to another job.

Tues 2nd Feb

Continued cladding walls iso room/drum cage end. Have to measure and cut every sheet personally if it's to be done properly.

Cut holes in ceiling for aircon supply. Labourers continued insulation work.

Finally organised proper lighting & extension cables myself as client appears incapable of doing anything asked of him.

Wed 3rd Feb

Work delayed in morning due to failure of driver to turn up with starting handle for generator.

Left carpenters with instructions and took 1 hour off to go and change money at bank.

Laid sole plates for iso room and finished cutting holes for aircon supply.

No labourers today.

Began stud walling to iso rooms & drum cage. Corner stud very difficult for carpenters - succeeded on 4th attempt.

## \* NOTE \*

Carpenters have learnt abysmally little over last 4 weeks. Every single repetitive task is approached as a brand new job involving much argument between them in local lingo. Am rendered speechless with frustration approximately 20 times a day.

Thurs 4th Feb

Continued studwork to drum cage & iso room.

Also wall cladding.

Again no labourers. Only three carpenters.

Fri 5th

Drum cage studing & joisting out for expanded raised floor. Began sheet material here.

More iso room studwork and fixed suspended ceiling plate to walls.

Again only 3 carpenters.

Informed client that iso room will be seriously delayed until he produces sliding doors or gives me precise dimensions for same.

## COMPLAINTS

1/ On arrival found site to be total bedlam. Control room not complete. Predecessor has left soundboard finish to fix carpet to sliding doors leaning the wrong way. Aircon return duct in ceiling does not allow space for lights above console. Unidentifiable cables left poking through here and there.

2/ No proper plans - especially re lighting, power points, and aircon.

3/ Shortage of materials - especially plasterboard & plywood. Much damage to materials on site.

4/ No reservation made for sound ducting. No ducting on site, (Asked for several times and no result).

5/ Local labour very very slow. Unable to communicate adequately.

Example of time taken - 3 men, 6 studs, 1 hour.

6/ Client very ignorant. Extremely difficult to discuss any aspect of job. Never certain if anything has been understood.

7/ Aircon contractors very unreliable. Cannot extract from them exact information about anything. Cause of constant delay, 4 conflicting plans ~~3~~ before finalisation.

8/ Lighting on site was totally inadequate. Client did not respond to constant reminders about this.

9/ Gave list of extra materials required on 19/1. - No result.

10/ Scaffolding bulky, clumsy & dangerous. Very time consuming to move about.

11/ Client has habit of hanging around site and getting in the way. Frequently suggests to me how to do my job - this I find insulting. Never listens/understands what I say - after turns away and starts talking to ~~someone else~~ someone else when I am halfway through a sentence.





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**c4DM:** *telcom* cards that will fit Dolby *cat 22* compatible frames.

**E112:** 2-channel encode and/or decode.

**E312:** 2-channel automatic switching.

**E322:** 2-channel automatic switching transformer balanced.

**E122:** 2-channel transformer balanced.

**E114:** 4-channel electronically balanced.

**E124:** 4-channel transformer balanced.

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**413/16** and **413/24:** 16- and 24-channel racks respectively, automatic switching.

**ANT Nachrichtentechnik GmbH, Fachbereich Electroakustik, Lindener Strasse 15, D-3340 Wolfenbittel, West Germany. Tel: 05331 83 364.**

**UK:** ProBritto, 35 Britannia Row, London N1 8QH. Tel: 01-226 1226.

**USA:** ANT Telecommunications Inc, Avenel Business Park, 211 Perry Parkway, Suite 4, Gaithersburg, MD 20877. Tel: (301) 670-9778/9779.

## Bel

**BC4:** modular multichannel simultaneous encode/decode noise reduction system giving 30 dB noise reduction. Can be supplied 8- or 16-channel, 2U 19 in rackmounting, -10 dB or +4 dB operation.

**Bel Electronics, 3 Horwood Court, Bletchley, Milton Keynes MK1 1RD, UK. Tel: 0908 641063.**

**UK:** Studio Equipment Distribution, 14-15 Cam Square, Wilbury Way, Hitchin, Herts. Tel: 0462 422622.

## Crystal

Single-ended noise reduction system comprising the *DNE Proline* stereo and *ECD Proline* 8-channel systems, both available balanced or unbalanced.

**Tontechnik franz J Vilter, Engerstr 62, 4806 Werther, West Germany.**

**UK:** gtc, Malby House, 5 Fulmer Drive, Gerrards Cross, Bucks SL9 7HH. Tel: 0753 884319.

## dbx

**Type I:** professional noise reduction comprising *150X* stereo simultaneous encode/decode, *911* single-channel encode/decode system for *900* series rackmounting and *K922* single-channel unit which fits into a Dolby rack.

**Type II:** noise reduction for VTRs, U-matics and low speed tape recorders comprising *941/942* encode and decode pairs for *900* rackmounting,

new *900* series *929* single-ended NR module, and *140* 2-channel system.

**dbx Inc, 71 Chapel Street, Newton, MA 02195, USA. Tel: (617) 964-3210.**

**UK:** Scenic Sounds Equipment Ltd, Unit 2, 12 William Road, London NW1 3EN. Tel: 01-387 1262.

## Dolby

Dolby manufacture type *A* noise reduction and the *Spectral Recording (SR)* system, which has a noise reduction function.

**Cat No 280:** single-channel *SR* module for use with model *360*, *361*, *365* and *M* series frames.

**Cat No 431:** single-channel *SR* module for use with *XP* and *SP* series multitrack frames.

**Cat No 22:** single-channel *A*-type noise reduction module for use with *360*, *361*, *362*, *365*, *M* and *SP* series frames.

**Cat No 331:** single-channel *A*-type noise reduction module for use with *XP* series frame.

**Model 361:** single-channel unit record or play (auto changeover) either *A*-type or *SR*.

**Model 365:** 2-channel unit independent record or play either *A*-type or *SR*.

**XP series:** multichannel frame for *SR* or *A*-type (up to 24 channels).

**Model 372:** portable 2-channel *A*-type noise reduction unit.

*SR* and *A*-type are also available incorporated within Studer *A820* and Otari *MTR100* multitrack tape recorders.

**Dolby Laboratories, 346 Clapham Road, London SW9 9AP, UK. Tel: 01-720 1111.**

**Dolby Laboratories Inc, 100 Patrero Avenue, San Francisco, CA 94103, USA. Tel: (415) 558-0200.**

## Rebis

**RA220:** High Com system manufactured under licence from Telefunken. Full double-ended simultaneous encode/decode noise reduction system with optional module for single-channel simultaneous encode/decode or relay for switching. Available in 8-, 16- and 24-channel packages.

**Rebis Audio Ltd, Kinver Street, Stourbridge, West Midlands DY8 5AB, UK. Tel: 0384 71865.**

**USA:** Rebis US, 2093 Falkener Road, NE Atlanta, GA 30324. Tel: (404) 633-6626.

## Symetrix

**511A:** (new version of *511*) offering 30 dB stereo single-ended noise reduction in a 19 in rackmounting package.

**Symetrix Professional Audio Products, 4211 24th Avenue West, Seattle, WA 98121, USA. Tel: (206) 282-2555.**

**UK:** Sound Technology (UK) plc, 6 Letchworth Business Centre, Avenue One, Letchworth, Herts SG6 2HR. Tel: 0462 480000. □

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Tel: (01) 544029

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**TASCAM**

# THE ATR80-24



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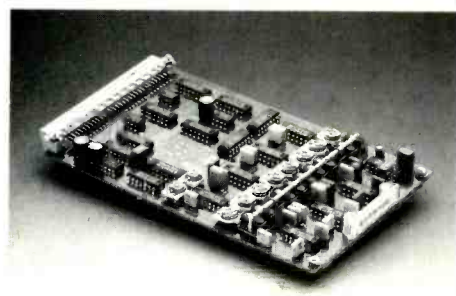
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Telecommunications



The new c4 E card uses the latest SMD technology.

**J**igsaw Studio owner Dave Williams knows exactly what he wants out of his studio and, more important, how to get it.

It's not that he ignores what everyone else is doing, he just has his own well-defined philosophies.

For a start the studio is situated out of town in a Croydon suburb, in a residential street, which to all intents and purposes is oblivious to its existence. Hardly the heart of the recording industry. It is therefore easier for Dave and wife/partner Sue Williams to pursue an alternative path, removed from the customer and equipment battles that are fought daily between the London facilities. A studio with an individual approach also finds it easier to maintain regular clientele.

Jigsaw is not the most expensively equipped studio in the country but it has been put together with painstaking consideration of both musical and technical requirements and

Williams, in all sincerity, would not change anything for all the tea in China.

As with so many studios this one began as the 'home studio in the front room'. The front room is now the studio room, the control room an extension later built on.

"We got a bit carried away. The

studio started eight years ago when we went 8-track with an AG440 and Trident *Fleximix*. That was a good little set up but we progressed from there to a 16-track MCI, still with the *Fleximix* which was just about big enough to cope. We used that set up until three years ago when we changed to a Soundcraft 2400 console. This coincided with the digital reverb explosion—the console therefore had to have a lot of facilities. It has 28/24 plus 24 returns, which gives a maximum of 72 events per mix."

Williams' recording career began when he left school and joined Decca as a tape op in their studios. The musical approach to recording which was practised by Decca complemented his own interests and talents.

"I was always more interested in the musical aspect. It's different now, all you really need is a good set of ears. The technical side of it isn't anything great from the operational point of view."

The studio has grown out of Jigsaw Music production and publishing—the benefits of having an in-house operation are obvious. The workload is currently split 50:50 between in-house and outside projects.

"We will probably go more in-house. A commercial studio is not a good proposition—there are probably better investments," he remarks drily.

Jigsaw Music Publishing started in the '70s.

"We find artists to work with and develop until they are ready to make records which we then lease to the record

companies. Too many people present themselves to record companies before they are ready, often simply because they don't have the money to work on their music and recordings themselves. But the record companies aren't really developing acts these days the way they used to. We have just started our own label to be distributed through EMI.

"There is a lot of talent in the UK but it's not necessarily in the charts. When punk came along it wasn't good music but it did beat the system and that's what we want now. It would be better if the UK record companies didn't think solely of this country—and that as only Radio 1. A lot of what is in the charts doesn't really reflect what is selling around the world. Germany, Europe and the States don't have the same attitude so that is where we are aiming our acts.

"During the punk era you could go into a garage, bash it out, record it 4-track put it out and have a hit. Now there is a certain standard of sound but a lot of the bands can't afford to go into a studio like that. We are hoping to get together a UK label which is licensed to different companies all over the world—that was really the point of this studio. We have a new British rock band and our first deal for them was in Germany. It's a much bigger market there than in the UK anyway. That's where we are going to concentrate our efforts for the moment.

"I don't think you can rely on outside bookings to make a studio viable. Just about when we got the 16-track in 1979 there was an enormous recession and studios were going out of business left right and centre. You started to get caught up with taking bookings just so that you could buy more equipment."

He cites Stock Aitken and Waterman with their PWL studios as a prime example of the way of things to come.

"That's the future for studios; you've got to build things. You have got to find artists who are going to hang around. If you have a hit record in this country it doesn't mean anything in financial terms. The radio is just wallpaper now; people set too much store by it. You need artists that you can build and who are going to have some longevity. You only need one big success and then you can do everything else you want to do."

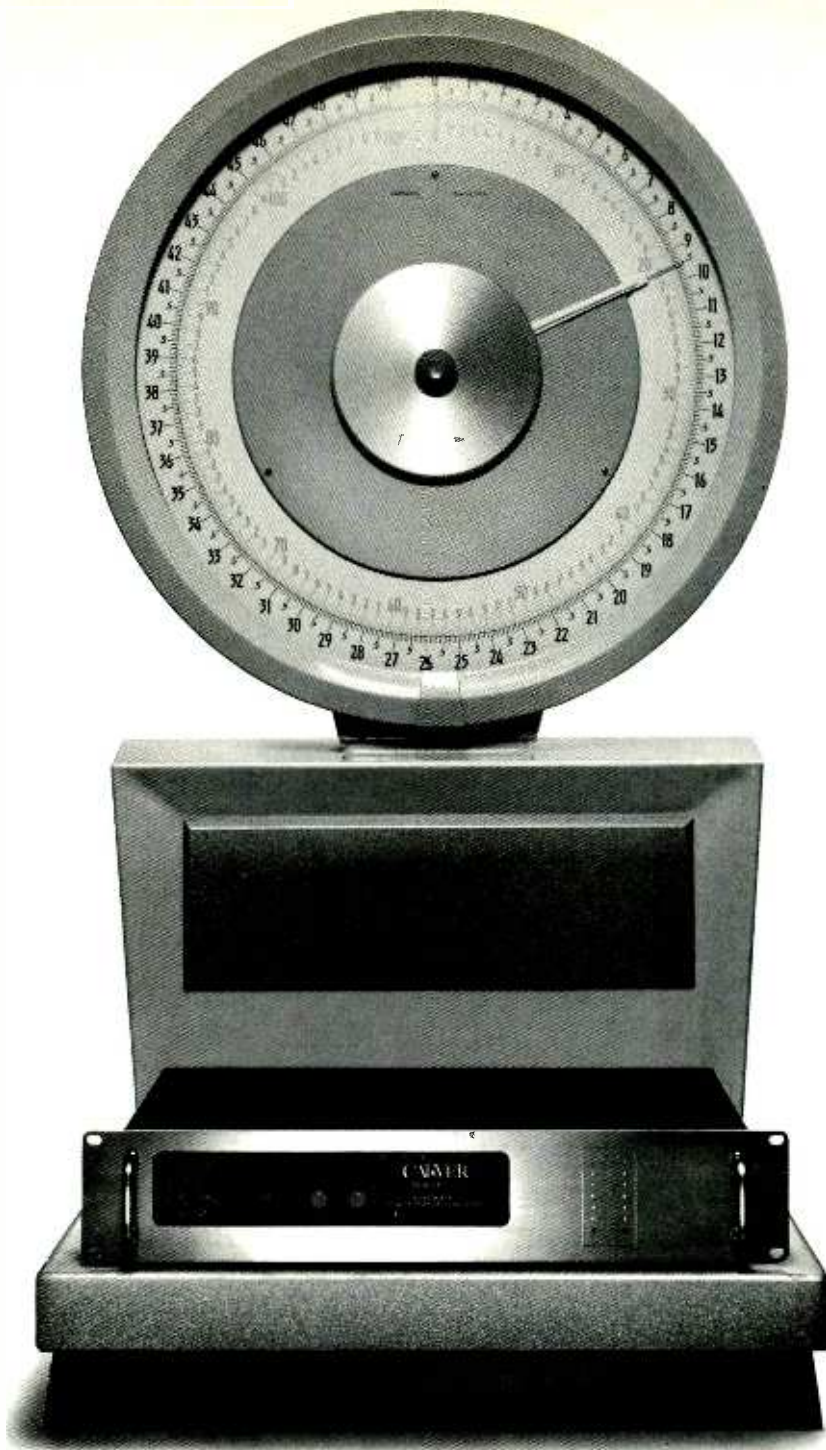
Money isn't everything when it comes to putting together a recording facility. This one wasn't exactly scientifically constructed, using ears rather than measuring equipment and technical know-how.

"But it sounds good; I would never change it even if someone gave me the money. It has just got a character which

# JIGSAW

*Janet Angus visits Jigsaw Studios in the London suburbs away from the bustle of town*





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**Sound Control**, Dunfermline, Fife. Tel: 0383 733353 and at: Edinburgh, Dundee, Glasgow, Kirkcaldy. **Windmill Munro Design Ltd.**, London W1. Tel: 01-434 0011.

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was accidental and it cost next to nothing really, compared to what people do spend on studios.

"I think that's what's missing now—everyone is following the commercial route, which is what people think everyone wants. But sometimes the use of unusual things can sound brilliant. A studio is a very personal thing. The sound is all part and parcel of the music and they both interact. People are really forgetting how to play. I am very much involved with the music side of things but it's all one and the same to me. There is nothing you can do with a mixer that will make someone who is boring, with a song that is boring, sound good.

"You can get bogged down with the technology—you're always reading manuals. There are manuals for everything. But the combination of machines and people playing can be good. People are very used to accurate timing now; that's one thing machines have done. They have got a place as long as they are not playing it all. Some people can make three *DX7*s sound better

# JIGSAW

than a *Synclavier* because they understand programming and they are musical too, that is they know when to sequence

and when to play. A lot of musicians got left behind when this technology arrived because they weren't prepared to look at it. Now we have got people who can't play but know how to program.

"In America they have a lot of people who can play but who can also program—and know when to stop. There is a case for using machines and samplers as long as you can get the energy. Just use what's right at the time. There is something very unnatural about sitting in a room with just a guy and a bank of synthesisers with wires coming out of his ears. If you're working with a band you get into the feel of it all. People should perform, not look at TV screens night and day."

When the Soundcraft console and MCI 24-track arrived a decision had to be made whether or not to retain the MCI 16-track.

"I had to decide whether to trade it in or not. I wouldn't actually fetch that much money so if I could keep it as well as get the 24-track I decided that would be good. The 16-track machine sounds better on things like drums—instruments with a lot of dynamic—because you can get a much punchier sound. So we got a *Q.Lock* and now have 40 tracks available. A lot of the time we do use both machines, using either one as a slave. The

extra headroom on the 16-track is definitely an advantage.

"When we bought the *JH16/24* it was just about the time that MCI had got everything on it really good. Soon after they brought out the *JH24/24*, which was transformerless. They had some problems with that and eventually had to modify it to get it to sound like the previous machines. Ours sounds so good and you can drop in whole tracks and not be able to hear it. We bought it from Radio Clyde, stripped it down, replaced the tape heads. It has the same electronics as the 16-track. Our maintenance man Colin Broad has hot-rodged it up even more."

