

STUDIO SOUND

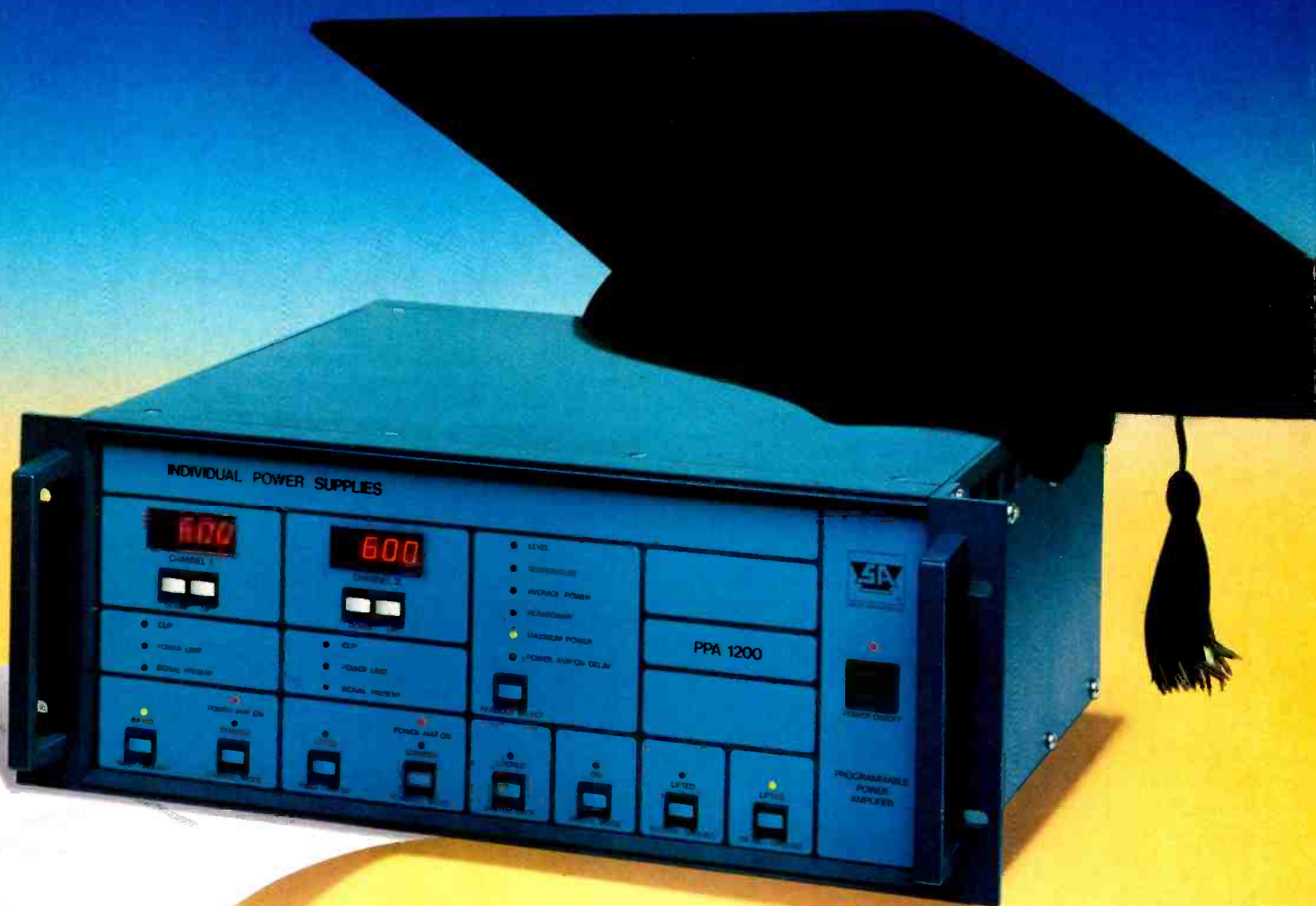
AND BROADCAST ENGINEERING



SIGNAL PROCESSING



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STUDIO SOUND

AND BROADCAST ENGINEERING

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EDITORIAL

Money is a strange commodity. We worry when we have none. When we have a little money we worry about what to do with it. When we have a lot, we worry about how to keep it. As we need money to do virtually anything in life there will always be this worry factor—the mental parasite (or is it symbion) that's along for the ride.

As I write this page I am very much surrounded by worry about money. Today is the day after the New York AES and the late edition of the *New York Times* carries the headline 'Stocks Plunge 508 Points, A drop of 22.6%: 604 Million Volume Nearly Doubles Record' with sub heads of 'Worldwide Impact and Fears Of A Recession'. The TV has been full of similar coverage and there is real worry among many of the people around me. By the time you read this, yesterday will either just be another statistic in the record books or we could be heading for some big changes.

The four days of the AES Convention saw the unveiling of a great deal of new products, which we will be covering in detail over the next few months. The Convention always continues in isolation from the events outside, so as the financial world was positive when the show opened, the show remained in that frame of mind despite the major financial upheavals outside. The Convention was not, however, isolated from money matters, although for a change it was good news generally. We saw major product announcements and unveilings, with facilities that have been talked about in hushed tones for years but come with pricing that contains a positive ring.

Aside from highly beneficial hardware and software updates for existing disk-based recording and editing systems, we saw two major introductions with far-reaching implications. In years past we would have been talking 6-figure sums in dollars or pounds for the kinds of facilities currently being offered but you will be pleased to hear figures of half these amounts. Mixing consoles from a number of manufacturers have received significant updates and improvements with very little extra cost. We have outboard processing gear offering three times the facilities of their predecessors but with a price tag of about half. There was much talk of what is about to happen—of major investments in new facilities and a healthy demand for mixing consoles, from the smaller top-end companies at prices that would buy you two moderate-sized SSLs. I came away with a definite feeling of excitement for the industry and the direction in which we seem to be heading. The members of the industry were expressing their confidence in its continued growth and development by investing within it. As I write in the aftermath of the show, with the headlines of the *New York Times* still as bold as ever, I pray that the optimism that everyone experienced over the period of the Convention is not about to be blown away by factors outside our control. By now you may be wiser than I.

While on the subject of money and the recording industry, there have been two occasions recently that have made me laugh as we see how those outside our industry perceive us.

A Japanese hi-fi manufacturer is running a series of ads in the consumer press—you may already have seen them. The product, I seem to remember, is a rack system with infra-red control. The copy extols the virtues of the product, and very good it probably is too. My lack of clear recall of the product's details is explained by the fact that I was quite blown away by the headline—in inch-high letters—referring to the value for money of the product: 'About two million pounds less than the average recording studio'.

What's yours worth?

The second occasion was a BBC TV play, in which a couple were trying to sell their house. It appeared that the only viable purchaser was a rather objectionable man—white suit, black shirt open to the navel with rows of medallions, his and hers BMW/Mercedes and an expensive taste in jewellery. When one of the vendors asked the other what their prospective purchaser did for a living the reply went something like this: "Oh, he's filthy rich. He owns a recording studio. That is where the new money is these days!"

So now you know.

Cover: Bel BDE-2600S digital stereo editor, Tubetech PE 1A programme equaliser and Quantec QRS/XL room simulator. Photography by Roger Phillips.