They followed a period of mastering on Sony *PCM-701*, which eventually was superseded by a Studer *A80 ½ in.*

"We couldn't really edit. The *701* sounds good but the editing problems were getting ridiculous on 12 in mixes. So we decided to stick with the ½ in format, which has got the warmth of analogue and it is a proven format and, of course, we can do all the editing we want.

"Without console automation you need to be able to edit. I also think that without automation you get spontaneity with mixing. For certain types of music, automation is great. But some mixing accidents are brilliant and you would never get them on a computer mixdown.

"It was primarily the editing that made us go back to ½ in but both digital and analogue have their points. Digital is a very bright and true medium. The analogue sound when it hits the tape becomes warmer because it is not completely flat across the frequency spectrum. It has a better bottom end and digital has better top. There is the unreliability factor of domestic video tape machines, which don't seem to me to be the ideal way to be recording masters anyway. If R-DAT becomes available and there are not too many problems (it is reliable and sounds good) it might be different. But I think rock music on analogue sounds better. Energy music sounds better analogue.

"The main thing is that however you achieve the finished result it really doesn't matter. Some studios make a band so nervous and so pressured that the energy doesn't come across."

The Soundcraft *2400* was chosen primarily for its sound. Williams had used a *2400* in other studios and also found it versatile.

"It can be quite lethal sometimes—it's not ultra subtle—but it has got a sound of its own, and a lot of facilities. With the use of the *Q.Lock* we have more than enough channels. It is very good value for money.

"It is also a question of cost. This studio is middle market. For rock music this has a good sounding room and a good desk. People who use it understand the music, they are not 'hi-tech'. I don't think I want to get into that league—just servicing the loans must be horrendous."

Jigsaw is one of a fast growing number of studios which offers an individual and affordable alternative for track laying prior to mixing at, for instance, an SSL facility.

"We have got to the situation where people are going into an SSL studio, sticking up one microphone to record a vocal, and spending all that money for the privilege. People are beginning to realise the folly of that.

"It would be good if studios here followed the US example where they are more individual. They're all the same here and people just go from one studio to another using exactly the same equipment and, often, the same acoustics as well. I don't think that's particularly interesting when it comes to making music. The character of a studio can make a record. Until you start getting different studios you will have records sounding the same. It's not too fair to lay all the blame on the manufacturers because the record companies seem to want everything to be the same."

Control room monitors have given way almost exclusively to nearfield monitoring at Jigsaw.

"We've had a pair of Tannoys and then JBLs—you can't really knock them because they were great for what was wanted then but because they were sitting here for two years and very rarely used, we took them out. They just tended to get used by people who didn't really know better. When we bought the ½ in machine it had to go where one of the monitors was and then the keyboard table had to go in the other corner, so they went!

"Nearfield is so much truer and if you are working for long hours it feels fine. If it sounds good on these then it is good. I was a bit worried about the low bass end on the nearfields but they're fine. If you're using big monitors you've got to build the





# Some quotes to make you think hard (disc).



"We've just completed our first film for Cannon Films completely on AudioFile without reverting to mag stock in post production. We can't see anybody wanting to work the old way once they've worked on AudioFile."

Vic & Linda Radulich,  
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John Wiggins,  
HBO Productions, New York City



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Wylie Stateman & Lon Bender,  
Soundelux, Los Angeles.



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John Binder,  
Editel, Chicago.



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room around them to get the right response."

Eight years ago the Williams' built an extension on their house to accommodate the new control room which, built on the room within a room principle, incorporates a quantity of Rockwool and "a few traps, but it was no big deal. The studio itself we just put up, went round playing a few instruments and put things on the wall or took them off until the sound was right."

The studio parquet floor is covered with a sectioned removable carpet to enable varying of the acoustic. A brick chimney breast has been retained and is sometimes used for bouncing sounds off. The walls are covered in acoustic board.

"It sounds completely untechnical because so many people spend fortunes on their studio designs."

When the 24-track equipment was installed mic lines were wired into the adjoining garage, which is sometimes used for recording or simply as an ambience chamber.

"We've got a few bikes in there; if you want to change the acoustics you just take some of the bikes out. You can't recreate that sound

# JIGSAW

on digital reverbs. Digital reverbs are great—I couldn't live without them—but a proper echo room can't be reproduced."

The outboard complement though not extensive is thorough and carefully planned. "I tend to buy equipment for what it sounds like as opposed to what everybody else likes or wants. You can't possibly please everybody if you try to follow fashions. We've got a good lot of outboard gear but not fantastic quantities; just what you tend to use."

Trident *CB9066* parametric equaliser: "It's just high, mid and bottom but you just get a fantastic sound. I think it is all handwired and all transistorised but I don't tend to worry about what's inside; just what it sounds like."

Drawmer noise gates: "I can't live without them."

Bel *BF20* flanger and *BA40* delay flanger: "They've got a sound of their own."

Roland *555* chorus echo: "At the time the only other thing around really was the AMS. There is just something about the sound and I still tend to use it for certain things in preference to the higher quality things."

UREI *LA4* compressor/limiters: "I use these for changing peaks without changing the quality of the sound. They have an in-built attack and release time. So if you have a very spontaneous singer you can almost set this up without listening to it. You're going to know more or less what you're going to

get. Especially with singers you have got to get it down quick; spontaneity is pretty important and so the reliability factor is also important. I would use the Drawmer *221* compressor if I have a bit more time."

MXR dual compressor: "This also has a sound of its own that is good for certain things."

Lexicon *PCM70*: "I'd rather have six of these than a *224X* because we tend to record with a lot of effects so we need as many as we can. I'm very impressed with the *PCM70*; it is a very high quality sounding unit. A lot of cheaper equipment has more programs but not the sound."

Tubetech *EQ PE1A*: "Particularly good on bass drum; I also use it for snare drums and vocals."

Yamaha *SPX90*: "For the money it is great."

The first reverb Williams ever bought was a Roland *2000*: "I have tried the Yamaha *REV7*, etc, but found that the difference between that and the Roland, although possibly a bit noisier on the returns, was marginal. All it has got in it is reverbs whereas other units have delays, pitch shift, automatic panners—this is purely reverb. The bandwidth on the *SDE3000* delay we have goes up to 18 kHz. I still want to get hold of a Lexicon *PCM60* for that Lexicon sound. There is a case for having some preset reverbs because it stops you getting caught up with the various programs and parameters—before you know it you've lost whatever it was you had on the track. Lexicons are my favourite sounding reverbs.

"We have got everything we need and we have got a lot of things—I think it is better than buying one unit costing several thousand pounds. This is quite an exciting time with all the new technology. People have gone through that period of thinking they have got to use the equipment because it is here. I certainly couldn't work without the technology but it is like having a tool kit—you just take out what is right for the job. I've been thinking, I don't really want any more equipment. If you read all the literature that came through the door you'd never get any work done.

"You have to pick your area. If you are going to have a studio you have got to aim it at what you want to be doing. We are looking at Germany and America, at the more long-term album market—rock music, not the machine music we have over here. You just have to go and make the music where there's a demand for it. It never goes away. You just do what you are good at; it is disastrous to try and do it all.

"We are getting out of the studio what we want. I've got no great plans to change anything." □

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# COMPRESSORS AND LIMITERS

The technology may differ but basic principles remain little changed.

Mike Beville looks at the uses and abuses

There are many uses for limiting and compression but typical applications include system overload protection, so avoiding distortion or even damage; reduction of dynamics to make a more acceptable or comfortable range of sound level; and increasing loudness or creating impact.

## Function

The compressor-limiter is primarily a linear audio amplifier with a voltage-controlled attenuating element. The control voltage is derived from the signal being processed in what is known as the 'side chain'. The characteristics of the side chain will determine the dynamic performance of the system: its sensitivity will establish the threshold level (the point at which gain reduction commences); its loop gain above threshold will control the slope or ratio (the relationship of input to output level); the way in which it integrates and derives the control signal will establish its attack characteristics, whether it be peak sensing, averaging, RMS or other. The speed of operation, or attack-time, will depend on the integration time and any additional CR network. The recovery or release time is normally controlled by CR networks, either singly or in a multiple arrangement. It is primarily the range of attack, release and slope characteristics that determine performance possibilities and application.

## Limiting

Limiting implies the use of a level control system to give overload protection; its purpose is to 'limit' the signal at a specified level. The amount of overshoot (the amplitude of a transient allowed to exceed the steady-state limit threshold) will be determined by the attack time. The effect of stopping every transient, no matter how fast, is likely to result in a lower average level, with audible side effects such as a 'gritty' sound and switching spikes. Delay-line techniques, of course, can have a zero overshoot without these side effects but will still result in a lower than average modulation level.

There is a consensus of opinion which suggests that it is better to have limiter attack times of some 250  $\mu$ s to 1 ms, allowing the very fastest transients (which will not be visible on a PPM) to overshoot and in the extreme instance saturate the tape. Such an approach preserves the wave front information that essentially gives the transient its characteristic, reduces side effects within the system, and increases mean level for a given amount of gain change.

Where ultra sensitive systems are involved—as in the case of AM transmitters or PCM links—a diode clipper is usually incorporated. Extensive tests conducted by the BBC many years ago demonstrated that a limiter with a medium attack time followed by a diode clipper some 2 dB above the limiter threshold, sounded more satisfactory than using a super fast attack time.

The compression ratio in a limiter will need to be greater than 10:1, and will typically be of the order of 20 or 30:1 (see Fig 1). Although units are available with even higher ratios (100:1), it will be appreciated that in normal use the difference between 20 and 100:1 will be microscopic in terms of increased output and the tighter slope will be certainly more audible.

The action of limiting must involve a peak sensing side chain as it is peak level that is being controlled. When limiting, programme dynamics are not greatly modified since gain reduction—when it does occur—is usually momentary, of small magnitude and relatively short duration (a fast release time being usual so that the action of recovery is inaudible).

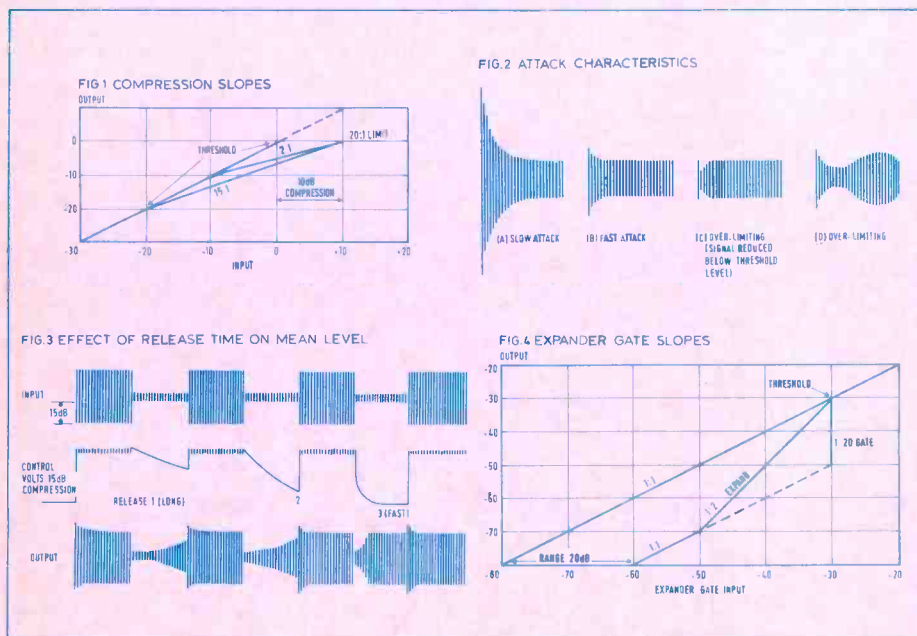
However, 6 dB of limiting can make all the difference between background noise being audible or inaudible. The action of limiting thus allows an engineer to reduce his 'headroom' or overload margin, and thereby extend the dynamic range of his recording or transmission medium without fear of overload. In the limit mode, the compression ratio is said to be 'tight' because whatever the increase at the input, the signal level at the output cannot rise significantly.

## Compression

Compression is used to describe conditions of gain reduction that are more or less continuous; the original dynamics are compressed or reduced. Compression ratios may be anything from the softest slopes (typically 1.5 or 2:1) to the tightest 'limit' slope, depending on the effect required. The ratio simply specifies the relationship between the input and the output levels. The normal relationship in an amplifier is 1:1; in a compressor or limiter this relationship changes above the threshold point and the output level rises at a slower rate compared to the input. For example, if a 2:1 slope is selected, for every 10 dB rise above threshold at the input the output increases by only 5 dB (see Fig 1).

When it is desirable to compress, yet retain the maximum dynamics within the signal content, it is preferable to use a soft slope with a slowish or multiple release time. For a given amount of compression or gain reduction, the threshold on a soft slope will be lower than for a tight limit ratio. The same compression effected on the two slopes will sound different: on the 2:1 slope it will hardly be detectable, while at 20:1 it will be more noticeably stopped or limited.

Some manufacturers have favoured the use of a gradual transition into compression, the so-called *soft-knee* approach where the threshold is a band of increasing compression ratio rather than a single level point. This is intended to give a less noticeable transition although this depends considerably on the unit's design.



NB: This article was first published in its original form in Studio Sound October 1977.

## Attack time

Attack time will determine the characteristic and size of peaks allowed to pass through the system prior to attenuation; in effect it will dynamically modify the static sinewave response of the compression ratio. Slow attack can be observed on a PPM as overshoot, and is apparent aurally as a softening or easing on a tight limit ratio. As attack time lengthens, a subtle change takes place in the spectral energy balance as increasingly high frequency content passes unattenuated and, in extreme cases, can lead to sibilant accentuation. Slower attack times are

useful especially when considerable compression is required with a tight ratio for maximum impact on an instrumental track (eg bass or drums).

Fig 2 shows various attack characteristics on a pulsed sinewave; 2a and 2b show good waveform envelopes as the signal is smoothly attenuated to the threshold level; 2c and 2d are examples of overlimiting and poor design and will sound constricted.

## Release time

Release time is very important since it determines the moment-to-moment gain change in the system, which in turn controls loudness. Under conditions of considerable compression, very fast release time and tight ratio, the medium and low level signal content is raised to peak level (see Fig 3), thus increasing *subjective* loudness. (The definition of subjective loudness: sounds louder but is at the same peak level.) In the extreme, fast gain change becomes noticeable as 'pumping' or 'breathing'—the effect of background ambience and reverberation rising and falling in level. Pumping and breathing can be used for effect but when unwanted can be minimised by either increasing the release time (or using a programme-controlled release network), reducing the amount of compression or softening the ratio.

A programme-controlled release is obtained by means of a multiple network that gives two or more release times, depending on signal level. It is intended to provide maximum gain change without pumping effect. Usually this means a fast release over 4 to 6 dB gain reduction before turning into a medium or long recovery time. The effect is sometimes described as a gain riding platform, and is ideal when considerable overall long term compression is required (eg AM broadcasting).

Where a fast rate of compression is essential, side effects can be greatly reduced by recording in a dead acoustic with good separation and compressing prior to tape. By reducing reverberation, ambience and any cross mic pickup there is little to indicate that gain change is occurring, and the engineer may be surprised at how much compression is possible. It should be noted that as the release time becomes shorter, low frequencies are increasingly flattened by the attacking action on each cycle. Fortunately the ear is very tolerant of LF distortion. In practice, therefore, this is not a major problem and can be used for effect (slowing the attack 'rounds' the distortion), and in any case is completely under the control of the operator. For bass instruments a release time of greater than 0.4 s will give a totally clean sound.

## Noise and modulation effects

Self-generated noise in compressors is rarely a problem in professional units. However, source noise can be raised through the action of compression on acoustic noise such as ambience, rumble and spill-over from other instruments. If you compress off-tape, a 15 dB gain reduction means an increase of 15 dB in tape noise (unless you use an expander). Even so, one should remember there is little or no masking of HF noise with a bass instrument, and it will be best to obtain the required sound before going on tape.

Modulation of the signal by specific instruments can best be avoided by compressing individual or

groups of similar instruments. There is then no dominant line to modulate another. It is impossible to limit a high level LF signal without a most obvious and objectionable modulation of high frequency signal and ambience (unless bandsplitting techniques are used). Such sounds must be treated as a separate track—get it tight and well controlled on or before the final mix-down.

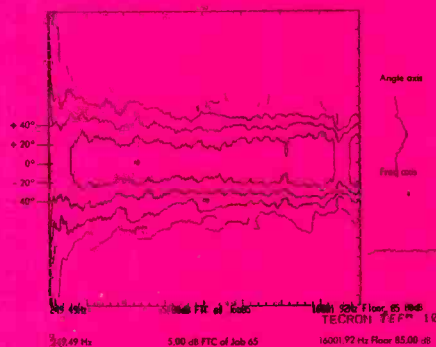
There is often the need to compress a balanced programme where the dynamic range of the new medium may be more restricted. Modulation effects can be minimised by using a soft slope, a programme controlled release or an averaging side chain. Some units incorporate or make provision for the insertion of equalisers into the side chain to modify system response. Cutting the LF content will reduce any modulation effects caused by bass instruments, so that compression is controlled from the mid-band signal. This can only apply to compression, since limiting may produce sudden surprises as LF signals exceed the established limit threshold.

Boosting frequencies in the side chain can also be used to advantage. An HF lift can predispose the

compressor to operate on sibilants—with a variable frequency equaliser the engineer can find and boost the sibilant frequencies. Normally a tight slope would be used, along with a fast release and attack time. Compressor gain would be adjusted so that attenuation only occurred in the presence of sibilant signal. This is best done on a separate vocal track to avoid modulation of the whole programme.

Compressors need to incorporate some system gain (typically 20 to 30 dB), which means that normal line levels can be compressed by the amount of gain available, yet still appear at the output at the standard operating level in the chain. This allows comparison between the direct and processed signal.

A conventional compressor limiter usually offers a range of ratios (eg 2, 3, 5, 10 and 25:1) but while the operator might prefer to use the softest slope (2:1) this can only be done on a well controlled signal. On a more unpredictable signal (for example, vocals) one might feel the need for overload protection as well as compression. On such a system a compromise must be struck by selecting a 5 or 10:1 ratio, which may not be



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# COMPRESSORS AND LIMITERS

quite so good artistically. In the more exotic units, it is often possible to compress at any ratio yet retain a limiter slope over the compressor. It is usually possible to vary the relationship between the compressor and limiter thresholds, so determining the amount of compression before the onset of limiting. Simpler systems may adopt fixed thresholds that, after say 10 dB compression, tighten to the slope of a limiter. Both approaches would allow the use of the softest slopes without fear of overload.

## Expansion

The addition of an expander or gate greatly adds

to the effectiveness of a unit. Besides reducing the increased source noise due to compression, the expander section can clean up tracks and dramatically reduce cross mic pickup from other instruments.

Gates are rather like limiters in reverse: typically, for a change of 1 dB at the input, the output falls by 20 dB, the rate being dependent on release setting. They can work well on punchy, well-defined dry sounds but due to the switching type characteristic are usually critical to set up (see Fig 4).

The expander may be likened to the compressor, except that it is operating on a low level instead of a high level signal. The softer the slope, the easier it is to use without modulation side effects but the softer the slope the less useful it is in attenuating noise effectively. In most recording applications, the purpose of an expander gate is not to expand the music but to get in below the low level signal and attenuate the channel gain

in the presence of noise only.

Imagine that on a particular programme the noise lies 10 dB below the wanted signal. By setting the expander threshold just under the music, it will be possible to lower the noise by a further 10 dB with a 2:1 expand slope. At this point it will be held on the noise itself. A tighter slope, of say 4:1, would increase the separation to 40 dB but be more susceptible to modulation effects.

For general track attenuation, a combination of peak sensing and averaging appears to be the correct side chain characteristic, so that it opens quickly when necessary yet modulation effects are reduced on decaying signal. For creative work the peak sensing side chain may offer greater options.

## Matching

Stereo matching is a very important aspect since gain reduction must track very closely if there is to be no image shift during compression.

Although mono units are sold with coupling possibilities, the potential user should establish the manufacturer's stereo matching tolerances, since this is rarely stated. Purpose built stereo units are likely to be more predictable in performance.

## Metering

Gain reduction or compression is normally indicated on a meter or light system. Whatever the quiescent gain established in the device, this shows the moment-to-moment gain reduction occurring in the channel. In a combination unit, it could be limiting, compression or even expansion (although in the latter case there is usually some other indication of what section is functioning). In addition to showing gain reduction, it is customary for the meter or bargraph to give a visual indication of release time. Clearly in the case of the meter, accuracy depends a lot on the ballistics but it is normally a good guide to the rate of gain change going on in the system. One should remember that although there may be a high compression reading, this does not necessarily mean that there is a lot of gain change operating—an indication of increased loudness will be the rate at which the meter moves. For little movement there will be little increase in loudness (other than the long term increase in lower level signal); where the change in dynamics within the music is faster than the release time, the music will hardly be affected whatever the amount of compression shown. It may be said that the rate of gain change determines loudness.

VU metering is still widely used in studios, however, since it doesn't indicate peak level a variation in setup procedure may be considered advantageous when using a peak sensing compressor limiter. If it is set up on tone, the VU will probably under-read by 6 dB when operational on a compressed or limited dynamic signal, and only approach 0 VU under conditions of fast gain change. Bearing in mind that any system that uses VU monitoring must have good headroom (peaks in excess of 10 dB being not uncommon), it makes sense to set up under dynamic conditions so that the meter reads 0 VU at least. Using fast attack in this circumstance the engineer can be confident that peak level is being well controlled some 6 dB higher without fear of sudden overload—well within the normal operating range. This may not apply to an RMS



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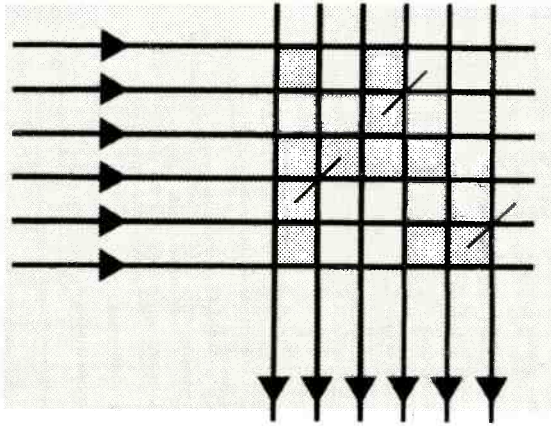


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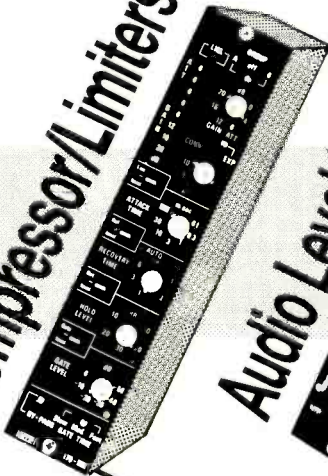
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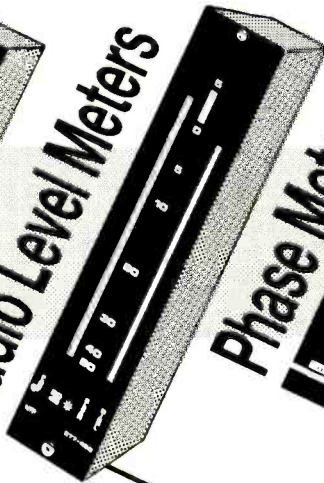
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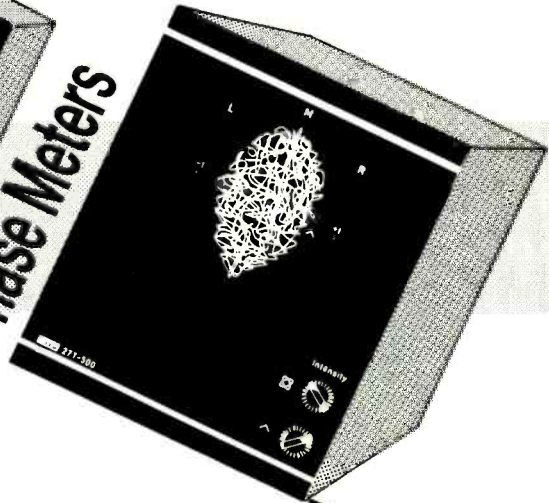
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# COMPRESSORS AND LIMITERS

or averaging device where peak levels may be less predictable.

## Application notes

In any recording work, whatever the musical style, it will be best to apply compression to the sections needing it, rather than overall. Where this is not possible, gain reduction will probably be restricted to some 6 to 10 dB, if its effect is to be inaudible. Up to about 6 dB can be accomplished as limiting with a fast release (fast enough so that recovery is inaudible); over this it may be best to use an automatic release network, where possible, with a soft slope and the limiter coming in on top. In this way maximum dynamics are retained.

## Studio

The effect of compression on signals containing plenty of presence frequencies, especially with ambience (ie choral work), is for the signal to recede as gain reduction takes place. Using the soft slopes will allow the sound to really get louder and reduce the impression of a receding image.

Using a tight slope on bass or bass drum, with fast release and medium or even slow attack, will give a bigger sound as the decaying signal is lifted to the level of the initial peak, creating a sustain. The acoustic will considerably affect the character of the sound, and is worth experimenting with.

Piano will come through well using a tight slope, medium/slow attack and fast release. The same goes for vocals in a rock group where high mean levels must be maintained to retain intelligibility. Some presence can be added after compression to help. More normally, the use of the softer slopes on vocals will retain expression and dynamic range. Compression with fast release will compensate for movement around the microphone.

Where direct injection is possible (for example, on bass, rhythm, lead and keyboard instruments), it can be worthwhile compressing the direct signal (to avoid spurious pickup) and mixing this with acoustic pickup.

Weaker instruments (like violins) can be given more body by compression; care must be taken, however, to watch out for pickup from foldback headphones. If this happens a good expander will maintain a clean track. With vocal or handclap overdubs, pickup from cans will be a problem; in this case impressive cleanup can be achieved with a gating action.

Gating or expanding the bass drum (depending on separation) can also be effective. A fast attack will give a sharp edge (like a stick), while slow attack will create a mellow, rounded 'leather pedal' sound. With fast release, the threshold should be adjusted until maximum cleanup is obtained.

When there is a lot of splash from cymbals (the mic was probably wrongly placed) it may be best to use a slower attack to respond to the drum rather than the cymbal. A gate with a frequency conscious side chain could be helpful.

Selective expanders or dynamic filters have proved to be useful. A highpass version can be used to attenuate low level acoustic rumble or

electronic hum, until sufficient wanted LF is present to mask it. At this point the system would be adjusted to give a flat response.

Similarly, a lowpass dynamic filter can attenuate electronic hiss or high frequency splash around a bass instrument, or be used with guitar and keyboards—opening to give a flat response in the presence of wanted HF transients and signal.

## Classics

In classical recording where high level compression causes a reduction in upper level dynamic contrast, an alternative form of compression can be arranged.

When a limiter compressor is placed in parallel with the direct signal, it is possible to obtain low level compression, the advantage being that the slope gets progressively softer as level rises, until finally returning to a 1:1 condition. In order to retain a correctly related internal dynamic balance between the original and compressed signal, it is essential to have a very soft slope with low threshold level. Compression commences just above the lowest signal level, this way the compressed signal can be a true reduction of the original.

Happily one of the effects of arranging the compressor in parallel is to soften even further the slope selected: for example, the 2:1 ratio is reduced to >1.5:1, while a 1.5:1 slope becomes 1.25:1 with a threshold of 60 dB down on peak level. The procedure is as follows: adjust the direct signal for required peak output (if live signal it may be preferable to use a limiter on the final output); connect a compressor in parallel and select the lowest ratio available that will give 20 dB reduction; adjust the compressor to give 20 dB compression at peak input level; set the peak output level of the compressor to be 10 dB below the peak level of the direct signal. The two signals are mixed and the effect will be approximately 12 dB overall compression.

Although this is similar to the Dolby A arrangement, it would be unwise to use Dolby units as single-ended compressors since there will be considerable spectral energy distortion due to the action of the band processors. Plus the drawback that since Dolby units use a limiter slope the ratio will be too tight.

## Conclusion

A wide range of limiters and compressors are currently available to meet the many applications to which they are now put. Simpler devices, although in general easier to operate, must compromise on the range of options available, which in turn restrict their application in creative engineering.

By their very nature, units that offer greater flexibility require a higher degree of operational competence and discipline on the part of the engineer. It is essential that he understands what he is trying to achieve, and knows what must be done to get the effect he is after. It is inevitable though, that in inexperienced hands combinations of such widely varying parameters could produce disappointing results.

It is a sad fact that, due to occupational pressures, many engineers just don't get time to fully explore the possibilities of their auxiliary equipment; for those who do, the rewards can be high. It is so often the ability to produce that little extra something that brings recognition by an artist and earns an engineer accolade. □

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# SAM THERAPY

*Dave Mellor visits an upgraded  
Sam Therapy in London*

Those who have visited Paul Samuelson's old studio in London's Ladbroke Grove area will remember it as an ordinary-looking room, full of high-tech and pot plants. Its main claim to fame was as a programming room with Fairlight and just about everything else needed to make synthesised music. With a recording area of little more than vocal booth dimensions there was always a problem recording live instruments and Sam Therapy have taken the trend towards control-room oriented studios to its extreme.

Paul Samuelson has progressed quickly from running two 16-track machines slaved together to full 48-track operation, with a DDA AMR 24 console, two Otari MTR 90s and the new MTR 20 stereo machine. So the time came to improve the standard of the accommodation to match the level of the equipment. As Samuelson says, the clients now expect the premises to be a little 'posher', with indoor toilets and little things like that. The aim was to become a leading recording studio and move out of the middle price bracket.

The most important consideration, one which affects all aspects of further development, was of course finding a location. The usual teams of estate agents were dispatched but after four months of searching, none had been successful. Then one day Samuelson found himself looking out of his window at a building across the road: "I was looking everywhere around town, had all sorts of estate agents looking for me, then I saw some people filming outside a building called Canalot Studios. I thought it was a film studio but someone told me no, it was a collection of recently converted studio units for rent. I went in there and fortunately the one I ideally wanted was still available, on the top floor overlooking London. There just happened to be a film crew there when I spotted it."

The fountain in the courtyard, the decorative external passenger lift and the goods lift running from street level to just outside the studio door also helped to convince him.

"With regard to planning permission, this council regards studios as light industrial use. Different floors of this building have different ratings, some of it is industrial, some of it is office. The area I wanted had light industrial planning permission. I didn't have to apply, I was just straight in. We

were lucky, some people have a lot of problems."

Having found the site, with enough space for control room, studio area, programming room and kitchen, the new Sam Therapy Studio was under way. Andy Munro of Windmill Munro Design was appointed designer of the project. His brief from Samuelson was straightforward:

"I wanted to keep the daylight, the space and the ambience. I wanted the left and right speakers to sound the same. I wanted the control room to be totally quiet for digital recording."

Among the various noise reducing exercises was the positioning of the video monitor behind glass to eliminate the high pitched whistle that they can produce, which many people find distracting.

"The machine room had to be big enough to wheel in two Mitsubishi's, if I need to hire them. There is also full Dolby patching, via EDAC connectors, so that I can just go and ECAD in a set of Dolbys. I think it would be unwise to invest in noise reduction, the same as it is unwise to invest in a digital machine which can be hired for the same price as going to a studio which is already digital."

## *Building problems*

Budgetary considerations allowed Samuelson to take advantage of Andy Munro's design skills only, and not to engage him to supervise the construction and it is to Samuelson's credit that he was willing to talk about the setbacks he encountered. It would have been easy for him to gloss over the problems and only talk about what went right.

The building work was all carried out to Munro's plan, but by a builder inexperienced in studio construction. Isolation, between control room and studio, and between floors, was not as it should have been. Paul Samuelson explains:

"Some of the studwork wasn't up to standard. Where it was meant to be self-supporting, it was held up with nails, bridging the structures. We had to get in there and cut them out. Also, when doing things like offering up plasterboard to studding, they had it resting on the floor and plastered over it, so again they were bridging the structure by not leaving a gap where the neoprene should have isolated it. In addition to these problems, some of the wood had been damp when it was fixed up. It shrank as it dried out leaving gaps for the sound to get through.

"Andy Munro gave me a quotation to have one of his men



# UNIQUE SIGNAL PROCESSORS... ONE COMMON TRAIT..

**\*KEPEX II (Noise Gate/Expander)**—Nothing exceeds the KEPEX II's ability to eliminate leakage on drum tracks. The secret to the unit's success is its extremely fast attack, high ratio capability, and wide range (0 to 90 dB). KEPEX II's logarithmic release shape option is ideal for use with extremely fast release times to preserve natural decay and sounds, such as snare overring, while eliminating "popping", which is common in less sophisticated gates.

**\*GAIN BRAIN II (Variable Ratio Limiter)**—Other limiters struggle with Peak or RMS detection schemes that squeeze the life out of music, but GAIN BRAIN's response is variable and dependent upon the degree of waveform complexity, thanks to proprietary **LINEAR INTEGRATION DETECTION** circuitry. L.I.D. allows the GAIN BRAIN II to distinguish between the absolute voltage level of a signal and its loudness as perceived by the human ear. As a result, a vu meter monitoring the output of a GAIN BRAIN II will indicate a constant output signal level, while the listener will still perceive the dynamic range inherent in the program material.

**\*MAXI Q (Fully Parametric 3 Band Equalizer)**—Maximum equalization capability is what the MAXI Q delivers. Each of the unit's 3 bands may be switched to either the peaking or shelving mode or the "out" position, so that the operator may employ only the needed portion(s) of the equalizer. The MAXI Q's variable "roll off" rate in the shelving mode provides the opportunity to create artificial tonal or "phasing" effects. The exclusive **TUNE** mode of the MAXI Q allows the operator to disconnect the main audio feed, leaving only the output of the one filter selected. This feature provides exceedingly accurate set-up and application, since the only part of the audio spectrum which is heard is the portion passed by the selected filter.

**\*DSP (Dynamic Sibilance Processor)**—Users of de-essers have found that the devices are literally "ess removers," a high frequency limiter of sorts, quite effective on spoken word, but virtually unusable on vocal musical tracks and especially offensive on mixed program. The DSP's proprietary circuitry allows the unit to "seek out" sibilance, which is characterized by sinusoidal signal content. When sinusoidal information is detected, the unit's control circuitry inverts the tone, and sums it with the original signal, thus handily eliminating the sibilance. This action takes place instantaneously without

"holding" or coloring the original signal. The unit's **TUNE** mode allows the DSP to be adjusted simply by listening and observing the control status indicators.

**\*LEVELLER (Audio Level Controller)**—The wide spectrum of sounds, from musical instruments and voice to mixed program material, comes out just the way the human ear wants to hear it, sonically correct, when processed through the LEVELLER, thanks again to **LINEAR INTEGRATION DETECTION**. Fast, effective results are easily obtained with the LEVELLER. More or less "levelling" action is achieved with the unit's threshold control. There are no attack time or release time controls to adjust on the LEVELLER. **AUTOMATED PROGRAM DEPENDENCY** circuitry automatically optimizes the unit's attack time, release time, and ratio dynamically as the program content changes.