We mix with many consoles



Internationally Acclaimed Connector Technology

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The FX Series by



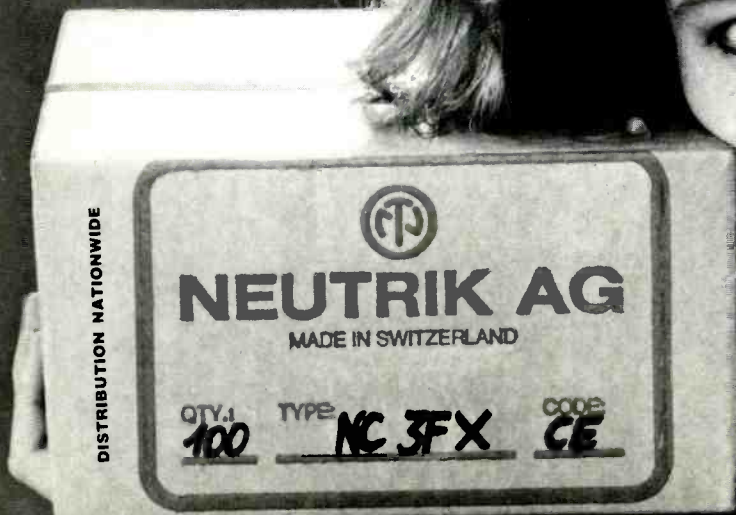
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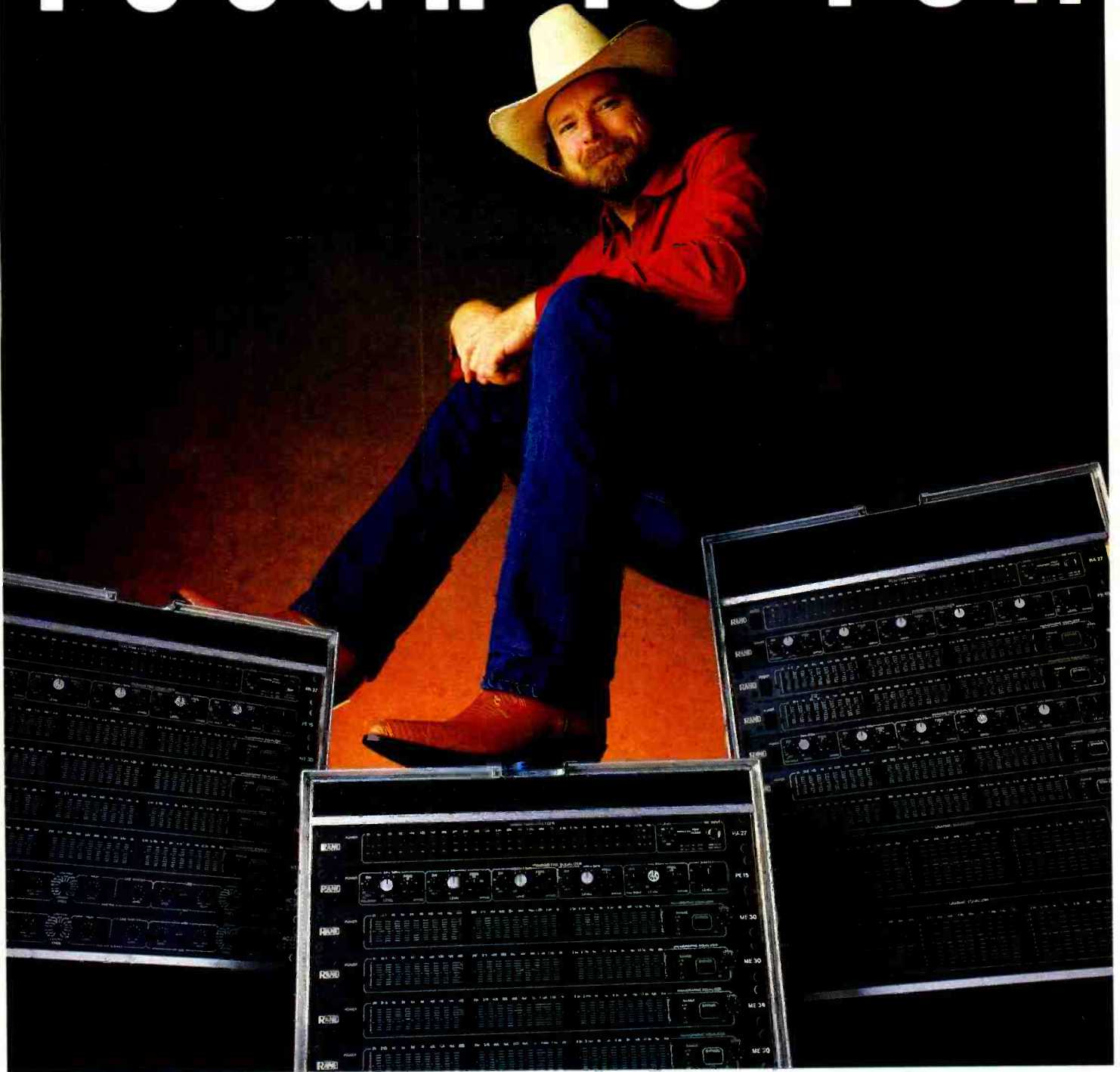
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Compact & Competitive



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F i c t



CD 08120

Bill

VOLUME 100 NO. 41

Sony's DAT Re-raises Ire Of E

BY PETER JONES

LONDON Leading members of the European Parliament are expressing deep concern over the decision by Sony to market DAT recorders in Europe later this year. The officials are stressing the potential damage, as they view it, to the European music industry of widespread use of DAT equipment to copy recordings. One British MP, James Moorhouse of the European Democrats, says that 60,000 jobs in the industry could be at risk. He is seeking a European Commission statement telling Japan that the launch of DAT in the European Economic Community would "not be tolerated before protection is afforded copyright own-

F a



From its very conception, Digital Audio Tape has been the subject of hype and controversy.

Much of the hysteria has stemmed from the use in which some consumers may choose to put DAT equipment.

Be that as it may, HHB has always believed that digits point the way forward in both professional and consumer audio.

Quality must always be king.



It is quality that will guarantee a successful future of the music business as well as the studio industry.

Forget the hype. Ignore the controversy. DAT is highly convenient and it works. And it can provide professionals everywhere with the extra quality they seek.

Professional format DAT equipment can record and playback on 486 KHz or 44.1 KHz.

Hopes rise of accord on digital audio tape

by David Thomas

MUSIC fans often in Europe and the US stand the chance of a voluntary agreement with the Japanese electronics industry on the introduction of digital audio tape (DAT) as a new format of recording. It is now being discussed by the Japanese, which could mean the music industry "thinks that the music industry."

The Western music industry believes that an early introduction of digital audio tape could mean the end of compact discs and the rise of high quality portable players.

However, the European Music Association of Japan (EMAJ) has agreed to support the introduction of digital audio tape (DAT) as a new format of recording. The International Trade Association of Music (ITAM) has also agreed to support the introduction of digital audio tape (DAT) as a new format of recording.

There are those who think that the introduction of digital audio tape (DAT) will mean the end of compact discs and the rise of high quality portable players.

Senior executives from both sides met in Vancouver, Canada, this week to solve the problem. However, the meeting broke down after the Japanese rejected the demands of the music industry, Mr.

Japanese likely to launch digital tape despite outcry

BY CARLA RAPPOPORT IN TOKYO AND DAVID THOMAS IN LONDON

JAPAN AND its Western trade partners are heading for a trade dispute after the Japanese Ministry of International Trade and Commerce (MITC) has announced a plan to launch a digital audio system which the music industry "thinks threatens its survival."