**\*COMANDER (Compressor/Expander)**—Our **SYMMETRICAL RELEASE COUPLING** circuitry allows the COMANDER to compress the audio signal for precise dynamic range control with complete freedom from noise level recovery, thanks to the unit's interactive expander. **LINEAR INTEGRATION DETECTION** ensures that correct musical relationships are maintained in the processed material, while **PEAK REVERSION CORRECTION** circuitry compensates for discrimination against low frequencies to eliminate "pumping" or "breathing," a common occurrence in conventional compressors.

Even the enclosures for the 800 series modules are special. The PR-2 is ideal for those jobs requiring only one or two processors. Identical modules, appropriate for stereo processing, may be linked via a convenient front panel switch.

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GEXCO is the worldwide exporter of the Valley 800 series and other high quality products for the recording, broadcast, and post production industries.

# SAM THERAPY

there full time. I couldn't afford it and wouldn't have been able to have gone as far as I have done with my budget at the time."

As a result of this experience, a team of Munro-approved builders came in and put things right, and also took the opportunity to float the control room floor. Previously only the studio floor had been floating but it was thought prudent to remove completely the possibility of complaints from neighbouring offices.

"I wanted to be able to play it as loud as I could without any comeback from anybody, and also be able to record digitally without hearing any outside noise. To sample pins dropping, that kind of thing. I really didn't expect the floor to actually resonate. What happened was that it took off, there were huge peaks at two frequencies downstairs when we spectrumed it out. We had to put in a false floor. We had already done it in the live room simply because we wanted to record digitally. I've since then increased my amplifier rating and I'm playing it as loud as I ever did and I haven't had a complaint from anyone so... success."

## Advantages

So, besides having had the opportunity of a rethink on acoustics, what makes Sam Therapy individual?

"You can hear more here than you can in a lot of studios and the control room is a lot bigger. The atmosphere is different

here. Daylight, sofas, flowers, pot plants, a collection of antique microphones...

"The air conditioning has four separate plants for the control room, the live room, the machine room and the amp rack, which keeps acoustic crosstalk between these areas to a minimum.

"I have things like a full video patchbay—wiring in Sam Therapy is by Lorn Campbell-Money—because there are a lot more things one can display visually these days and patch about the studio. All the SMPTE is going to be separated from the desk, with a separate SMPTE patchbay. There's also going to be a separate clock patchbay from the SRC going around the studio.

"MIDI-wise, I've got the Sycologic *M16*, with expanders, which is effectively a MIDI patchbay. That goes everywhere. I've got MIDI going to all the effects racks, amp racks, live room, control room, just about everywhere.

"Equipment-wise, I try to keep it the most sophisticated and as much choice as possible. My general outlook is that people shouldn't have to call out for anything. I have a sophisticated range of keyboards, a huge amount of outboards and general facilities here. If someone wants to do something, like even putting on a tambourine, I have a whole lot of percussion—you don't have to say, 'Where are we going to get a tambourine from at 3 o'clock in the morning?' We also have a full-time maintenance man."

Shortly to be added to the DDA *AMR 24* is Massenburg automation:

"The main consideration was to keep the noise performance of the studio. I've set my standards very high on this. The monitoring is excellent, the ambient noise level is extremely low. The Massenburg is a moving fader system so it's absolutely quiet. To put in VCA automation would have gone towards destroying all of that. The console will be extended to have 52 channels, making it a 52/24/32/2. The automation will have 62 moving faders."

Synchronisation, surprisingly some may say, is by Fostex:

"It's the *4030/4035* system and it's excellent, with an average lock time of less than three seconds. It's funny that a lot of home recording stuff is getting into the big studios but you have to sift through it. People look enviously sometimes at home recording products, wishing that some of the features were implemented on their more expensive units."

So what of the future for Sam Therapy? Paul Samuelson intends taking the plunge into digital multitrack in a different way.

"I've heard that the earthing arrangements can make a lot of difference to the noise figures of a studio. Now I've got an incredibly low noise figure so if I get another 3 dB, that will be amazing. We are going to run a technical earth and sink it in the canal that runs beside the building. I'm arranging for a diver to come and sink a copper pipe. It should be a hell of an earth."

"As far as digital goes, for my own personal satisfaction, obviously I'd like one but it's more important to have two *MTR-90s* full time in the machine room than perhaps one Mitsubishi and one *MTR-90*. People are prepared to pay for the privilege of having digital in there. If it was in-house they probably wouldn't, or they would try and do a deal. At this



Control room



Live room



## Why your next console should be as difficult to hear as it is easy to operate.

### The studio is more complex and less forgiving.

Electronic production techniques using MIDI and SMPTE sync require more control than a "wire with gain" can provide. But as functions and components accumulate, the console's signal path has grown more complex, and its audio performance has suffered. On analog recordings, higher levels of crosstalk, noise and intermodulation were an acceptable price for additional control. On digital multitrack, however, these flaws become glaringly obvious.

### Crosstalk blurs the stereo image.

Now that digital recorders have virtually eliminated crosstalk, this is an especially annoying problem. *The AMR 24 matches the channel separation performance of digital multitracks* because it employs balanced buses that eliminate crosstalk the same way mic inputs do. This radical design approach takes full advantage of digital's more coherent stereo imaging.

Balanced buses also eliminate the intermodulation that plagues the sound of conventional "virtual ground" mix amps. *The AMR 24's noise floor is constant whether you route one input*

*to a group, or thirty six.* So you can concentrate on the music without distractions from the mixer, even on digital multitrack.

### Features shouldn't degrade audio performance.

Automation widens creative possibilities — and narrows the margin for console error. For example, FET mute switches that are "silent" individually can produce audible glitches when grouped. The AMR 24's carefully controlled switching time constants eliminate this problem.

Every circuit in the AMR 24 has been calculated with equally close attention. Each stage has at least 22 dB of headroom; total dynamic range is over 100 dB. Even so, *unused stages are bypassed to produce the shortest effective signal path in every operating mode.*

Perhaps the AMR 24 is a product of extremist engineering. But as we see it, optimum audio performance, not simply a revised layout, is what makes a console automation- and digital-ready.

### The feel is familiar, the functions are unprecedented.

The AMR 24 facilitates innovative production techniques within a classically

split configuration. Master Input Status switches select mic inputs or line returns on all input channels simultaneously. In its mixdown configuration, the AMR 24 will handle up to 60 tracks, because the 24 Track Select switch changes the monitor returns to line returns normalled to your second 24 track (or to synchronised "virtual tracks" from synthesizers and samplers). The monitor returns have aux buses, solo and mute, plus four bands of EQ and long throw faders, so this flexibility is achieved with no loss of audio quality. For additional effects returns, the Fader Reverse function creates an additional 24 patch points through the cue send faders.

Imaginative design and uncompromising construction give the AMR 24 flexibility and sonic transparency that represent clear achievements: especially clear on digital recordings. For all the facts on this innovative console, send your business card or letterhead to:

**DDA** AMR 24



Unit #1, Inwood Business Pk., Whitton Rd.  
Hounslow, Middlesex, UK TW3 2EB

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London NW6 3BT. Tel: 01-625 4515

difficult but, thankfully, it has all worked out to our advantage. All the problems have now been solved."

## Designer's viewpoint

In most cases, building a studio will only be experienced by a studio owner once or twice. The designer, of course, has seen many and can put the results in context. Andy Munro describes how the problems at Sam Therapy were brought to a successful conclusion but first, just what did Paul Samuelson's specification call for?

"He wanted it to be what I would call the ultimate programming room, very much a synthesiser-based studio, but a normal studio as well so that you could actually record live real-time events such as musicians. But his background is in Fairlight and synthesised music. He wanted to be capable of producing an integrated product that was his synthesiser side blended with normal recording practice of vocals, overdubs, mixing and so on, so that you could do the whole thing in one place, but based on programming and synthesising. If you had wanted to record a band in the normal way—guitar, bass, drums, etc—you wouldn't really have gone to Sam Therapy. That was the basic idea behind what he had, and what he's got now is a sort of a refined version of that."

With regard to the problems of keeping daylight flooding into a studio, apparently there were none.

"The only problem is one of symmetry. If you create a window on one side of the control room, you have to create an acoustic illusion of a window on the other side, so you have to be very careful about how you actually balance the sound. Glass is actually quite an effective bass absorber, given that it's a large panel, so you need a bass absorber on the other side. It's a black PVC membrane covered with fabric so you can't see it. It simulates the acoustic impedance of the glass."

The constructional problems were described by Munro as fairly inconsequential, as they only took about three days to put right. Nevertheless, his comments are worth noting.

"It started off on a self-build basis, because there wasn't the budget available to do it as a complete design-build contract. It simply wasn't done to a standard high enough to achieve what Paul wanted to achieve. We put in another team of builders who did the whole thing in a much more formal way.

"The most interesting thing about Sam Therapy is the sound, because we used the new UREI monitors. When I'd heard them before I wasn't all that impressed; I thought they were a bit hard sounding. They'd gone from a UREI sound, which was soft, to a JBL sound, which at the top end was what I consider unacceptably harsh.

"We took into account, to some extent, the harshness produced by the horn and softened up the front of the room even more than usual. That seems to have done the trick. It seems to have tempered the sound of the horn a bit, so that to me they sound much more acceptable than they usually do.

"I must say the monitoring there is very good, I'm more than happy with that. I think it conveys what is going on very well. I've never heard that system sound as good anywhere else and I think that most of the people that have been there will bear that out."

There is of course no room equalisation: "Equalisation is a complete waste of time if it's actually compensating for room faults. It doesn't have any effect whatsoever.

"What we do do is equalise the speaker system. If a speaker system is designed to give a flat bass response standing in space, or in an anechoic chamber, if you put it in a wall you are going to get 6 dB more bass. So you need to get rid of 6 dB bass to make it flat again. UREI speakers are designed to be mounted in walls so if you don't mount them in walls they are bass light and you need to boost the bass. So again, an equaliser is a valid approach to that."

So it seems that the new Sam Therapy Studio is well worth a visit, and there is an excellent restaurant on the ground floor of the building that looks like attracting some interesting looking customers soon. The general atmosphere of the studio is very pleasant and the Canalot building has a busy feel which should be most conducive to work. □

Sam Therapy, 222 Kensal Road, London W10 5BN, UK. Tel: 01-969 9394.

# SAM THERAPY



Studio construction

stage of Sam Therapy's growth I'm not prepared to take that risk. I'll wait a while, then I'll be able to afford half a dozen of them."

Samuelson's conclusion is optimistic, and with Herbie Hancock and Derek Bramble being among the first users of the new studio, perhaps he can afford to be.

"A lot of the work we've been doing has been painful and

## Studio equipment

**Console:** 52-channel DDA AMR 24

**Multitracks:** 2× Otari MTR-90 MkII

**Stereos:** Otari MTR-20, Otari MX-5050 Mk II/ASC, Sony 701ES/PROPAK 2

**Monitors:** UREI 813C, Yamaha NS10M, AR 18S, Tannoy Arden, AKG LSN50 (all Rauch powered)

**Processing:** Lexicon 480L Larc, Lexicon PCM 70, Yamaha REV5 and SPX90, Roland

DEP 5, AMS dmx 15.80, TC 120, Lexicon PCM41, Roland SDE 3000, MXR

flanger/doubler, UREI 1176LN, 4× dbx 160X, 2× Valley People Dynamite, Drawmer

DS 201 and DL 221, ElectroSpace Strate Gate, 2× Summit TLA-100A

**Microphones:** Sanken, Neumann, AKG, B&K, Shure, Beyer, Calrec

**Keyboards:** Fairlight CM1 series III, Yamaha KX88, Prophet VS, Roland D550,

Oscar, Yamaha DX7 MkII/DFD, Roland Juno II, Roland JX3P



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# MARTIN POLON'S PERSPECTIVE

The tall dark-haired man rose to the elaborately carved podium. He was handsome in a rugged way that women loved. His strong visage had made it to the living rooms of thousands of people around the country. His success as a televangelist was not as great as some of the others but the Reverend Milton Keynes knew that he had achieved some level of real success. He felt his heart palpitate as he mounted the podium and prepared to face his flock, possibly for the last time. He knew he had to tell them the truth. He just didn't know how.

"I have sinned," he began. Tears began to well up and flow down his cheeks. "Not like the others," he said. "My flesh is not weak. I did not lust for the pleasures of the flesh. It is my ears that gave in to the Devil's Audio Temptation... DAT. I was pure of heart but not pure of hearing. I have a hobby. I love to make stereophonic recordings of trains and I acquired a DAT recorder to make digital recordings with." The congregation sat in shocked silence and then began to turn to each other with a frantic buzz of whispered conversation. His reputation as a world famous audio expert was well known among the brethren.

"If the good Lord wanted you to record in digital stereo you would have been born with 18 bit oversampling and dual digital-to-analogue converters," a voice called out from the congregation.

"Yes, you are right," echoed the Reverend Keynes, "I know I was weak. After all the warnings from the Religious Institute of Acoustical Analysis, I still hungered for DAT. It was all of those pure tones devoid of analogue distortion. It came from my past. If I had not hungered for my first Ferragraph and then my first Ampex and then my first Revox and then my first Studer, none of this would have happened. If I did not shake upon the arrival of the first CD player in our town, none of this would have happened. How did I know, lo those many years ago, that being a hi-fi enthusiast would let the Digital Devil into my heart?"

The preacher went on with his recitation of his litany of guilt. It spilled out in a torrent of words and emotion. The entire congregation began to move, keeping a 16 bit pace as they oscillated back and forth. Suddenly, the back doors of the church flew open and a dark figure entered with the sunlight at his back. The stranger called out, "Reverend Keynes."

"Yes," responded the cleric.

"You are saved," echoed the stranger.

"How is that?" questioned the preacher.

"The National Bureau of Standards (NBS) has just issued its edict. Copycode and the notch filter are not what they seem to be. They damage the

integrity of music and the system does not always work in stopping people from copying copyrighted music nor is it foolproof. It can be tricked inexpensively and sometimes tricks itself when recording non-protected sources."

"Then I am redeemed," heralded the preacher. His congregation jumped to their feet and began to belt out a rousing rendition of 'On The Glory Road To Redemption I Found 96 dB Of Digital Dynamic Range' while a large chorus and accompanying orchestra rose to the fore on the church's pit elevator. Everyone was caught up in the glorious celebration as digital gospel spilled out of the resplendent old tabernacle.

This little known anecdote about the impact of the revelations of the National Bureau of Standard's findings is yet another in the series of journalistic 'scoops' that you have come to expect from *Studio Sound* in this column. We spare every expense to make this monthly report as vital as possible. Most sources of information will be ignored in bringing you this column. You can depend on us for all the news that fits to print. In line with this policy, we bring you an exclusive in-depth interview with the Reverend Keynes on the future of DAT recorders and playback units now that the research arm of the US Congress has turned thumbs down on the Copycode scheme.

*Studio Sound:* I suppose this ends your jeopardy with the DAT issue?

*Rev Keynes:* I sincerely hope so. I was getting very nervous.

*Studio Sound:* How severe would your punishment have been?

*Rev Keynes:* Beyond the imagination. The most foul vengeance ever foisted on a wayward missionary of the Word. I mean consider that the Baker's were accused of mishandling the affairs of their church and Swaggert was accused of seeing ladies in the night. How embarrassing if I was labelled only as having cosied up to a digital audio tape recorder and a Japanese one at that? No misappropriation of funds, no carousing in the vestry with scantily clad chorus girls. Would I be labelled a wimp or what? The only thing left to me would be chaplain to the George Bush presidential campaign or to Tony Benn for his next run at something or other.

*Studio Sound:* It is hard to imagine what penalty you might have paid. Could they make you listen to the collected recordings of Jim and Tammy Faye Baker's sermons?

*Rev Keynes:* No. Far worse than that. I might have been forced to listen to Tammy Faye take her makeup off, miked with MS equipment in digital stereo.

*Studio Sound:* That would give new meaning to the term 'Oversampling'.

*Rev Keynes:* Now let us have compression for those less fortunate than ourselves.

*Studio Sound:* What else could they have done to you?

*Rev Keynes:* No, if I was to be punished it would have been by making me listen to the collected speeches, Congressional testimony and press releases from the record industry about all of the good to be done by Copycode and the Notch Filter.

*Studio Sound:* That is inhumane. The Geneva Convention specifically forbids cruel and unusual punishment and if the outpourings on the code and the notch don't qualify as cruel and unusual, then nothing ever will.

Any obvious reactions to the NBS decision?

*Rev Keynes:* All I know is that on the day the National Bureau of Standards announced their findings against the Copycode system, there was this group of small Japanese men dressed in colourful costumes dancing and singing, "Ding dong the witch is dead—the wicked witch is dead." Funny thing, they were followed by a strange group: There was a little girl from Kansas wearing Ruby slippers with her dog in a basket, a tin man, a shabby looking lion and a scarecrow.

*Studio Sound:* I always thought that the whole DAT issue was being handled by all parties concerned like something out of *Alice In Wonderland* rather than the *Wizard Of Oz*. All joking aside, what will happen now with DAT?

*Rev Keynes:* No more jokes? That's easy for you to say. You have had to invent this ridiculous interview to find a way to write yet another column about DAT. How many DAT columns have you already written? Two hundred and three? It sure feels like it. You and the rest of the audio columnists have written so much about it that the public is really rather confused about the whole thing. I know audio dealers who have customers coming in to buy a CD player and who decide against it when they ask if the CD can record. They insist on waiting for the 'digital recorder'. Ditto the reaction of record stores faced with customers returning discs that they claim have been damaged by the record companies' use of the notch filter. You and I both know the 'notch' was never used but it was written about so much that the public does not know where the truth begins.

*Studio Sound:* What happens now that the issue is out of the US Congress?

*Rev Keynes:* You can be sure it is out of the legislative arena in the United States. There are more than several legislators who have been made to look foolish by their support of the Copycode system. They feel as though they have been lied to since the majority of the testimony offered to Congress was refuted by the findings of the National Bureau of Standards. Several aides to these legislators suggest only half-jokingly that the record industry types who testified would find themselves in contempt of Congress if they ever show their faces under the Capitol dome again.

*Studio Sound:* So that is the end of legal challenges to DAT?

*Rev Keynes:* Not exactly. The RIAA (Record Industry Association of America) has made specific threats of litigation against any DAT hardware maker who brings recording DAT machines into the United States. There are less specific potentials for action hanging in the air against any duplicators of DAT software. It is not clear that any legal action can be successfully sustained but it is equally unclear whether RIAA court action could be successfully defended without significant (make that six or seven figures to start with) expense and a trip to the





# MARTIN POLON'S PERSPECTIVE

appeals courts.

*Studio Sound:* So the record industry has simply transferred its objections to DAT from the legislative arena to the courtroom?

*Rev Keynes:* More or less. However, you must remember that there are many in the audio and record industries who feel that the whole point of the RIAA/FPI stand in the US Congress and elsewhere has been to buy time at the expense of the DAT system. If that is the case, the use of the court threat and if necessary actual legislation could tie up DAT until at the least the end of this decade. If suit were filed in the courts of a very litigious state such as California or New York, it could well take four years to reach trial in a superior court. Add appeal and the whole process could drag out for six years. That would more than serve the supposed goal of those in the record industry who want to see the Compact Disc so well established that nothing could blow it out of the water. Metaphorically speaking, as it were.

*Studio Sound:* So DAT hardware makers are taking a go-slow stance?

*Rev Keynes:* Well, it seems that everyone is trying to reach an accommodation where the DAT recorders will use a computer 'flag' system to prevent a unit from making more than one recording of a specific CD or of a digital copy of that CD.

*Studio Sound:* How would that work?

*Rev Keynes:* In the same way that top-end Compact Disc players can 'remember' the computer identification code present on all CDs and store the associated user preferences for that disc into a permanent powered RAM memory, a DAT player can also be manufactured to remember which CD has been recorded from that same coding. That machine would refuse to record that particular CD again or to copy a digital copy thereof. The use of this or some other format of 'Unicopy' system would in theory satisfy both sides of the digital copying controversy. It would allow audio hardware makers to sell DAT recorders that would have real utility. It would

also allow home users to make one copy of a specific disc and not to be able to make multiple copies for their friends. It would protect record companies from profligate copying of their copyrighted intellectual property.

*Studio Sound:* Is there really a threat of DAT copying cutting into record company sales any more than the widespread practice of cassette copying already does?

*Rev Keynes:* Right now, DAT players will sell in the US—if and when—for well over \$1,000 a pop and blank tapes will cost in the \$10 range. Pre-recorded DAT tapes use a less expensive coating since the reproduction is done by high speed saturation. Tapes that will record on a DAT machine in the home will not become drugstore commodities for some time. A simple rule of thumb is that nobody makes an illicit copy when the original costs only 20% more than the price of a copy. With a CD priced in 1988 closer to \$10 than to \$15 and with DAT software priced potentially at the \$10 price point in large quantities, the incentive to copy at home will be very low. And at the projected rate of adoption for the DAT, it will be 1992 or later before any kind of copy economics will apply to blank DAT media. By 1992 CD prices could be down to the \$8 mark!

*Studio Sound:* How does all this fit in with two of the largest software providers now being two of the largest potential makers of DAT hardware?

*Rev Keynes:* In theory, the presence of NV Philips and their various holdings and labels plus the newly enlarged CBS-Sony group, was supposed to ease the tension between software and hardware makers. In fact, the two companies have been operating like giant amoebae, one from the Netherlands and the other from Japan. Each company has its proponents of DAT hardware and its antagonists to DAT on the software side. Their arguments are the same ones we have already heard from the various camps. Then, there are forces pushing DAT on the software side who think that when coupled with a play only DAT machine for automotive or portable use, DAT

could become a bigger cash cow for their company than CD is right now. For that same reason, there are hardware people who are committed to the CD who do not want to see DAT spoil the future for the glittering aluminium disc. So we have a bit of a stalemate.

*Studio Sound:* Where does this all go? What will happen to DAT in 1988?

*Rev Keynes:* It would seem that hardware makers will take a go slow position in the United States for the time being. Despite the legal presence of DAT machines in Europe and Japan, the enormous US market is the one consumer electronics makers need to legitimise DAT and to convince duplicators that it is safe to invest in DAT duplication equipment. There is currently a burgeoning market in 'grey' DAT players brought into the United States by various dealers from Japan and Europe. The Japanese units will operate on US power and the European units require a simple outboard power transformer. These dealers are not afraid of a record industry law suit because as small business entities they can close a store as soon as it is sued and re-open under a similar name next door with a new business identity. Large Japanese consumer electronics companies cannot do business in that way so they are currently susceptible to the record industry's threats of legal harassment. Nevertheless, it does appear that Casio, Harman America and US Marantz will take the plunge and offer DAT recorders for delivery at the Summer Consumer Electronics Show in Chicago. Players will be available for automotive use from Kenwood and several other makers.

*Studio Sound:* When will DAT enter the mainstream?

*Rev Keynes:* As I said, it will not be possible to convince the duplicators or to bring player and/or recorder prices down until the mass market velocity of the United States is brought into play in the marketing of DAT products worldwide. You will know when DAT products have achieved status in the mass marketplace. That will be when the major catalogue merchandisers and the electronics specialists carry DAT units as a matter of course. That could happen for the Fall 1988 catalogue but it is more likely to take place in 1989 if record industry blocking manoeuvres are successful.

*Studio Sound:* Finally, are there any other hidden agendas lurking about?

*Rev Keynes:* As a matter of fact, there is. Remember the amoebae we talked about earlier? Within the structure of Philips and Sony lurk other technologies that will make the DAT obsolete. Consider the recording optical disc system. Giant Thomson SA of France, who also own the RCA and GE consumer electronic operations in the United States, have delivered test samples of a recording CD system to makers of blank disc media and to recording studios to test the new system. Sony and Philips are both rumoured to have such systems within reach. Equally large Matsushita, with their many subsidiaries, are also close to completion with recording CD technology. Sanyo have been working on just such a device since they demonstrated a prototype in 1984. IBM is also rumoured to be 'on the track' for development of such a recording system.

Some industry observers feel that the reason the major players in the consumer electronics industry are not applying their full resources to place DAT in the market is that there are systems in the pipeline that will leave DAT in the dust within the next 12 to 24 months. Only time will tell. □

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# BARRY FOX'S BUSINESS

One morning earlier this year a small group of cinema projectionists and managers gathered at the National Film Theatre on London's South Bank, for an industry training session. Before they got down to the serious business of learning about lining up sound systems, they got a fascinating talk by Mark Yonge of Dolby Labs (who has by now left Dolby Labs for SSL).

Yonge had put together a collection of film clips, tracing the history of stereo sound in the cinema from 1935. For the first time ever, we got to see the short stereo sound film made by Alan Blumlein and the Hayes Amateur Dramatic Society. There they were, 53 years on, performing a playlet for the benefit of Blumlein's modified variable area optical sound recording system. This split the track into two to record live stereo with pictures.

The playlet was shot with a single camera, from a single viewpoint, to avoid the need for editing. Set in a cafe, waiters run on and off, noisily dropping plates to the extreme left and right off screen. An orchestra, obviously a recording, plays off set to the extreme right. At one point one of the waiters asks the musicians to move. The sound pans across, as one of Blumlein's assistants carried a hidden loudspeaker around the set.

Picture and sound quality are remarkably good, with very wide stereo. How sad it is to know that Blumlein himself can never have seen it projected properly. How sad also that it has taken EMI all these years just to let others outside the company devote time and money to transferring the old nitrate 35 mm film on to 35 mm acetate safety stock and arranging a screening.

Next, Yonge screened *The Sorcerer's Apprentice* sequence from Walt Disney's *Fantasia*. Fortunately he was able to go back to the Stokowski recording, made and originally screened in the multitrack optical *Fantasound* system. Because *Fantasound* was so unwieldy, and screening so expensive to arrange, *Fantasia* was dubbed on to 4-track magnetic in the '50s. Absurdly Disney Studios later re-recorded the soundtrack in digital stereo, with a modern orchestra for re-release. The original is far, far better even though the sound quality shows its age, and the stereo has an artificial panpot feel.

In 1953, 20th Century Fox launched *Cinemascope*, with *The Robe*. It had 4-track magnetic sound, with left, centre right and a mono surround spread. Mark Yonge had found an old Fox short, *The Miracle of Stereophonic Sound* which plays a musical parade, thunder, trains and planes, first in mono and then in stereo.

Also in the '50s, MGM and Paramount made films with the *Perspecta* sound system. This was a mono optical format, with low frequency optical tones steering the track between left, centre and right loudspeakers. The tones, 30 Hz for left, 35 Hz for centre and 40 Hz for right, were

initially used to switch the sound sharply but later it was smoothly panned. *Perspecta* was ideal for cartoons and Dolby Labs found several, along with a decoder.

*Seven Brides for Seven Brothers* was made in this same format but the sound was simply switched from narrow mono for dialogue, to wide mono for music. The system was abandoned, not so much for artistic reasons but because variations in projector speed altered the pitch of the tone and made the sound steering erratic.

Mike Todd, working with American Optical, produced *Oklahoma* in 70 mm Todd-A-O. This had 6-track magnetic sound; a front spread of five tracks and mono surround. Mark Yonge unearthed the trailer for *Battle of the Bulge*. Although the colour has faded, it is a good example of early 6-track stereo—overblown and overspread.

Dolby Labs, working with EMI, produced the first 35 mm optical stereo films (since Blumlein) in 1975. Like Blumlein the Dolby optical system splits a variable area track but adds noise reduction to make up for loss of signal. The first film in Dolby optical stereo was Ken Russell's awful and awfully self-indulgent *Lisztomania* but it's an interesting piece of history.

Coming up to date, Yonge screened a clip from the equally awful *Top Gun* in 70 mm. Matrix encoding and frequency banding gives the equivalent of seven channels; five across the front with bass enhancement and split surround, ie separate left and right feeds for the surround speakers.

The audience hears both music and sound effects in stereo from the rear as well as the front. The effect on music is at times eerie and at other times stunning. Dog fight sequences are dramatic but exhausting.

On the lighter side, *Crocodile Dundee* uses surround much more subtly to create ambience and atmosphere, for instance at the New York party scene (from which the hilarious coke-sniffing sequence was cut for video release).

Over 1,500 features have now been made in Dolby stereo, and 12,000 cinemas round the world are equipped to show them. The latest move is to use Dolby SR (*Spectral Recording*) for film tracks. This will never become a new standard because the SR tracks are not compatible with conventional sound systems. So the film companies must release in dual inventory, something they are normally reluctant to do.

Dolby has now re-recorded the demo film *Listen* in SR, with seagulls, squeaking blackboard chalk, cannons and rockets. Provided the cinema sound system is capable of doing justice to the track source, the effect is very impressive. So far there have been SR prints of *Star Trek IV*, *Inner Space* and *Robocop*. Without any publicity, some London cinemas have recently been showing both *Inner Space* and *Robocop* in SR, in order to test public reaction.

The AES listened when we suggested organising a day out at the EMI museum in Hayes for the London Convention. Perhaps the AES could give Dolby's potted history of film stereo a wider airing. Now that Dolby Labs has collected the film clips, and refurbished an old *Perspecta* sound decoder, all the real donkey work has been done.

The AES has just announced a 2-day conference, 'Sound with Pictures', for May 17th to 18th at the IBA theatre in Brompton Road. The programme includes a talk by Norman Green of the ITVA who gallantly took on the job of saving the Blumlein stereo films from the ravages of EMI apathy. There is also to be a talk by Dolby Labs. Let's hope that between them they can slot in the fascinating programme material shown at the NFT.

Otari would like it known that the Studer A820 was not the first multitrack recorder to use *HX-Pro*—as I had suggested in my piece about the Bridge studio (*Studio Sound* September 1987). Otari's *MX80* with *HX-Pro* was being shown in advanced prototype form at 1986 industry exhibitions. First customers in the US got theirs in January 1987 and in the UK in February.

Yes, says Otari, we know that Bauch had shipped an A820 to Great Linford Manor by Christmas but it was a late prototype which was later swapped for a production model in the Spring. We suggest you call it a draw, says Otari, asking for an honourable mention. Hence the mention.

But while we're on the subject of Otari, let's also mention the King case...

"This is a classic story of David and Goliath," says William Anderson, president of King Instruments, the small electronics company in Belmont, California which became famous for the King cassette loader. "All too often a larger company will copy a patented device—when the startled inventor discovers that his patent has been ripped off he finds that he cannot afford the cost of litigation."

In 1970, James King devised a clever machine which would do the fiddly job of loading flimsy 3.8 mm wide tape into audio cassettes. Until then people had either done the job by hand or played around with lash up machines which behaved as if they had been designed by Jacques Tati. The BASF tape factory was one of the first to try automating a cassette loading line. The original machinery was a disaster with tape spooling everywhere other than where it belonged, inside the cassettes.

James King found the trick was to use suction pressure on the tape rather than try and hold it with mechanical fingers. His loaders sold like hot cakes, first for audio and later for video.

In 1972 the US Patent Office granted him a patent (USP 3 637 153) and in the mid '70s Otari asked for a licence. King said no, so in 1979 Otari started selling a copy machine. A year later King sued and became locked in a legal battle which cost over \$1 million.

The Northern District Court of California backed King, and said Otari must pay \$8.5 million in compensation. The court also said King could have royalties on future sales of Otari loaders. These are now rolling in and will continue to do so until January 1989 when King's US patent expires of old age.

"The verdict endorsed the integrity of our whole patent system," says William Anderson.

Otari has not asked for an honourable mention of this. Hence the mention.

# THE ADVANTAGES OF A STUDIO CONDENSER WITHOUT A SOUND OF ITS OWN



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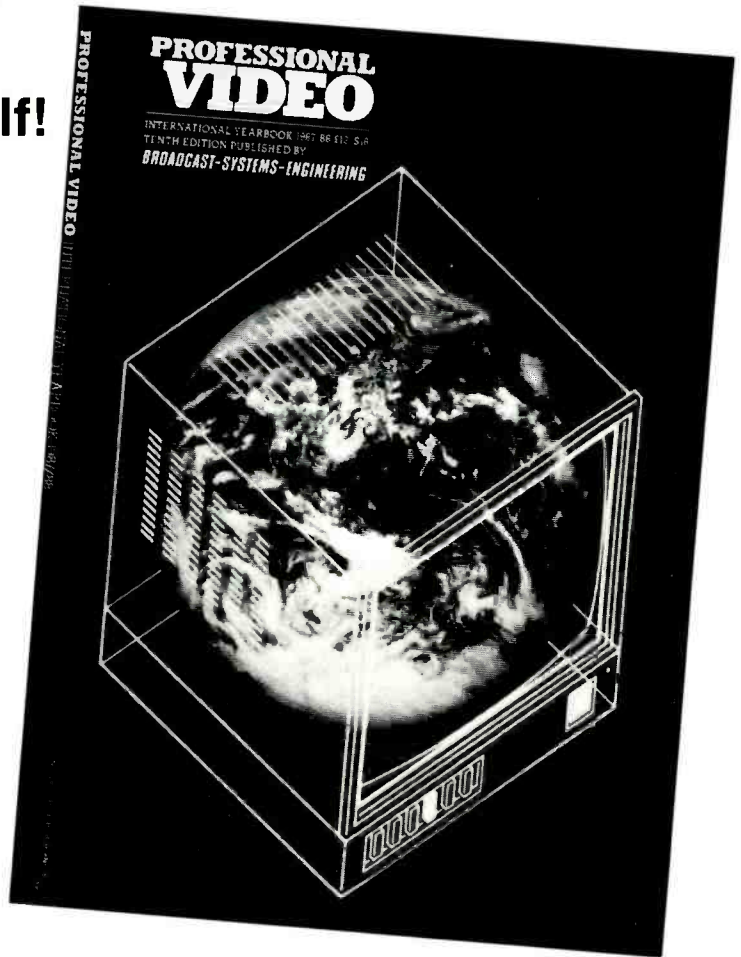
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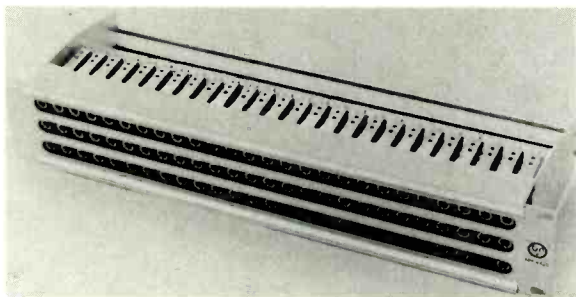
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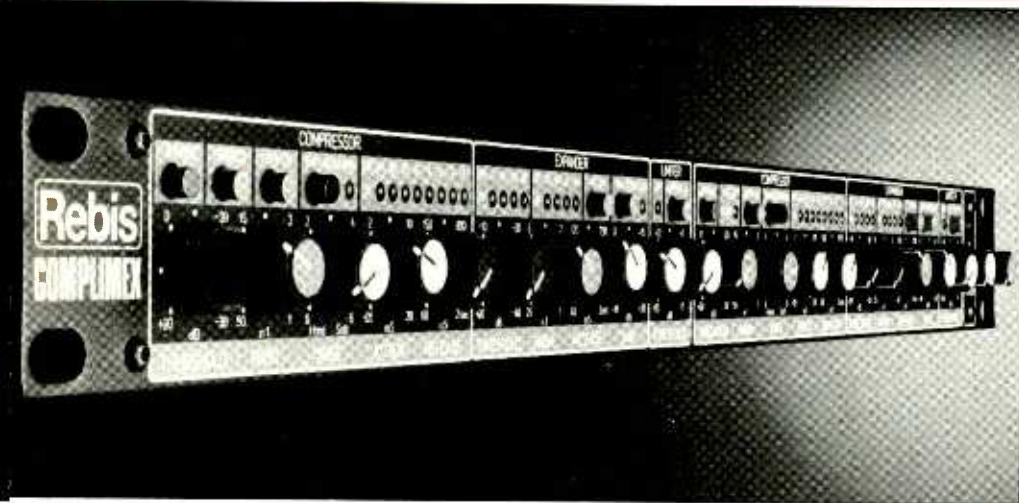
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# REVIEW

*Dave Foister takes a brief look at the RA303 CompLimEx from Rebis*



The latest addition to the Rebis range of signal processors is a comprehensive dynamics control package, the RA303 CompLimEx. This is a 2-channel device incorporating a compressor, expander and limiter in each channel, linkable for stereo working. It is a traditional manually-operated unit and consequently bristles with controls, switches and LED indicators, all sensibly arranged to make operation simple and logical. Its main notable feature is fully-variable control of the compressor knee characteristic, ranging from a hard, sharp knee to a soft transition curve covering most of the compressor's working range. This makes an otherwise simple compressor much more versatile, allowing hard, severe compression, gentle subtle dynamic control, or anything in between.