The Japanese now look certain to launch the digital audio tape system next year, but the Western music industry will press the US Government and the European Commission for laws forcing the safeguards it wants.

The system will allow music reproduction on a par with compact discs, but the Western music industry fears that compact discs will be copied onto the digital tapes unless they carry a "password" to prevent this.

The industry believes that combined compact disc/DAT players, which the Japanese have already exhibited, will encourage consumers to tape off compact discs with out paying royalties, undermining its copyright earnings.

Senior executives from both sides met in Vancouver, Canada, this week to solve the problem. However, the meeting broke down after the Japanese rejected the demands of the music industry, Mr.

Don't panic over DAT

TECHNOLOGY
Michael Cross

THE record industry's opposition to digital audio tape (DAT) is not surprising in a world where the music industry has been accused of being the most aggressive commercial piracy, but it is a pity that the music industry has not been more united in its opposition.

The International Music Federation (IMF) has been accused of being the most aggressive commercial piracy, but it is a pity that the music industry has not been more united in its opposition.

The music industry has not been more united in its opposition to DAT. The music industry has not been more united in its opposition to DAT.

Japanese companies ready to sell digital audio tape systems

BY CARLA RAPPOPORT IN TOKYO

THE JAPANESE launch of a controversial digital audio tape (DAT) is gathering pace as Sanyo Electric and Sony, two heavyweights in the world consumer electronics industry, are set to unveil marketing plans for the product this week.

DAT, which will both record and play back music with almost perfect quality, has been attacked by the international music industry. It claims that the technology would undermine the industry by allowing music pirates to record copyrighted material, such as compact discs, without penalty. As a result, it is seeking to modify the product or tax its sales heavily in the US and Europe.

However, it is seeking to modify the product or tax its sales heavily in the US and Europe. However, it is seeking to modify the product or tax its sales heavily in the US and Europe.

Liberal Party's Gija de Vries, letter to REC Commissioner

network says that the launch "would be another aspect of Japanese onslaught on the European electronics market" calls for the commission to (Continued on page 100)

Cat



It's now available at HHB in the shape of the Sony PCM 2500.

The DTC 1000ES is designed primarily as a domestic device at a domestic price, but we see it as an every-day tool in any professional recording environment.

HHB should know. The company created a massive pro-audio role for the EIAJ digital format.



Of course, both machines are well supported by HHB's legendary expertise and back-up service. That's the special reward for those that choose Europe's leading pro-audio centre for their digital technology.

You've read the fiction and you've got the facts. Now buy the product. There's no turning back.

SONY/HHB

New exhibition in Italy

IBTS, the first purely professional audio and broadcast exhibition to be held in Italy, took place in Milan from September 24th to 28th.

In past years professional audio has been represented at the SIM exhibition at the beginning of September, together with all aspects of audio including hi-fi and disco equipment. But it has long been felt that the professional audio and broadcast market needed its own exhibition to break away from the diversity of SIM, which is good news for manufacturers and visitors as the products are now being displayed in a smaller, more specialist environment.

The show was held at a new exhibition centre called Fiera Milano Sud, a complex of exhibition and conference halls surrounded by countryside 20 km from the centre of Milan in Lacciarella. The exhibition was housed in a light, spacious and fully air-conditioned building, and

took place on the ground floor level with the bar and lounge areas on a first-floor gallery.

There were around 80 exhibitors and although all were Italian, there was an extremely good representation of English-manufactured products, among them Soundcraft, Trident, Soundtracs, DDA, Audio & Design, Tannoy, Canford Audio and ElectroSpace Developments.

Some concern was expressed by several exhibitors about the fact that the Audio Videx exhibition, aimed primarily at the sound reinforcement and studio market, will take place in Rimini at the end of October. The situation is similar to the one in London earlier this year when two major audio exhibitions were held in close succession.

The general opinion, however, is that the first IBTS show has been a success and will become an annual event in Milan.

Caroline Moss

NEWS

AudioFile CD masters

AMS have announced that compact discs are now being produced bearing the *AudioFile* logo as proof of the machine's role in the production process. The first CD release using the *AudioFile* was *Cathedral Oceans* by John Foxx, out on Quiet Man Records. The most recent digital recording to have been mastered on



AudioFile is the first CD release, on EMI, of Deep Purple's *24 Carat Purple*, mastered by Ian Gillespie at Tape One Studios in London.

AES election results

The Audio Engineering Society have announced the results of this year's worldwide election of officers for the 1987/88 term. They are as follows:

President Daniel Gravereaux (elected in July after president-elect Richard Heyser died in March)
President-elect Stanley Lipshitz
Regional vice-presidents Eastern Region, US and Canada, Randall

Hoffner; Central Region, US and Canada, Thomas Behrens; Western Region, US and Canada, Richard Cabot; European Region, Roger Furness; International Region, Lawrence Fincham
Governors Diana Deutsch; William T Shelton; Frank Anthony Griffiths
Secretary John J Bubbers
Treasurer Arthur E Gruber

Forthcoming events

November 23rd to 26th Digital Information Exchange '87, Private Member's Suite, London Zoo, UK.

1988

March 1st to 4th AES 84th Convention, Palais des Congrès, Paris, France.

March 9th to 13th Frankfurt Musik Messe '88, Frankfurt, West Germany.

March 21st to 24th 7th International Conference on Video, Audio and Data Recording, University of Yorks, UK.

March 22nd to 26th 28th USITT (United States Institute for Theatre Technology) Annual Conference and Stage Expo '88, Disneyland Hotel, Anaheim, California, USA.

April 5th to 8th Acoustics '88, University of Cambridge, UK.

April 8th to 12th NAB, Las Vegas, USA.

April 25th to 28th Audio Visual '88, Wembley Exhibition Centre, UK.

May 18th to 20th ShowTech Berlin '88, Berlin Exhibition Grounds/International Congress Centre, Berlin, West Germany.

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

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

1989

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.

Association for Multi-image

Association for Multi-Image Europe, an offshoot of AMI International, has recently been formed. The limited company, registered in England, is a non-profit making association serving the needs of multi-image professionals in Europe, and aims to provide its members with: a greater voice in shaping AMI International policy; the AMIE newsletter *Focus*, along with the international *Multi-Images*; access to AMI Gold Tours of

award-winning programmes, and to AMI seminar tapes and other educational and professional materials via a library of resources at AMIE headquarters; and a non-competitive festival of programmes, the first of which is expected to be in 1988.

Further information and details on how to join are available from: The Secretary, AMIE, 79 St Martin's Lane, London WC2N 4AA, UK.