Manual envelope control of the compressor is restricted to attack and release times but the envelope can be set to Auto where these time characteristics are varied according to the nature of the input signal. In most cases, particularly vocals and horns, this works extremely well. Similarly the expander has only a release time control and the attack time can either be fixed at 2 ms or set to Auto. The separate threshold controls, and compression ratio and expansion range controls, all have wide useful ranges, and a gain make-up control is fitted after the expander for restoring the subjective signal level after

processing. The limiter threshold is completely independent of the other thresholds, and the limiter can be operated as a clipper for extreme 'safe' limiting. Metering and status indication is comprehensive and includes a long LED meter showing compressor gain reduction, a separate expander gain reduction meter, and a final output level meter.

While there is no on-board filtering for frequency-conscious processing, separate access is provided to the side chains of the compressor and expander, allowing external processing to be added to either device independently. The unit is available balanced or unbalanced at +4 dBm line level.

Owners of early unbalanced models should note that a minor design fault has been discovered that can lead to limiter instability and lock-up of the output meters; the modification to correct this is a simple one and details are available from Rebis.

The audio performance of the unit is very good. It is quiet, clean and extremely reluctant to overload.

All in all this is a good budget-priced unit whose novel, thoughtful features and competent performance make it much more versatile than its price and simple layout might suggest.  Rebis Audio, Kinver Street, Stourbridge, West Midlands DY8 5AB, UK. USA: Rebis US, 2093 Falkener Road, NE Atlanta, GA 30324.

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# REVIEW

## A user report on the Symetrix 511A noise reduction system from Dave Foister

**T**he concept of a device to magically clean up less-than-perfect recordings must be the audio business' equivalent of the Philosopher's Stone, and despite the best efforts of those modern day alchemists the R&D departments, we still can't turn lead into gold, regardless of what the CD issue boys would have us believe. No doubt, in time, artificial intelligence and pattern recognition techniques will allow a badly recorded piece of music to be broken down into its component instruments and fixed in the mix but meanwhile the most persistent and successful attempts at a more basic level of improvement have been in the area of single ended noise reduction systems.

Conventional noise reduction, of course, relies on a 2-stage procedure: the processing (pre-emphasis or encoding of the signal before recording, transmission or whatever) followed by the mirror image process on playback or reception. Signals that have not been initially encoded, generally sound dreadful when passed through a decoder, and such systems are obviously totally unsuited to the task of cleaning up existing unencoded noisy material. Various devices have been introduced, however, which attempt to achieve a similar result with single ended or playback only processing. These use circuitry whose configuration changes according to the nature of the signal itself in order to make use of the noise masking effects of that signal. The two processes which best lend themselves to this are expansion and dynamically controlled filtering. The 511A from Symetrix uses both.

This is not Symetrix' first single ended noise reduction unit; the first, the 511, was a simpler box that attempted to do the best for any signal without the user having to worry about it. Evidently Symetrix decided that a greater degree of user control was called for. The result is the

511A, a 2-channel unit which can be linked for stereo working.

Each channel comprises three sections: a highpass filter, a downward expander and a dynamic filter, each of which can be separately bypassed. The expanders and filters are properly linked for a stereo signal; the inputs are summed and the resulting control signal is applied to both channels using one set of controls. Control is simple enough—there are only four knobs on each channel.

The expander has the three obvious controls of threshold, release time and ratio, variable from 1:1 to 1:6. It has a fixed soft-knee characteristic and its fixed attack time is not stated, although as its action is fairly gentle compared with some applications of expansion, there are no really noticeable side effects. It rarely clicks in (if it does then its threshold is probably set wrong) and yet it is fast enough to catch percussive transients. Its effect is shown on a 4-LED yellow meter indicating gain reduction.

The filter is a programme controlled low pass filter whose turnover frequency drops when the HF content of the input signal falls below an adjustable threshold. The filter slope is 6 dB/octave and the corner frequency varies between 3 kHz and 35 kHz. The rate at which it opens and closes is programme dependent, with a maximum opening rate of 700  $\mu$ s/octave. This seemed even less prone to clicking than the expander even when deliberately wrongly adjusted. The movement of the turnover frequency is shown on another 4-LED display (red this time) and this is very useful when setting the threshold, making sure that the LEDs are all out when the desired signal is present. The threshold can be adjusted down to -50 dBm (10 dB lower than the expander) but even so I found that with some low level sources this range was not quite sufficient. The unit claims to work with operating levels from -20 to +18 dBm and the manual

particularly mentions the wide range of threshold settings to cater for this. I would have thought, however, that a slightly wider range would have been useful on both sections, or failing that an input level control with a small amount of available gain.

Stereo tracking with the two channels linked is excellent, although a small problem can arise when working in stereo if only one of the highpass filters is switched in. These are not stereo linked but with one in and one out on a stereo signal a phase shift is introduced which messes up the bass end and low mid imaging. Of course it's unlikely anyone would want to cut the bass on one channel only but it is something that could easily happen accidentally and cause a degree of head scratching. These filters themselves are straightforward 18 dB/octave bass cut filters turning over at 50 Hz, and part of their purpose is to remove confusing constant LF information from the control signal. More elaborate frequency conscious processing is made possible via the side chain, which is accessible on the rear panel on screw terminals along with the balanced inputs and outputs. Unbalanced out and balanced/unbalanced in are on  $\frac{1}{4}$  inch jacks.

I found the unit surprisingly effective in the majority of cases. Nothing in the world can cure severely noisy sources. Any attempt to do so inevitably introduces audible breathing, which can sometimes be more intrusive than the original constant noise. The control offered by the 511A certainly allows the best compromise to be found for any signal. On less severe examples the system worked very well. Many problems could be cured with the dynamic filter alone, perhaps setting the expander to cut in only during actual musical pauses where its variable release time would allow the noise to fade unintrusively. Careful adjustment of the dynamic filter produces some quite surprising results. Where the LEDs are showing that the unit is working quite hard, for example, its turnover frequency swinging up and down very quickly and yet apart from subtle cleaning up no audible effect at all.

Single ended noise reduction of course has a place in the multitrack studio. Several sources, particularly guitar amps, unavoidably generate noise which for obvious reasons is completely unaffected by conventional noise reduction. The 511A can cure amp noise and similar problems rather more subtly than straightforward gating or expansion alone with perhaps less risk of removing the bits you wanted to hear. Other suggested applications include video-post production radio stations (from cart machines to transmitters) and phone lines.

Despite its rather unprepossessing appearance, the Symetrix 511A is logically laid out and easy to use, with helpful indicators. It appears to be solidly built. Its job may be unglamorous and functional but it does it very well and could usefully find a home in many different facilities and applications.

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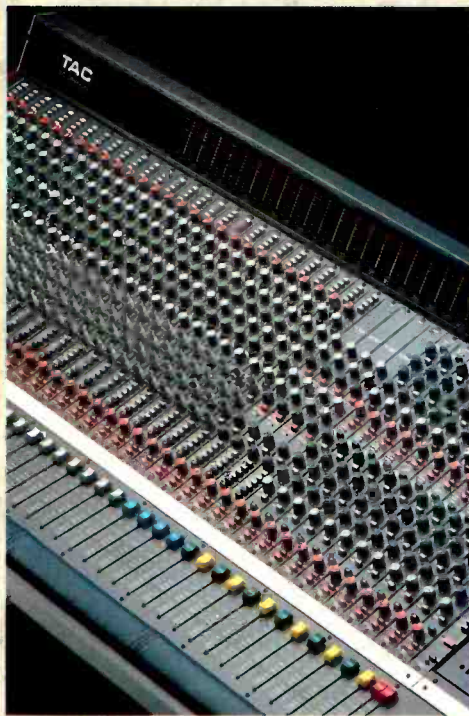




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# REVIEW

## A technical report by Sam Wise on the IEQ system from Applied Research and Technology

The Applied Research and Technology IEQ system is a family of MIDI controllable graphic equalisers. The range currently includes two basic versions having either 31 filter bands on  $\frac{1}{3}$ -octave

centres or 15 filter bands on  $\frac{1}{2}$ -octave centres. In addition, each of these types can either be purchased as a controller or a satellite (remote slave). The other member of the family is the model 290 monochrome video monitor. Apart from MIDI control, the unique feature of these

equalisers is what ART call 'Smartcurve'. This function takes account of the interactive nature of overlapping filters and automatically corrects the actual boost/cut (pot) settings to obtain the desired frequency response. The IEQ product range proved to be a most interesting set of equipment both in the lab and in use.

### Ease of use

The model 300  $\frac{1}{3}$ -octave controller was plugged into the video monitor and an attempt was made to operate the unit before reading the manual. The basic functions of setting up a curve and saving/recalling presets were accomplished with no trouble at all. There were some operations that were unclear but these were just ignored. At no time did the system lead into a blind alley with no apparent escape route. Later, after using some of the more complex functions, there was no problem in recalling the correct procedures even after a two week break. Congratulations to ART for an excellent user interface.

### First impressions—video monitor

The IEQ video monitor was removed from its box accompanied by rattling sounds. Inspection revealed that a grey contrast filter that fits flush into the front panel was hanging loose, although no other damage was apparent. The front panel of the unit has a brushed black finish, which is business-like in appearance. The whole assembly is a steel construction of adequate strength. Overall the video monitor is four rack units in height.

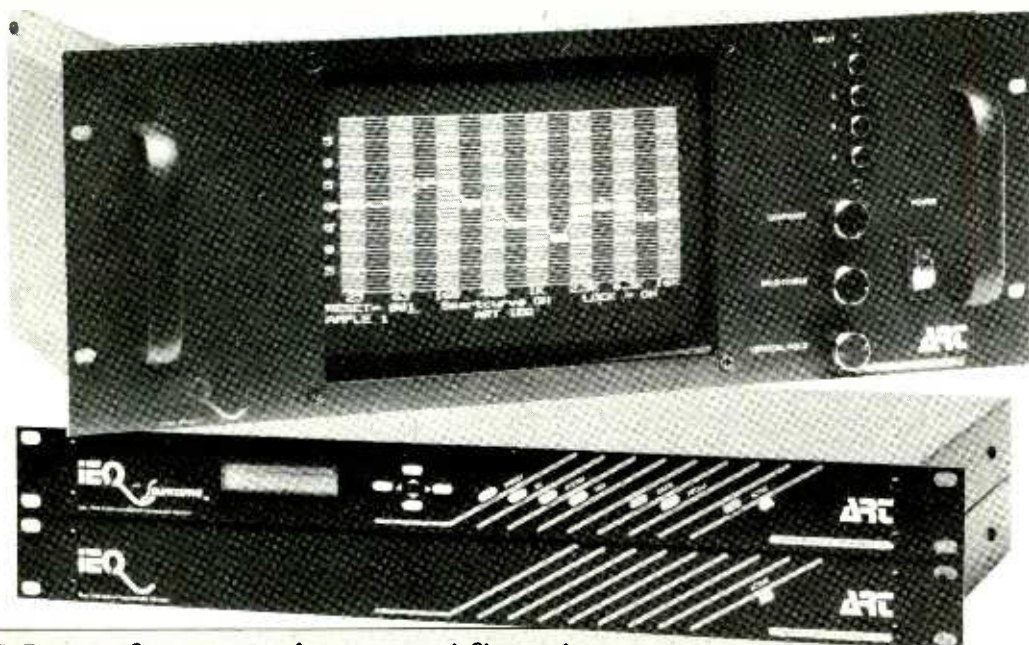
Robust handles are fitted to the front panel providing ease of handling and protecting the front panel controls. The 9 inch diagonal monochrome monitor is mounted near the centre of the unit. To its right are four interlocking input selector switches, which allow up to four IEQ controllers to be monitored without replugging. Below these switches are contrast, brightness and vertical hold adjustments. Front panel controls are completed by a neon illuminated power on/off switch.

On the rear of the unit there are only four phono (Cinch type) video input connectors and a retained power lead. There are no externally accessible fuses, nor was the voltage or current rating printed on the unit.

Removing the lid revealed a standard Motorola green phosphor monitor. The main video driver PCB is mounted on the base of the chassis by plastic pillars stuck down with double-sided tape. An I/O assembly is screwed to the rear cover and the input select/video adjustment PCB mounted to the front panel. The offending filter had been glued in place in its front panel aperture. It was replaced and the monitor powered up. Fortunately everything worked perfectly.

### Performance

In use the video monitor displayed both text and graphics well. There was no interference between



### Manufacturer's specification

Specifications for models 300 and 310,  $\frac{1}{3}$ -octave versions are given,  $\frac{1}{2}$ -octave models are similar.

**Max input level:** +20 dBm unbalanced/+24 dBm active balanced, switchable.

**Input impedance:** 20 k $\Omega$  unbalanced/40 k $\Omega$  balanced.

**Max output level:** +20 dBm unbalanced/+26 dBm balanced, switchable.

**Output impedance:** low, suitable for 600  $\Omega$  load (balanced).

**Bypass active when selected or on power fail.**

**Frequency response:** 10 Hz to 25 kHz  $\pm 0.5$  dB.

**THD:**  $\leq 0.009\%$  @ 1 kHz, 0 dBm.

**Dynamic range:**  $\geq 102$  dB.

**Filters:**

**Type:** minimum phase, constant Q.

**Frequency centres:** ISO  $\frac{1}{3}$ -octave centres in 31 bands from 20 to 20 kHz.

**Boost/cut range:**  $\pm 15$  dB in 0.5 dB steps.

**Highpass filter:** 3-pole, 18 Hz roll-off, switchable.

**Smartcurve:** accuracy 10% of dB indicated or  $\pm 1.0$  dB, whichever is greater.

**Level control:**  $\pm 15$  dB in 0.5 dB steps.

**Memory:** 32 kbyte EPROM, 32 kbyte lithium battery backed RAM.

**Presets:** 0 to 127, TMP (for transfer), and working preset, each with user defined name up to 16 characters.

**MIDI:**

**Programs:** 0 to 127, any number assignable to any user preset number.

**Channels:** 1 to 16, OMNI on/off.

**Jacks:** MIDI IN, MIDI OUT, Satellite IN, Satellite OUT.

**Video:** 1 V (sync to white) with 75  $\Omega$  load, NTSC compatible monochrome (PAL for export markets).

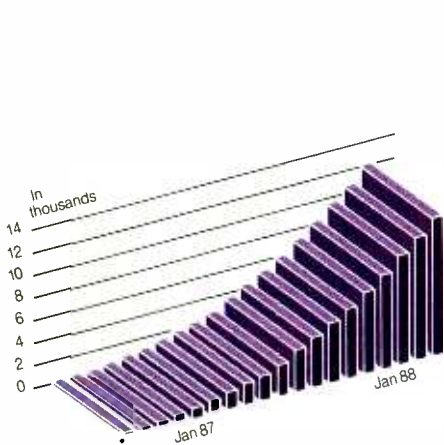
**Power requirements:** 117 VAC, 60 Hz, 16 VA, internal 3AG 0.5 A fuse. Export units configured for country of destination.

**Dimensions:** (whd) 19 $\times$ 1 $\frac{1}{4}$  $\times$ 10 $\frac{1}{2}$  in/483 $\times$ 44.5 $\times$ 269 mm.

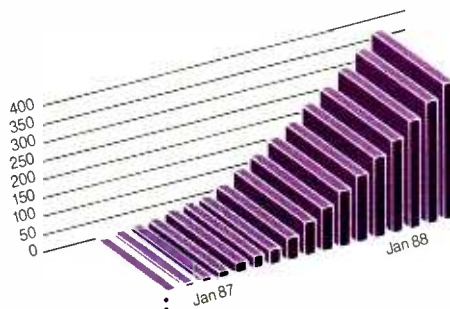
**Manufacturer:** Applied Research and Technology Inc, 215 Tremont Street, Rochester, NY 14608, USA. Tel: (716) 436-2720. UK: Harman (Audio) UK Ltd, Mill Street, Slough, Berks SL2 5DD. Tel: 0753 76911

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# REVIEW

the four inputs, and an adequate range of control of brightness and contrast for all lighting conditions. A small amount of hum was visible on the unit supplied for evaluation.