The state of play

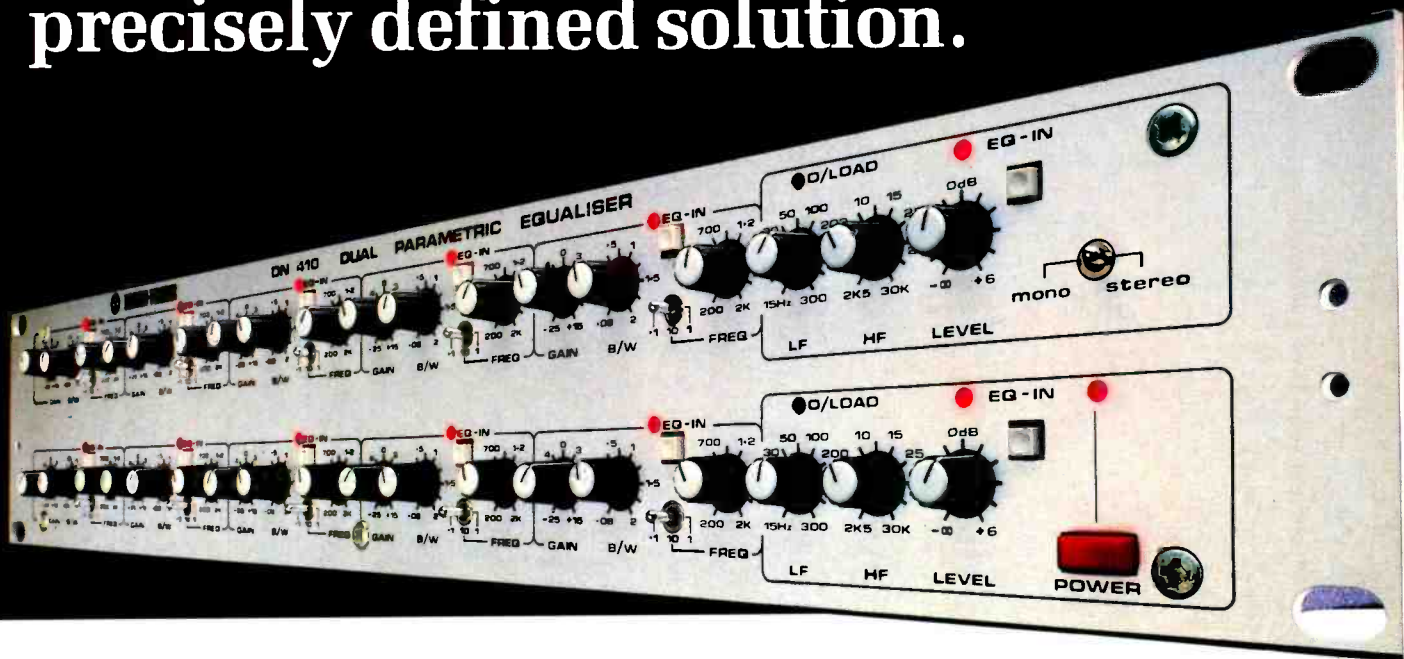
Euromonitor, independent industry analysts, have released their 1986 findings on the UK music industry. The figures are prefaced with a note that as the average working week is now 39 hours and there is high youth unemployment, this is one of the main reasons why sales of pre-recorded music has shifted to the 24-35 age group.

The UK music market was worth over £2 billion in 1986, 43% of that on hi-fi and portable systems, and 39% on pre-recorded music. Sales of cassettes accounted for a third of that but vinyl still accounted for over 60%, according to the report. CDs were worth just under £100 million in 1986, a jump from £33.5 million in 1985. Euromonitor found that music

videos accounted for 35% of all videos sold, and that 98% of people over 16 years old watch TV but only 63% listen to records or tapes.

Across the Atlantic, the RIAA (Recording Industries Association of America) and NARM (National Association of Recording Merchandisers) have completed a joint annual market survey. It shows that cassettes made up 56% of 1986 music dollars, while CDs represented 19%, up from 8% in 1985. LPs were worth 18% and singles 7%. Of the people surveyed, 80% felt sales would increase over the next two years and planned to expand in that period. Nearly all (96%) felt CD sales would increase in 1987.

For those of you who have defined the problem more precisely, a more precisely defined solution.



Klark-Teknik introduces Series 400 Parametric Equalizers

Parametric equalizers have become the optimum choice for correcting complex room problems. Series 400 Parametric Equalizers let you deal with these problems more precisely, with bandwidth control from notch filtering to broadband.

Room resonances can be very deceptive, as you're all too well aware if you've ever tried to tame them. That's why all center frequencies on Klark-Teknik parametrics are fully variable from 20 Hz - 20 kHz. Each band can handle any problem, any time, anywhere. An extravagance? Not to anyone who has tried to use a parametric with fixed frequency bands.

Unique features for unsurpassed control

Because every room presents a different set of challenges, Series 400 Parametrics are designed for the highest level of operational flexibility. Filter bandwidth is variable from a 1/12th octave notch to 2 octaves. Each band has 15 dB of boost, 25 dB of cut. Variable high and low pass shelving filters offer additional control. Two models are currently available: the single channel five band DN 405 and the dual channel five band DN 410. In really difficult environments, the DN 410 can operate as a single channel ten band parametric or notch filter.

Klark-Teknik reliability stems from uncompromising standards

Our standards are demanding: so are our customers. Years ago, we pioneered the use of thick film micro-electronic circuits in our graphic equalizers. This technology reduces equivalent solder connections by more than 50%: its proven reliability is one reason we back Series 400 Parametric Equalizers with a five year limited warranty.

The other reason is the 100 hours of testing every

Klark-Teknik product undergoes before being shipped.

Our standard procedures include stereo dynascope board inspections, full performance verification and a cycled burn-in followed by a complete re-check.

Lower standards of design, construction and testing could make our equalizers less expensive to purchase. But it would make them more costly to own. There are no short cuts to true "set and forget" operation.

Klark-Teknik products for a full range of applications

Perhaps you'd like to spend less time tuning — and retuning — the room. If so, investigate Klark-Teknik Parametric Equalizers. For full information on the design, construction and applications of our parametric and graphic equalizers and digital delay lines, write to Klark-Teknik at the address below.



Each one of Klark-Teknik's Series 300 Graphic Equalizers, Series 400 Parametric Equalizers and Series 700 Digital Delay Lines is optimized for specific applications.

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Klark-Teknik Electronics Inc.,
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Farmingdale, NY 11735 (516) 249-3660
Distributed in Canada by: Omnimedia Corp., 9653 Côte de Liesse,
Dorval, Quebec H9P 1A3 (514) 636-9971



In brief

• Australian Metropolis Audio Pty Ltd have completed construction of a live acoustic environment in their Studio One. The variable shape of the room is achieved by large, hinged panels forming the walls, and various sized door panels mounted on the walls, which can be opened and closed to adjust the amount of liveness. A bass absorber has been built in, some 6.5x4 m (wh) by 12 layers thick, absorbing energy down to 16 Hz. Metropolis Audio, 180 Bank Street, PO Box 296, South Melbourne 3205, Victoria, Australia. Tel: (03) 696 2111.

• Audionics of Sheffield have announced the birth of their new company, dealing in broadcast audio project management, manufacture, design and outside broadcast. Manufactured products include audio mixing, switching, and routing equipment, and services include installation of turnkey systems,

including custom-made cabling. Specialist logging systems can be produced, with systems available from 16 to 256 inputs, and several OB vehicles, including the Audionics Mobile, are available for hire. Contact Derrick Connolly or Michael Adams at Audionics Ltd, PO Box 194, Hartshead, Sheffield S1 1GP, UK. Tel: 0742 769769.

• Tom Oberheim, founder of Oberheim Electronics, has announced the formation of his new company, Marion Systems Corporation. The company will be involved in the design, development and marketing of music-oriented products, with an emphasis on working closely with musicians. Oberheim will also be providing broad-based consulting services. Marion Systems Corp, 1317 Fifth Street, Suite 301, Santa Monica, CA 90401. USA. Tel: (213) 451-8910.

NEWS

People

• Electro Sound have appointed Gary Johnson to the newly created position of manager, audio engineering. Johnson's experience has included work for Dolby Laboratories and the Ampex Corporation.

• Harman UK have announced two personnel changes. Peter Lambert has been appointed to the new direct sales division, and will specialise in technical support for Fostex synchronisers and Focusrite input electronics. Martyn Jago becomes service and installation engineer for New England Digital products.

• Ampex have appointed Richard A. Antonio to the new position of director of sales and customer service. Antonio has been with Ampex for the last 11 years as

national sales manager.

• Surrey-based Digital Audio Research have appointed Kevin Dauphinee as director of marketing. The former vice-president of sales and marketing for Dolby Laboratories will be responsible for worldwide marketing and sales activities.

• Dearden Davies Associates (DDA) have appointed David Neal marketing manager. He'll be looking after all aspects of the marketing operation and will work closely with Klark-Teknik's marketing director, Gaston Goossens.

• California-based Stewart Electronics have named James M Ruse as their national sales and marketing manager. Ruse comes from Deltalab, the pro-audio division of Analog & Digital Systems Inc.

Stolen equipment

The following list of equipment, estimated at around (Australian) \$30,000, was stolen from DEX Audio in North Melbourne on the night of September 20th. Any information should be forwarded to Greg Williams at 87-91 Arden Street, North Melbourne, 3051, Australia. Tel: 329-2877. Or contact Senior Detective Andrew Fulton at City West Police Station on 329 0000.

2 pairs Yamaha NS10M speakers, serial no 212301 of 2 pair
1 Yamaha RX21L digital drum machine, serial no 33213344
1 Yamaha REV7 digital reverberator, serial no 4488 or 31480337
1 Sony SLFH 100 AS beta hi-fi VCR with cordless remote
2 Sony PCM-501ES digital audio processors, serial nos 300088, 300049
1 Sansui SE-7 2-channel 10-band graphic equaliser, serial no 582070594
1 Akai digital sampler S612 serial no 0076015218
1 Akai sampler disc drive, model 280
1 Denon DRM 07 cassette deck, serial no 7026300185

1 Denon DCD 1500 CD player with remote control
1 Nakamichi High COM II NR unit, serial no 05987
1 Aiwa HR 50 high-com NR unit, serial no D10108159
1 Aphex Type-C Aural Exciter, serial no AXTCE 2857
1 Aphex Compellor
1 Eventide H910 Harmonizer
1 Drawmer DS 201 2-channel noise gate, serial no 1372
1 MicMix DX-2 Dynafex NR unit
1 CRL DX-2 Dynafex NR unit, serial no 861155031
1 DEX 120 2-channel power amplifier (yellow reset switch), serial no 19
1 DEX 120 2-channel power amplifier US model (grey), serial no 12 (only one produced)
2 DEX AL 200 2-channel audio limiters
1 Beyer M69 MC dynamic microphone
1 Teac V80 stereo cassette deck, serial no 90028 (engraved on back V762817) and neighbourhood watch sticker
2 JBL 2235 15 in speaker components



Metropolis Audio's new live room

NED works with Analogic

New England Digital have announced a joint technology agreement with Analogic Corporation of Peabody, Massachusetts, who design and market A/D converters, signal processing equipment, and medical products. Under the agreement, the two companies will work together in developing a new generation of extremely fast A/D converters and signal processing

products that will be incorporated into the Synclavier system.

Along with the Analogic announcement, NED chairman and co-founder Sydney Alonso also revealed that the company had received a 7th patent on the Synclavier, an 8th was pending, and that several new patent applications are now being prepared by NED.

Music technology for Newcastle

The Business and Technician Education Council has validated a 2-year, full-time national diploma course in Music Technology for the Newcastle College of Arts and Technology. It is the first B/TEC course in the country to study computer-controlled music, synthesiser skills and recording techniques. Among the topics covered

are analogue synthesis, sequencing and control units, FM synthesis, keyboard skills, recording studio organisation and practice, psychoacoustics, MIDI systems and computer-based systems.

School of Music, Newcastle College of Arts and Technology, Maple Terrace, Newcastle-upon-Tyne NE4 7SA, UK. Tel: 091-273 8866.

Mitsubishi X-86

2 Channel Digital Audio
Master Recorder

4 Additional subtracks: 2 cue,
auxiliary digital & time code

Switchable 44.1 & 48 kHz
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Cut & Splice Editing or new
XE-2 Electronic Editor

Insert Recording (individual
or simultaneous Punch-
in/Punch-out)

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display

Remote Control Parallel
Interface—RS232C/RS-422
SMPTE/EBU "ESbus."

Fully compatible with
PAL/SECAM TV NTSC/
standards: Sync
to: 9.6/8 kHz.
External clock:
50/59.94/60 Hz
or Composite
Sync.

14" Reels



Three models:

X-86 standard

X-86LT extended four hour,
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X-86HS extended bandwidth
(96 kHz Sampling)

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X-86



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NEWS

Contracts

- Harrison Systems consoles have been selected for the Voice of America's Washington DC broadcast production studio. Nineteen identical customised AIR/PRO-7 consoles were purchased, arranged by Dynalectric Corp. Further east, Thailand has purchased 12 Harrison consoles for use in recording, on-air and broadcast production. The sale comprised 11 PRO-7s and one MR-4 multitrack production console.
- Elliot Bros have recently completed an installation and wiring contract at the Image Co, Leeds, UK in association with Windmill Munro.
- CTS Studios in Wembley, London, have had installed a Neve V Mk II

in-line console, the first of its kind to be installed in the UK. The console features 60 inputs, 48 tracks, *Necam 96*, and is equipped for 4-track film and stereo applications.

Customisation includes a unique metering design, for use with digital recorders. CTS's sister facility, Lansdowne Studios, have had a Studer A820 multitrack with full Dolby SR installed. The Lansdowne Group have also announced a major refurbishment plan for CTS, beginning with extensive alterations to the reception and the restaurant.

- DDA have sold an AMR 24 split configuration recording console to White Field Studios in the States. Other American DDA sales include a D series console to Capron Light & Sound of Massachusetts (with 40 theatre inputs and eight matrix outputs); two D series consoles to Sound Rental Services of West Virginia; a 36/24 AMR 24 and a D series to Saban Productions in California; a 36/24 to Christopher Cross's private studio in California; a 28/24 AMR 24 with *Necam* automation to Bill Horowitz in New York; and a 36/24 AMR 24 to composer/producer Bob Rafelson, also in California. In Europe, sales include a 28/24 AMR 24 to David Dundas's London TV commercial studio; a 6/2 S series to Tape One in London for analogue mastering (their third DDA); a 44/24/2 AMR 24 with 64 channels of *MasterMix* to Scacco Matto Studio in Lavagne, Italy; a 36/32 AMR 24 with 36 channels of *MasterMix* to Orinoco Studios in London; a 44-input frame AMR 24 to Parsifal Studios in West London; and single D series consoles going to the Kings Theatre in Glasgow, Theatre Royal in Newcastle, and the Guildhall School of Music in London.

- Benchmark Media Systems have announced two American sales of their *System 1000* audio distribution amplifiers. One goes to WGN-TV while the other goes to PBS (Public Broadcasting System).

Change of address

- The Centro Corporation have announced their move from San Francisco to Salt Lake City. The move involved doubling their staff size and tripling their facility size, to 140,000 ft². Their new address is: 369 Billy Mitchell Road, Salt Lake City, UT 84116, USA. Tel: (801) 537-7779.