Connecting a UK standard video monitor to either of the two IEQ controllers did reveal a minor weakness in the design of their video outputs. The scan width was outside acceptable tolerances resulting in an image that was too wide for the screen. This is just usable in the context of setting up a permanently installed system but could prove excessively irritating in a studio environment. An NTSC version was not tested. There is no problem if ART's own monitor is used.

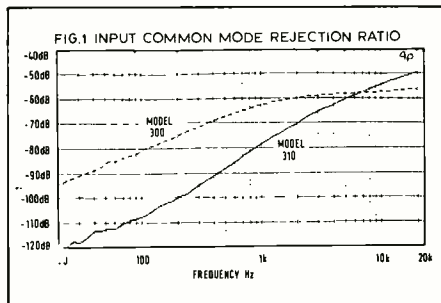
When rackmounting the video monitor beware of placing it too near any large transformers or loudspeakers. Like most video monitors, external magnetic fields can have severe effects on picture quality. There were no problems induced in the video by racking it above or below any of ART's IEQ units.

## IEQ equaliser units

The remaining units, models 300 and 310, 1/3-octave controller and satellite, and models 270 and 280, 2/3-octave controller and satellite had suffered no visible transport damage. All are finished black but with a glossier finish than the monitor. They are of steel construction and quite attractive with useful and stylish screen printed graphics. Except for blue labelling on the 2/3-octave units and yellow on the 1/3-octave units, they are externally identical. Overall height is 1U, saving rack space over conventional graphic equalisers. The absence of sliders also prevents unauthorised adjustment.

Internally all the units are similar with a Z80 CPU and 15 active filters on one large PCB. Like the video monitor main PCB, these are mounted on pillars held down by double-sided tape. The 1/3-octave units have an additional daughter board containing another set of 16 filters. The main difference between a controller and slave internally is two small PCBs mounted on the front panel, one containing the satellite channel selection switches, the other a proprietary back-illuminated LCD display.

Although with proper quality control on installation, PCB mounting pillars stuck down with double-sided tape should be OK, in practice it is better to avoid them in professional equipment that may go on the road. In one of the equalisers the inevitable had happened, and one corner of the PCB was flapping around in mid-air. Also at risk is a capacitor fitted between the main



PCB and chassis, which is supported only by its uncropped leads. Vibration could be a killer.

Revised software (first production release for the 1/3-octave types) had to be installed and this was straightforward.

## Front panel operation

Commencing at the left side of the controller unit front panel, there is a 2x16 character LCD with back illumination. The viewing angle of the display is adjustable under software control and was found to be acceptable except when the unit is mounted at the top of a high rack. In that case the display was visually fading. It is possible to operate the unit entirely from the built-in display but this is not to be recommended for normal use since the information available is very limited. For example in EQ mode, the frequency and level of only one filter band at a time is displayed in numeric form, while the video image gives a truly graphic display of the whole response. For other functions, such as selecting presets, or setting MIDI program numbers, the LCD is entirely adequate. The display is not required when using a video monitor, since all information is duplicated there.

Next is a set of four cursor control keys which are used for selecting or adjusting various functions. For example, in the EQ mode, the left and right buttons are used to select the required frequency band and then up and down adjust its boost or cut level. These buttons are also used for many other purposes such as giving titles to presets, setting the MIDI channel and so on. In a studio-type application when adjusting by ear, setting up an equalisation curve manually using these cursor buttons is not as quick or natural as moving a set of 30 faders. But 'Smartcurve' makes things fast and easy when the desired response is known, since filter interaction is accounted for. Of course using MIDI to call up

preset response curves is virtually instantaneous and useful for recreating particular sounds or effects.

To the right of the cursor keys is a set of four mode control pushbuttons, selecting the cursor and display for PRESET selection, EQUALISER adjustment, SYSTEM functions or MIDI functions. In practice it was easy to remember which mode any operation was under. The most commonly used operation in any mode is available first whenever a mode is selected, making operation simple. Further operations within a mode are selected by the left and right cursor keys.

Next are the STORE and RECALL pushbuttons, which are used to memorise equaliser presets or MIDI parameters. STORE can be locked to prevent accidental loss by overwriting the data. These buttons are also used to pass presets and other information between a system controller and its satellites.

At the right end of the panel is an ACTIVE pushbutton and LED. This selects 'by-pass' mode (LED green) or 'active' mode (LED red). It is also used to signify remote control operation (LED flashes yellow) to allow tracing and testing of complicated MIDI hookups, and to indicate the failure of the internal RAM support battery within one month (LED flashes off).

Satellite units have no front panel controls but do have the LED indicator on the right hand end.

## Rear panel facilities

The rear panel contains (starting at the left) two 3-pole A-type 1/4-inch stereo jacks used as in and out audio connectors. These connections are duplicated on an adjacent screw barrier strip. Internal pluggable jumpers allow the inputs and outputs to be unbalanced, or active balanced.

Next are four DIL switches used to select satellite channel numbers 0 to 15. Both controllers and satellites are fitted with these switches, since controllers can be used as satellites and slaved to other controllers if required.

Near the panel centre are standard MIDI in and out connectors. These are common to both controllers and satellites, however, on controllers there are two further MIDI connectors labelled SATELLITE IN and OUT, more about those later.

Next there is an as yet unused location labelled 'Interface Option', which can be used for an optional RS232 interface. This replaces the functions on the MIDI connector when installed. This was not available for test.

All units have wired-in power cords with no external voltage selector or indication of operating voltage. Additionally, the power fuse was fitted inside and had no indication of the required rating but this information is in the manual. Warnings to the user of high internal voltages as required by BS415 were not evident either.

## Input and output performance

Input impedance was measured to be within 1% of specification in both balanced and unbalanced conditions, being 40 kΩ and 20 kΩ respectively. The input common mode performance of models 300 and 310 was satisfactory; Fig 1 shows the results of both master (top) and satellite. Other models tested were similar. With nominal gain set to 0 dB, the measured system gain is -0.12 dB,

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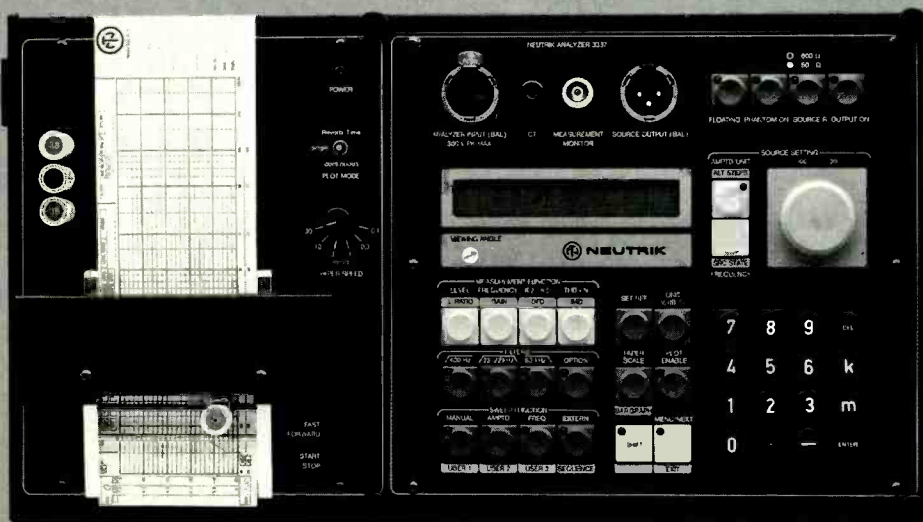
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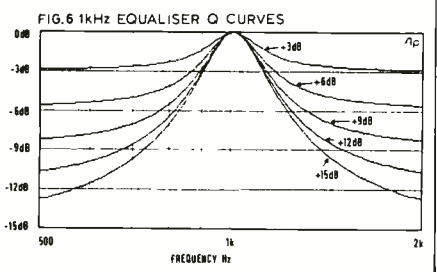
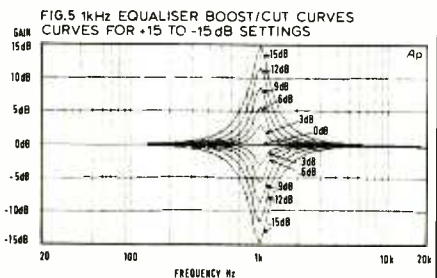
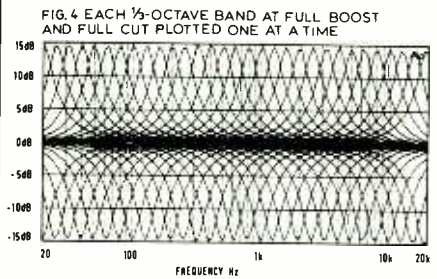
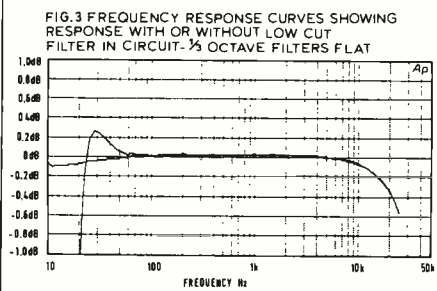
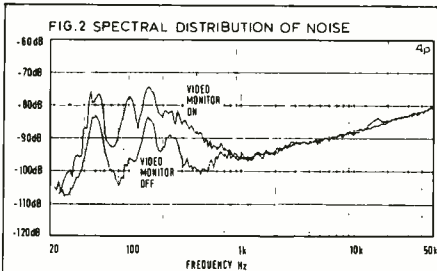
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# REVIEW



with the output in balanced mode reaching 0.7% distortion at +27.5 dBu into a load of 10 k $\Omega$  or greater. Reducing the load impedance to 600  $\Omega$  resulted in a maximum output level of +25 dBm, which is adequate but below the manufacturer's specification. Reducing the gain, the input reached clipping at +28.0 dBu, which remained constant for all gains below 0 dB. The system design is such that at 0 dB gain, clipping occurs almost simultaneously throughout the unit. The output impedance in balanced mode measures 202  $\Omega$ , higher than usual for equipment of this class but acceptable when driving normal high impedance loads. The input gain operated in 0.5 dB steps, with a typical absolute setting error of 0.1 dB, reaching 0.15 dB in the worst case.

## Noise and distortion

Table 1 shows the noise performance of the unit. The noise measured over a 22 Hz to 22 kHz bandwidth, unweighted, RMS results in a dynamic range of 104 dB. This is achieved with equalisers flat and unity gain, and is better than the published specification. The noise is virtually unaffected by gain adjustment setting but, in common with other equalisers, deteriorates when the 1/3-octave faders are boosted. The noise shown with all equaliser bands boosted to +15 dB and Smartcurve off is an absolute worst case that is unlikely to occur in practice. In this condition the system gain (with gain control adjusted to unity) has increased by 44.9 dB, the noise having increased by 39 dB. Unlike some other graphic equalisers we have measured, noise does not increase when the bands are cut. The noise spectrum response measured using a swept 1/3-octave filter is shown in Fig 2, indicating some problems with mains harmonics being picked up within the unit. As is evident, these are worse when the unit is operated directly above or below the ART video monitor. This deficiency is minor but bears investigation by the manufacturer. Although lack of a narrow band analyser made

measurement impossible, breakthrough of microprocessor noise was just audible when the 500 and 800 Hz bands were boosted.

Switching noise was investigated by setting up a number of presets. These were then recalled while measuring the peak level of the click. The rectifier used was Quasi-peak to CCIR 468-3, 22 Hz to 22 kHz unweighted. The worst case measurement was -28 dBu with an average peak level of about -40 dBu. In practice, this is too audible to be used in what is supposed to be silence but not so loud as to frighten anyone or cause damage. Most people in a mumbling crowd would be unaware.

Total harmonic distortion plus noise was measured at the specified input level of 0 dBm and was found to consist mainly of noise. As level is increased, THD+N decreases. Spot measurements of individual harmonics were found to be very low, resulting in a THD well below the published specification of 0.009% at 1 kHz.

## Frequency response and filter performance

With all filters set flat, the frequency response is +0/-0.4 over the audio band as shown in Fig 3. Inserting the highpass filter produces a small hump in the response of +0.28 dB at 30 Hz. The filter slope is -18 dB/octave with a 3 dB point of almost exactly 18 Hz, meeting the published specifications. This filter will be useful in removing sub-audible noises generated by wind or impact and protecting bass drivers from excessive excursion.

All 31 of the 1/3-octave band filters are creditably similar in amplitude response as shown in Fig 4, any apparent variation being due to the measurement frequencies used in the test. In addition, frequency centres are within ISO limits.

Fig 5 shows the response curves of the 1 kHz filter bands for settings of 0, +3, +6, +9, +12 and +15 dB. It can be seen that the effective Q remains essentially constant at all settings. Fig 6 shows this effect in a slightly different fashion by referencing all the curves to their peak position. For boost/cut settings of 6 dB and higher, Q is about 4.7. The constant Q design reduces the width of the filter 'skirt' and therefore interaction between adjacent filter bands at low boost/cut settings. This means that small adjustments are more easily made, clearly an advantage for equalising sound reinforcement or monitor systems. If a graphic equaliser is used for subtle adjustments in the tonal quality of voices or instruments, the narrow nature of the constant Q curve at low boost/cut settings compared to more conventional filters may render the effect too abrupt and audible. Adjacent bands may be used to broaden the skirts but this takes time.

Even with constant Q filters, a typical graphic equaliser only gives a poor approximation to reality when many adjacent bands are in use. The

TABLE 1 Noise and gain measurements

Filter settings Gain (dB)	Full cut			Flat			Full boost		
	-15.0	0.0	15.0	-15.0	0.0	15.0	-15.0	0.0	15.0
Resulting System Gain (dB)	-59.0	-44.9	-30.0	-15.0	-0.1	14.7	30.0	44.9	59.6
Measured noise (dBu)									
RMS 22 Hz to 22 kHz	-78.5	-78.5	-78.5	-77.0	-76.5	-75.0	-36.0	-35.5	-33.5
RMS 400 Hz to 22 kHz	-79.0	-78.5	-78.5	-78.0	-77.5	-75.5	-36.0	-36.0	-33.6
RMS A-weighted	-80.5	-80.0	-80.5	-80.0	-79.5	-78.0	-37.0	-36.5	-34.0
CCIR 468-3 weighted	-67.5	-67.0	-67.5	-66.5	-66.5	-64.5	-22.7	-22.5	-20.5



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# REVIEW

# SLAVE TO THE RHYTHM?

FIG 7 VIDEO DISPLAY SMARTCURVE OFF

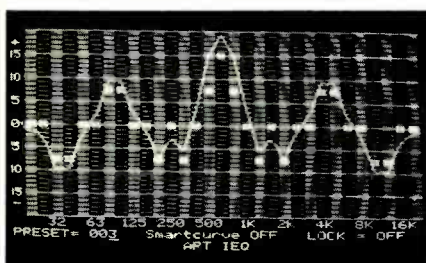


FIG 8 VIDEO DISPLAY SMARTCURVE ON

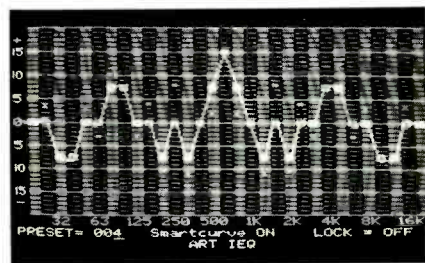


FIG 9 SETTING/RESPONSE RELATIONSHIP WITH SMARTCURVE OFF

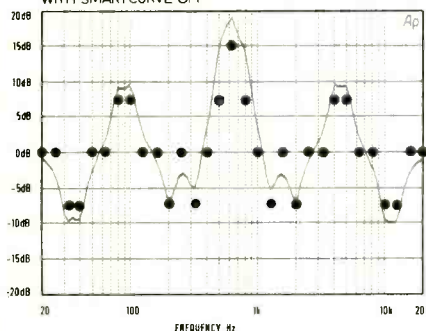


FIG 10 SETTING/RESPONSE RELATIONSHIP WITH SMARTCURVE ON

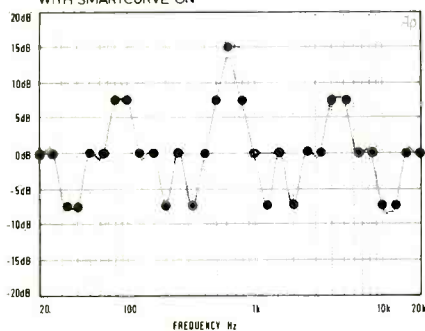


FIG 11 COMBINED RESPONSE OF 1kHz AND 1.25kHz EQUALISERS BOTH BANDS SET TO 15dB BOOST

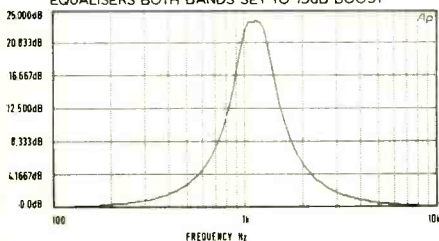
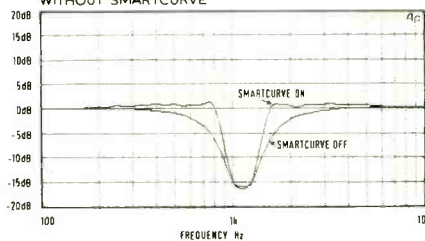


FIG 12 MAX CUT OF 1kHz AND 1.25kHz BANDS WITH AND WITHOUT SMARTCURVE



ART IEQ with Smartcurve does make WYSIWYG (What You See Is What You Get) very close to reality when using the video display. The curves displayed by the IEQ monitor are shown in Figs 7 and 8 where the 'rectangles' depict the settings put in by the user, while the 'x's show the actual 'knob' settings used within the equaliser. These curves are in substantial agreement with the measurements. Fig 9 shows the measured response of this equalisation setting with Smartcurve off, where the spots represent the 'knob' settings. Here the error between required and actual response is up to 7.5 dB (at 500 and 800 Hz in the example). The same setup is measured in Fig 10 with Smartcurve on. Notice that the errors have been reduced to a maximum of 1 dB (at 60 Hz for example).