- Stewart Electronics have opened their new 11,000 ft² facilities in Rancho Cordova, which will accommodate their sales, marketing, manufacturing and R&D divisions. The full address is: 11460 Sunrise Gold Circle, Suite B, Rancho Cordova, CA 95670, USA. Tel: (916) 635-3011.

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D-4005 Meerbusch 2
West Germany
Telephone: 010 49/2159/50-861, -862 or -863
Telefax: 010 49 2159 1778
Telex: 8531638 OTEL D

NEWS

A history of Ferrograph

After several years with a very low profile, the grand old British name of Ferrograph is once again active. In the '50s and '60s they dominated the industrial and quality tape recorder market in the UK, outside the studio but in proliferation within the broadcast environments. We felt that a short history of the company would put current developments in a truer perspective.

The company started in 1918 as Wright & Weaire Ltd in London, making radio components and instruments. In 1945, the company relocated in a new factory in South Shields.

Based on the early German-produced Magnetophone, the company manufactured its first tape deck, The Weairite Deck. This was later incorporated into the first Ferrograph tape recorder and the British Ferrograph Recorder Company was formed.

Under the Ferrograph name came the series 2, 3, 4 and so on until the series 7. Throughout the 1950s and '60s they were very successful and still a privately owned company. In 1965 they became a public company and shortly afterwards were acquired by Wilmot Breeden, a motor industry public company. Wayne Kerr Ltd were also acquired by the same group and Wilmot Breeden Electronics Ltd was formed.

The most successful period for Ferrograph was undoubtedly the '50s and '60s with the series V, VI and VII. These were really the only quality British tape recorders around. The names of Studer and Ampex were always around in the professional area but in the semi-professional market, Ferrograph held its own very well. They also supplied the British government, the military, and all the major institutions like the Post Office and British Rail. It was a real workhorse machine and it was used in every audio application apart from professional recording. They never did produce a professional machine until the *Studio 8* either as a multitrack or a stereo machine.

The big change in Ferrograph came in the early '70s when they decided

to produce hi-fi equipment. They started to produce amplifiers, tuners and loudspeakers which sold very well until the mid '70s when the Japanese companies started moving into the market with their hi-fi separates. Ferrograph sales plummeted. They decided to withdraw from the hi-fi market but continue making tape recorders. They carried on developing the series 77 into the *Super 7* and then the *Logic 7* and various other models. But all the time the basic problem was that they had an enormous factory in the North East, which at this time employed about 400 people in 60,000 ft² where they produced everything themselves from sheet metal work, right through to transformers, motors—every component part of the machine was manufactured under the same roof. Of course, when the hi-fi market began to drop, the tape recorder market was also being attacked by the Japanese and by Revox who were Ferrograph's main competitor. Volumes decreased until the cost of production per unit was exceeding the selling price.

At this point it was decided to develop a professional studio tape recorder in conjunction with Wayne Kerr; this became the *Studio 8*. Unfortunately, this took three years longer to develop than it should and also cost much more than was predicted. Consequently it didn't sell very well.

In 1977 the company were going through a very bad spell and was threatened with closure by Wilmot Breeden. At this time they were still employing several hundred people and it would have been a serious blow to the local employment

situation if the factory had had to close down. But also at that time the National Enterprise Board became interested and tried to save the business by getting another company to take it over.

In 1977, Newcastle-based North East Audio Ltd (NEAL), was approached by the NEB to make an offer for Ferrograph in an attempt to put the two companies together and make a viable unit. NEAL manufactured professional cassette recorders and employed mostly Ferrograph personnel. The people who came in to run Ferrograph were with the company before and knew the business, so it was fairly straightforward. Thus NEAL Ferrograph was formed.

The NEB pumped quite a lot of cash into the venture and the jobs were saved although it did not actually solve any of the existing problems. Unfortunately, even with the NEAL business added, it was not possible to turn Ferrograph around. In 1981 it was put into receivership and took the NEAL business with it. NEAL was purchased by its previous MD and is still a successful company. Tom Batey, then a director of NEAL Ferrograph, bought the Ferrograph part, or what was left of it, and set up AVM Ferrograph. This is the company that still exists today. The large factory was closed down when they went into receivership and they moved into about 8000 ft².

Tape recorder manufacture was not viable but spares and service, and test equipment manufacture—as much of the original business as possible—was continued. A deal was struck whereby Ferrograph would buy Revox transports but build a machine that was different to their product and sell it as a Ferrograph machine. So they were able to satisfy customers requiring that style of equipment with a Ferrograph specification. This is basically how they kept in the analogue reel-to-reel market and at this point the company became profitable.

Tom Batey: "We are still able to supply spares for Ferrograph machines back to the series 6. We still manufacture the heads and motors for example. We estimate that there are somewhere between 25,000 and 30,000 machines still in service—the BBC still have about 600. We supply spares all round the world and that aspect of the business is thriving. We have all the original machine tools. These factors have helped us keep the customer loyalty important in rebuilding the business.

"We spent from 1981 to 1984 sorting out the business to the point where we could start developing and introducing some new products. We started to distribute other brands of equipment for a while but it was not the way to go in the long term. What we needed was our own product lines.

"We then concentrated on Ferrograph products: the Ferrograph test set; series 77 tape recorder; we set up a video division to sell video presenters and video players to A/V customers. At the same time we had our eye on the future because we felt that although we wished to stay in the recording business, analogue recorders were not the way to go. So we looked around to find a way of entering the digital field. We felt that digital reel-to-reel tape was not the right direction for us so we looked around to find a company working with a disk-based system. The only company we could find at the time was Compusonics in the US. They had just started in 1983 and we had early discussions with them with a view to licensing their technology in UK to develop as a Ferrograph product for the future. We started with the intention of having their products manufactured and distributed in Europe by Ferrograph. That was three years ago."

This collaboration has come to fruition in recent months. The major problem has been the limited capacity of disks, which is still the case but to a lesser extent. Compusonics decided to develop some software that would manage the audio in a different way to PCM. They developed CSX which enables a more economic use of the disk for audio storage and they have now finally produced equipment this year and in a marketable form. This product line was launched at the APRS in 1987 as the Ferrograph series 9. Initially, the machines are being manufactured in the US by Compusonics but by early 1988 they will be made in the UK with Ferrograph initially covering the European market.

"Next year will also see the introduction of a multitrack system based on the same technology which will be considerably less expensive than a digital tape system, yet infinitely more flexible. Later, we plan to incorporate digital video recording with the audio side using the same disk media.

"Ferrograph are now fully committed to digital recording and this will be the main plank of our future business."

Agencies

- Gexco International have been appointed international master distributor for HM Electronics for all markets outside the US and its territories except Australia, Canada,

Mexico and New Zealand.

- Scenic Sounds have been appointed the first UK sales agent for the Ferrograph range of *Series 9* digital audio products.