During testing with Smartcurve off, the IEQ filters were more interactive than some other

graphic equalisers. This shows up in particular when all bands are set to maximum boost or cut where the gain of the system is +44.9 or -44.9 dB respectively. Fig 11 for example shows the combined response of two adjacent filters set at 15 dB boost giving a total maximum boost of about 23 dB. On an ordinary graphic this interaction could be a disadvantage but with Smartcurve active it is used to improve the response shaping characteristics of the unit.

Fig 12 shows two adjacent bands set to provide a total cut of 16 dB with and without Smartcurve. Fig 13 shows the IEQ video display with Smartcurve off and Fig 14 with Smartcurve on. When Smartcurve is on, the result is a narrower curve with steeper sides. Note the 'x's in the photo on the 800 Hz and 1.6 kHz bands—this shows that the setting of the 'pots' on these bands is +9 dB, sharpening up the sides of the response.

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This example might be of interest to advocates of cut only equalisers.

## Unit matching

As a quick check into tracking between units, the same settings as used in Fig 14 were despatched via MIDI from the controller to a satellite. Fig 15 shows the error between units at the top, and the actual curve at the bottom. The units tracked to within about  $\pm 1$  dB, being much better than this everywhere except at the centre of maximum cut.

## Use in a real room

As an experiment, the *IEQ* was taken to a local theatre to try Smartcurve out in practice. First, the room response was measured at several points using pink noise and the  $\frac{1}{2}$ -octave swept filter in an Audio Precision *System One*. The results were averaged and manually entered into the *IEQ*  $\frac{1}{2}$ -octave graphic. Using the built-in *IEQ* INVERT function, this was converted into an equalisation correction curve for the room. The room was measured again and was found to be within  $\pm 1$  dB from 100 Hz to 10 kHz. Minor tweaking improved the measured response to  $\pm 0.5$  dB. The total time taken (including humping up the stairs, plugging up, unplugging, coiling cables and loading the car again) was 55 minutes. Fortunately the new loudspeakers just fitted in the theatre had a dispersion nearly ideal for the room. Nevertheless this was an impressive performance.

In a more complex environment, what Smartcurve provides to get a good starting point rapidly is even more interesting. As multiple arrays are focused and tuned and their interactions investigated, the ability to save intermediate stages as presets is also useful. In a multipurpose room having various centres of activity requiring different system adjustments for each use, these presets are (now that they are possible) indispensable.

## MIDI and system functions

The MIDI implementation on the *IEQ* is comprehensive and flexible. A controller has two sets of MIDI connectors. The first is labelled MIDI and is connected to the main loop of a MIDI system. This allows the controller to have presets recalled by any device capable of initiating MIDI messages. The second set is labelled SATELLITE and is essentially used to construct a standalone system, or a subsidiary MIDI loop for private communication between a controller and its satellites.

On a satellite unit the one set of MIDI connectors provided can be connected into a main MIDI loop to use it standalone by recalling previously installed presets, or they can be used to connect within the satellite loop.

A controller or satellite can be set to any of the 16 available MIDI channels. Using the satellite loop, a controller can send messages to up to 15 satellites that are out of the main MIDI loop. Thus, up to 256 *IEQ* graphics could be on line at once, responding in 16 groups.

An *IEQ* controller itself can be set to generate MIDI program messages. These will go out over the channel set on that unit.

There are several ways to control a satellite. First, the controller can take direct control via its front panel switches. In this case the satellite responds identically to the controller's own internal EQ. The video display on the controller shows the responses of the satellite. If a studio uses a bank of graphic equalisers, the *IEQ* makes it possible to rack most units remotely and control them with a single unit kept near to hand.

To send a single equalisation setting from the controller to a unit in the satellite loop or the reverse, a preset called TMP is used. TMP in one unit is loaded with a copy of the required preset, which is then sent to the other unit's TMP preset, from which a copy is made into required preset number. This is awkward to use since one has to

go through up to 127 other preset steps to get there. Scrolling which wraps from preset 0 back to TMP and likewise forward from TMP to 0 would be a useful software modification, since most users will work on the lower presets first.

DUMP can be used on the MIDI (not satellite) output of a controller to send the current preset, all presets, or the MIDI program table to another unit on the main MIDI loop.

TRACKING can be set up so that the equaliser sections of several satellite units will exactly follow another unit. In this case the tracking units' preset and MIDI program tables are not used. Alternatively, using the built-in MIDI program generator, units can be set up to recall their own internal presets but tracking the preset number called up in the MIDI generating unit. This is useful for multipurpose halls or stage monitor equalisation where each unit requires a different adjustment but they must be switched in unison for a different application.

Each unit has what is called a MIDI program table, which forms a link between MIDI program numbers and preset numbers. The user can set this table up to call up any desired preset when any MIDI program number is received. There is much more to be said about the MIDI implementation but this provides an overview of the facilities of the *IEQ* system. Complete details are provided in the manual, which are adequate to enable a user to program any function of an *IEQ* unit from an external computer with MIDI interface.

## Security

Password security is provided, which can be programmed by the installer to protect his EQ adjustments. He can allow the user to recall only one preset, or as many as required up to the maximum of 128. The user cannot change any of the equalisation settings in the presets, thus they are fully protected. The only way stored preset or MIDI table information can be disturbed without the password once the unit is in security mode is by removing the battery. In this case after 30 seconds or so, all stored information is lost.

## Summary

The ART *IEQ* family of products is well constructed and has a good user interface. Audio performance is generally good, with only a few minor deficiencies. As a tool for room equalisation, in anything but the simplest installations the ability to experiment and keep the results could both speed things up and give a better outcome. The SECURITY mode also is far more tamperproof than any perspex cover.

The star of the show, however, must be Smartcurve, which uses microprocessor technology as an invisible helper, overcoming the limitations imposed by practical electronics in constructing a truly graphic equaliser. □

FIG 13 VIDEO DISPLAY SMARTCURVE OFF

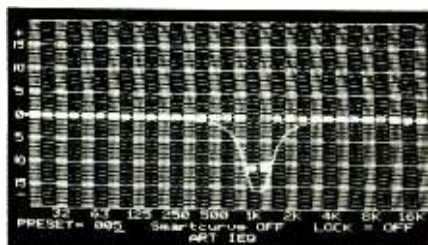
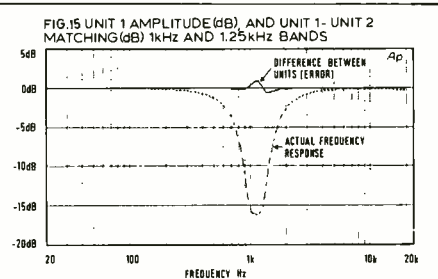
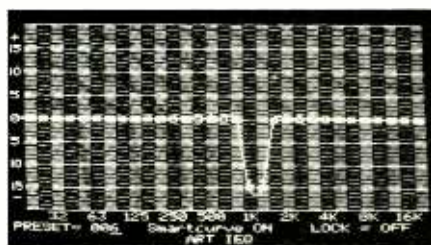


FIG 14 VIDEO DISPLAY SMARTCURVE ON



# CLASSIFIEDS

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## SERVICES

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**SCS**

Specialists in the supply and service of cassette duplicators, bulk custom wound cassettes, and accessories

**GRAFF SONY TELEX WOLLENSAK**

Main Dealers UK and Export

**SOUND CASSETTE SERVICES LIMITED**  
BODEN STREET, CHARD, SOMERSET

**0460 67237**

**HIGH SPEED HIGH QUALITY LOOP-BIN  
DUPLICATING BY SRL TAPE SERVICES**

REEL-REEL — DOLBY A — QUALITY CASSETTES  
NAB — REC — QUALITY CASSETTES  
F1 PCM DIGITAL — IN...OUT — QUALITY CASSETTES  
AUDIO CASSETTE — DOLBY C — QUALITY CASSETTES  
DOLBY B

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037986 370

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Studio Accessories  
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Music House  
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Rainhill, Prescot  
Merseyside L35 8LD  
051-430 9001



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BLANK CASSETTES & ACCESSORIES

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## SERVICES

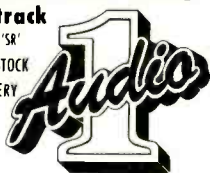
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FOR QUALITY, PRICE AND SERVICE

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**ROSANNA STUDIOS**  
2533 Evilard, Switzerland  
Phone 010-41-32-224242  
Fax 010-41-32-228092

ADAMS SMITH 605 Synchroniser, one master. Two slaves, no interfaces required. Several units available £250 + VAT. As seen. Details, send SAE Knight Audio, The Granary, Monkmoor Farm, Shrewsbury (0743) 57707. Personal callers strictly by appointment.

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## FOR HIRE

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WESTLAKE, ACOUSTIC ENERGY  
LARGE SELECTION OF OUTBOARD  
INCLUDING FULL SUMMIT RANGE

## CLASSIFIEDS

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Previous experience essential

Hours of work: 40 per week

If you are interested in the above position please apply in writing to TRACEY TOMLINSON,  
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THE NATIONAL THEATRE IS AN EQUAL OPPORTUNITIES EMPLOYER

## R G JONES SOUND ENGINEERING

We have vacancies for experienced sound engineers in both our Hire Division and Installations Division which are based in Mitcham, South London.

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A clean driving licence is essential.

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To obtain an application form telephone: 01-540 9881 or write to: The Personnel Manager,  
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**Tape Machines, Mixing Consoles, Microphones, RF, Time Code, Digital Circuitry, Talkback.**

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Contact Mike Jones,  
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RG24 0NE.  
Telephone: (0256)  
470704.

**Professional &  
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Appointments**

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For the right person, who will become a key member of a small friendly company we can offer an attractive package of basic salary, open ended commission scheme and a company car.

Applications in confidence please to:

**box no. 968**

Submitting a full CV.

## CLASSIFIEDS

## SITUATIONS VACANT

### Are you young, enthusiastic and eager to work with an equally enthusiastic, lively group of people?

Then you should be talking to Stirling Audio Systems. We are expanding and with the move to our new Studio Centre in Kilburn, we need more go-ahead people to help us stay ahead. We currently have 2 vacancies within our sales and service operations.

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To cover an expanding dealer network. Technical expertise is not essential, although you should have previous selling experience. You must possess the self-motivation and initiative to get out and find new business and the presence to liaise with manufacturers. An attractive salary and benefits package is available to the right person.

If you think that's you, call Andrew Stirling today.

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If you have around 2 years studio experience or a working knowledge of multitrack equipment, then you could join the small, dedicated team working under our Technical Director servicing customer's equipment in the field.

You don't necessarily need formal qualifications, you will be assessed on your abilities. With a salary in line with your experience, this is an ideal opportunity to expand your horizons. Apply to Rod Thear.



Stirling Audio Systems Ltd  
Kimberley Road  
London NW6  
01-624 6000

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For an application form, telephone:



Personnel Department, Agfa-Gevaert Ltd,  
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## CLASSIFIEDS



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 Digital audio concepts: DASH & PD formats; analogue/digital recording, processing, mixing & editing, automation & synchronisation MIDI & SMPTE timecode, computerised sound mixing consoles, analogue/digital sound synthesis & sampling working with various bands & individual artists; music writing, song & orchestral arrangements, radio jingles & commercials; TV/film sound tracks; local radio operation; introduction to pop promo production, business practice in music industry

*3-month intensive or 6-month part-time CERTIFICATE courses in*

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Name . . . . . Address . . . . .

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This brand new 2-track machine looks set to take the mid-priced market by storm. Not just a re-vamped B77, we tested one and the response was so flat we had to check the machine wasn't switched to source.

7 1/2/15 ips, 20Hz-20Khz +/-0.2db (that's flat!)

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TASCAM MS16 inc dbx + autolocate - console package	£5500
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ALESIS Microlimiter	£100
ALESIS Microgate	£100
APHEX type C	£230

ALL PRICES EXCLUDE VAT  
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Any item can be reserved by phone for up to 3 days pending receipt of cheque

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- Custom Wound Cassettes - BASF chrome & ferric, selection of shells, V, competitive prices, ring for list.
- Hire Dept - New list available - for details phone & ask for Mat.
- Tape & Sundries - Agfa & Ampex, blades, splice, chinagraph & spools always in stock.



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Sounds

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MANCHESTER M16 9EA  
061-873 7770  
MAIL ORDER - EXPORT**

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# Our latest release

Ampex hits the top of the charts with its newest release, Ampex 467 digital mastering tape.

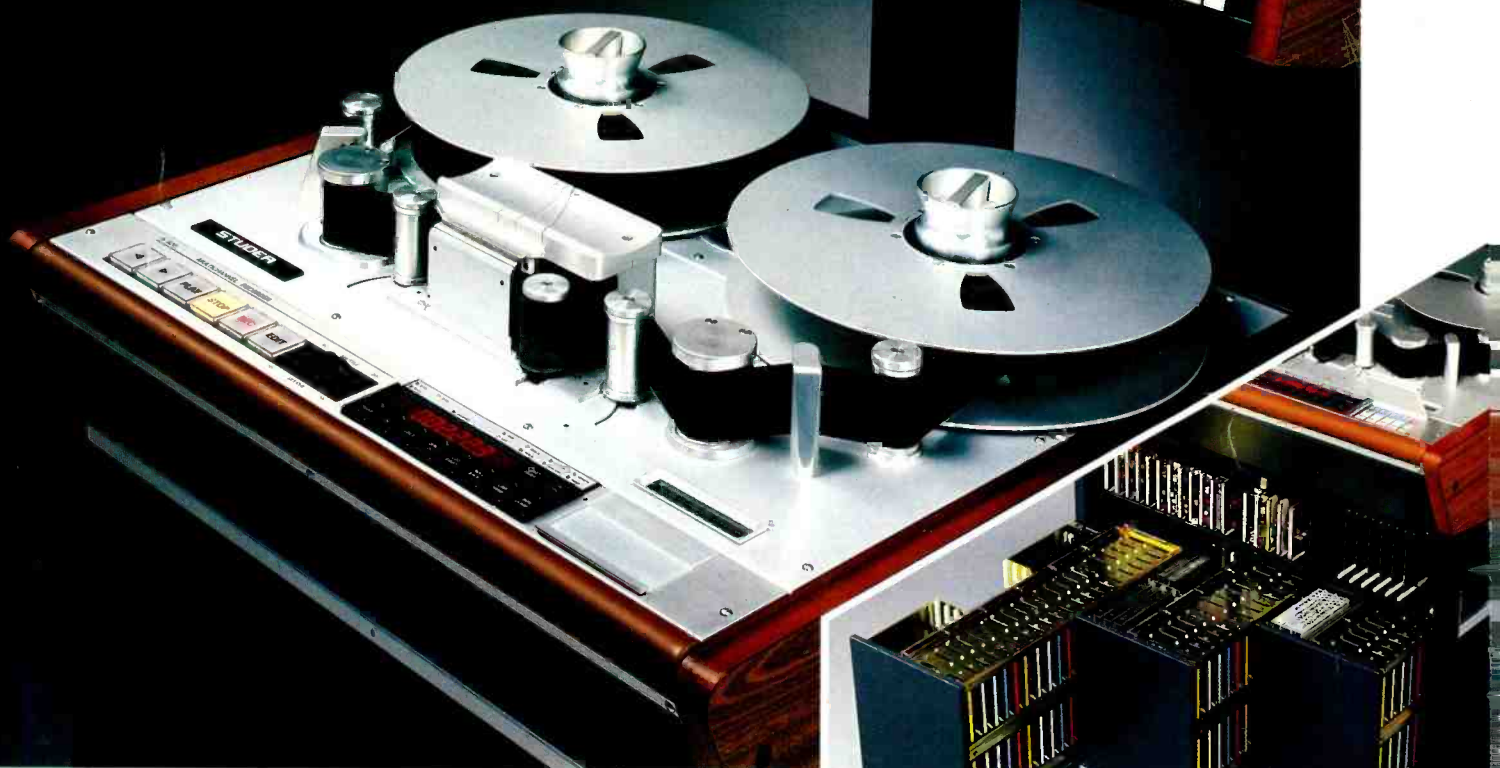
We not only pioneered digital audio tape, we also refined it. The result is Ampex 467, a tape that sets the highest standards for all digital audio applications. And it's available in all open reel and cassette formats, including the new 80-minute cassette length.

More top performers record their hits on Ampex tape than any other tape in the world. While opinion may vary on what it takes to make a hit, there's no argument on what it takes to master one.

## AMPEX

Ampex Magnetic Tape Division  
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# Capital Investment



When you invest money, you expect a return. The more invested, the greater the return. Simple logic. In the studio business, this boils down to matters like hourly rate limitations and equipment utilization.

That's why, when it comes to profitability, the new A820 multichannel recorder is likely your best choice. This is analog technology thoroughly re-engineered by Studer. Economical. Universally compatible. When teamed with new noise reduction technology, A820 sound will unnerve the digital devotees. All-encompassing microprocessor control provides unprecedented convenience and flexibility. Studer manufacturing ensures precision and reliability.

For the sake of your bottom line, drop us a line for more information.

**Studer A820 multichannel recorder.**  
A capital idea.



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