Why doesn't someone design a console which is perfect for:

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video post production
film scoring and dubbing
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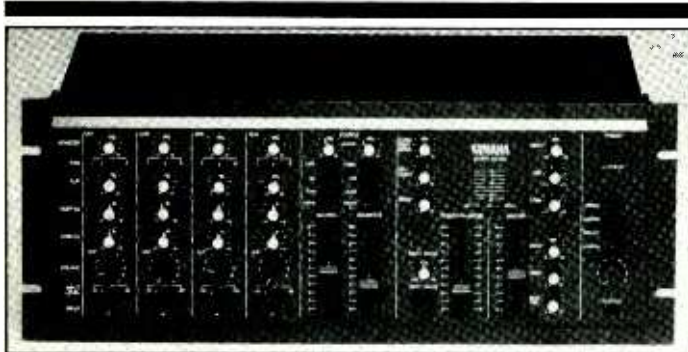
NEVE ELECTRONICS INTERNATIONAL LIMITED, CAMBRIDGE HOUSE, MELBOURN, ROYSTON, HERTS, SG8 6AU.
TEL: 0763 60776. TELEX: 81381. FACSIMILE: 0763 61886.

RUPERT NEVE INC, BERKSHIRE INDUSTRIAL PARK, BETHEL, CONNECTICUT 06801.
TEL: (203) 744 6230. TELEX: 96-9638. FACSIMILE: (203) 792 7863.

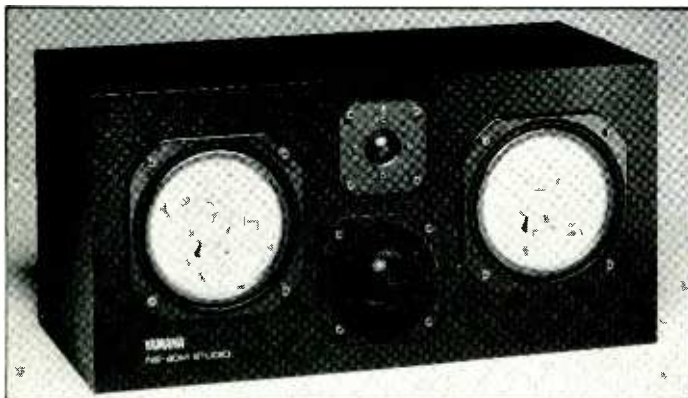
A SIEMENS COMPANY

Yamaha at AES

NEWS



MV422 multisource mixer



NS-40M studio monitor



DEQ7 digital equaliser

Beyer M58 omni mic

Beyer have recently introduced an ENG-type microphone designed with the stresses of practical use in mind. The M58 is an omni pattern dynamic with high output using an internal shock mount design that fully isolates the capsule from the shell. The manufacturers claim this dramatically reduces handling noise. The extra long handle design helps with close-up reporting. The body is made from aluminium and the finish is matte grey anodised to help keep a low profile on camera.

Manufacturer's specification

includes frequency response of 40 Hz to 20 kHz, an omnidirectional polar pattern and a nominal output impedance of 200 Ω .

Beyerdynamic GmbH,
Theresienstrasse 8, D-7100
Heilbronn, West Germany. Tel: 071
31.617-0.

UK: Beyerdynamic, Unit 14, Cliffe
Industrial Estate, Lewes, East Sussex
BN8 6JL. Tel: 0273 479411.

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

AES saw the launch of a large number of new products from Yamaha. The DEQ7 is a digital equaliser with two channels using 44.1 kHz sampling, 16-bit A/D conversion with 32-bit internal processing. The 30 factory programs include graphic and parametric EQ configurations as well as shelving, notch and dynamic/sweep filters. There are 60 user programmable RAM memories and these are accessible through MIDI as is the bulk dump capability. Digital I/Os enable direct interfacing with other Yamaha digital format equipment.

There were also first US showings of the REX50 digital multi-effects processor, the REV5 digital reverb and the SPX90II. Other new products included an addition to the NS series of monitors the NS-40M nearfield monitor. This is a larger upgraded version of the NS-10M in a 3-way system incorporating dual 7 in woofers, a 2.4 in soft dome midrange driver and a 1.2 in soft dome tweeter. A frequency response of 50 Hz to 20 kHz is quoted with a rating of 100 W programme. Sensitivity is 90 dB at 1 m on-axis. Crossover frequencies are 1.2 kHz, 5 kHz with slopes of 12 dB/octave for LF and MF and 18 dB for the HF.

Four new microphones have been added to the MZ series. The MZ203Be and the MZ106S are principally vocal mics although they have other applications. The MZ203Be uses a diaphragm that is described as ultra-rigid and is of Beryllium construction for a good transient response. The design apparently minimises response aberrations in the 3 kHz to 20 kHz range. The MZ106S uses a double laminated polyester film diaphragm. The second pair of mics are the MZ205Be and the MZ204 and these

are designated as drum mics. They are of compact design and come with a special multi-axis stand unit that allows the mics to be placed close to the drums without interference. They also have special right-angled XLR connectors. The MZ205Be has a Beryllium diaphragm and the manufacturers say it has been optimised for high pitched drums. The MZ204 has a 2-layer laminated polyester diaphragm and is designed for pickup of floor toms and bass drum.

Further products include the C300 professional rackmounting cassette deck with three heads, Dolby HX Pro, and dbx, Dolby B and C noise reduction; the EM series of mono powered mixers comprising three models of four, six and eight channels with 150 W power amps; the MC series of consoles with eight, 12 and 16 channels into two; the Club series of small live sound speaker systems; the MV422 rackmount mixer with four inputs and a wide range of source selection; and finally an intriguing 6-input mixer with high quality 4-track cassette built in with all the features common to this type of unit. This latter unit also has a sync selector circuit that allows the user to assign track 4 to the optional YMC2 MIDI converter or other external MIDI converter allowing the unit to synchronise to any MIDI source.

Yamaha, Nippon Gakki Co Ltd,
Hamamatsu, Japan.

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

USA: Yamaha Music Corporation,
Professional Audio Division, PO Box
6600, Buena Park, CA 90622. Tel:
(714) 522-9105.

Bel BD80S

The Bel BD80 was one of the earliest delay line/samplers available several years ago. It has now been redesigned and re-introduced as the BD80S. This is a stereo unit with a 20 Hz to 20 kHz bandwidth and a 1U 19 in rackmount case. Memory capacity is over 6 s in stereo and 13 s in mono, with a frequency bandwidth constant of delay. The unit has delay line and sampling capabilities with mix, feedback and modulation controls. Samples can be edited front and rear, modulated and pitch shifted from $1/50$ of a semitone up to one octave up or down.

The memory can be filled part at a time or all at once and two channels

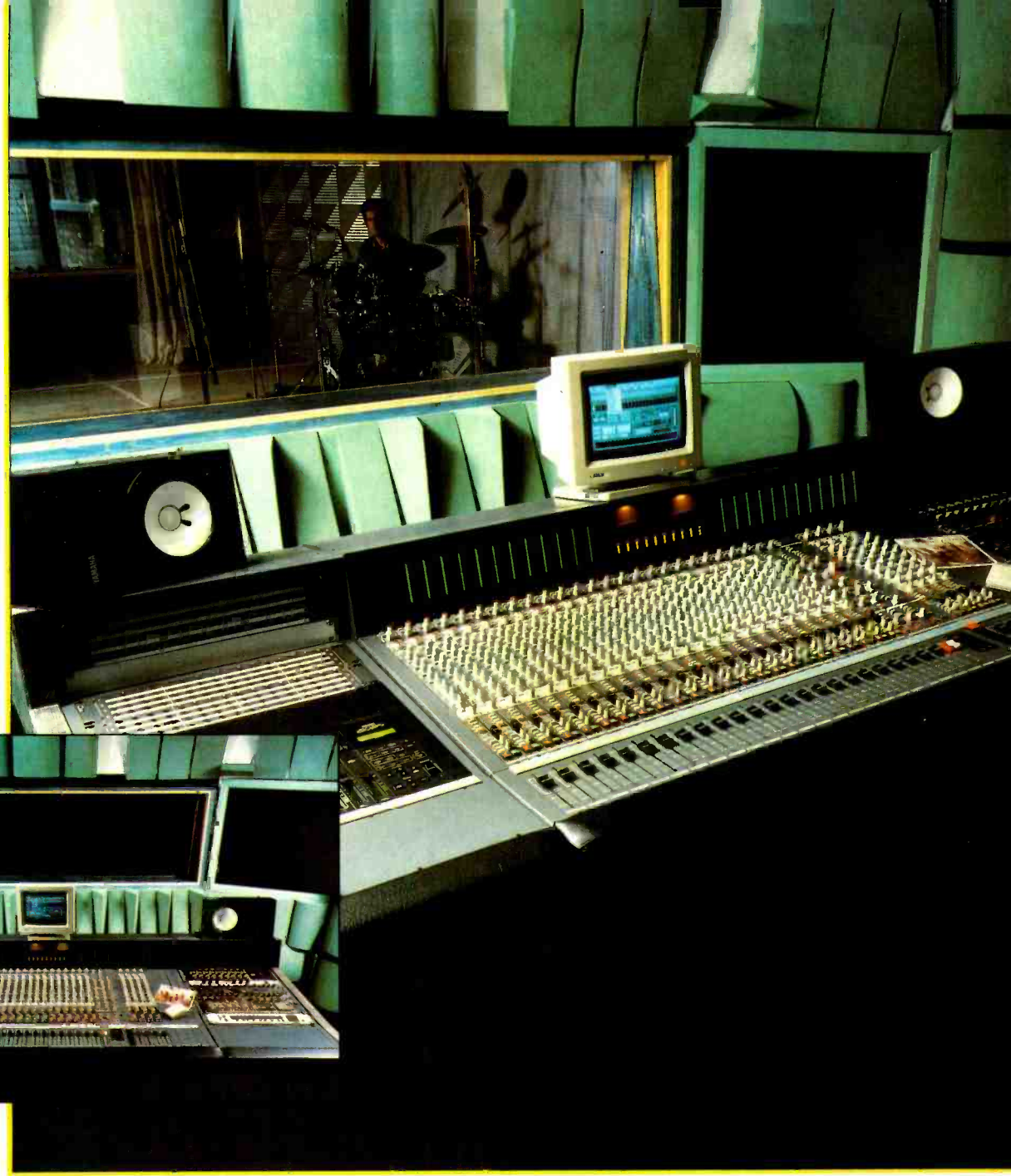
can be recorded independently or simultaneously for 'true stereo' samples. There is provision for both internal and external triggering.

Manufacturer's specification includes distortion of 0.2% max (0 dB at 1 kHz) and a dynamic range of 80 dB as typical.

UK: Studio Equipment Distribution
Ltd, 29 Guildford Street, Luton, Beds
LU1 2NQ. Tel: 0582 452495

Europe: Musimex, 46a Marlborough
Road, London N22 2NN. UK. Tel:
01-881 6060.

North America: Resource
Imports/Distribution, 13462 57th
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NEWS

Kodak professional tape

Kodak have announced the availability of a range of professional audio recording tapes and magnetic film under the Eastman brand name.

The ¼ in recording tape is available in standard and long play lengths with intended application in the TV and motion picture industry. Kodak claim the tapes have high output and low noise characteristics with low print through. Initially the range will include the popular lengths used in these industries and are supplied on smokey-grey spools with the tape

leadered white top and red tail.

The perforated mag tape will be available in a range of lengths in base thicknesses of 75 micron (3 mil) and 125 micron (5 mil). Claimed characteristics include high output, low noise, good HF headroom and sensitivity. They will be supplied on yellow 4 in plastic film cores.

Kodak Inc, 343 State Street, Rochester, NY 14650, USA.

UK: Kodak Ltd, PO Box 66, Hemel Hempstead, Herts HP1 1JU. Tel: 0442 61122.

Eventide H3000 Ultra-Harmonizer

AES saw the introduction of a completely new *Harmonizer* from Eventide that is not just an update on previous models. The *H3000 Ultra-Harmonizer* is described as a pitch change and effects processor containing two complete pitch change channels. Possibilities include Dual Shift, two channels of independent pitch shift; Layered Shift, two different pitch shifts on one input; Stereo Shift, stereo pitch shift which retains imaging and phase accuracy; and Diatonic Shift, the ability of the unit to analyse the note being processed and generate musically-correct harmony based upon the user specification of the key in which the signal is. One input can be harmonically pitch shifted to two separate musical intervals to form a musically correct triad chord.

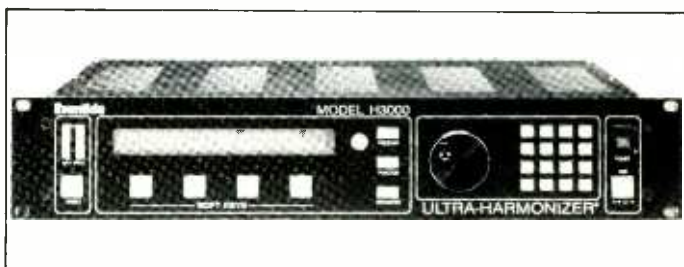
Aside from the *Harmonizer* functions, the *H3000* has a wide range of reverb programs and effects

including programs such as Aliens, Death Flange. There are 50 factory-set programs plus a large number of user presets. Control is based around a variation of the *Harmonizer* knob that allows full selection of programs and functions, etc, displayed on a 40x2-character backlit LCD display, together with soft keys and key pad. The unit is also fully MIDI programmable.

Specification is 16-bit, 44.1 kHz sampling rate with a claimed frequency response of 5 Hz to 20 kHz ± 1 dB and an A-weighted S/N of better than 92 dB. Available from early 1988, the cost will be lower than that of previous models.

Eventide Inc, One Alsan Way, Little Ferry, NJ 07642, USA. Tel: (201) 641-1200.

UK: Marquee Electronics, 90 Wardour Street, London W1V 3LE. Tel: 01-439 8421.



MUSIC NEWS



Roland MT-32 assessment

Roland's *MT-32* is a small synthesiser module designed for the home MIDI keyboard market. However, since it uses a similar sound generation system to the *D50*, it definitely has professional applications, and its ability to play multitimbrally makes it ideal as a sound source for complex composition.

Apart from 100 sounds based on the sampled attack portions of string, brass, wind, piano, percussion and many other instruments, the *MT-32* has 28 on-board PCM-sampled percussion sounds that can be controlled via MIDI channel 10. A built-in digital reverberation unit with a choice of decay times can be assigned to any voice and the available sound generators are assigned to the voices in a dynamic fashion, so a given part does not have to use exactly the same number of

voices throughout the course of a composition.

The *MT-32*'s sounds cannot currently be edited except by the use of long chains of system exclusive codes sent via an *MC-500* or other sequencer. However, at least three editing packages for the *MT-32* running on the Atari *ST* micro are expected to appear shortly.

In conjunction with a MIDI sequencer, the *MT-32* is a formidable songwriting tool. Its output is slightly too noisy for fully professional use but its absurdly low price makes it a compulsory purchase for any MIDI-based facility.

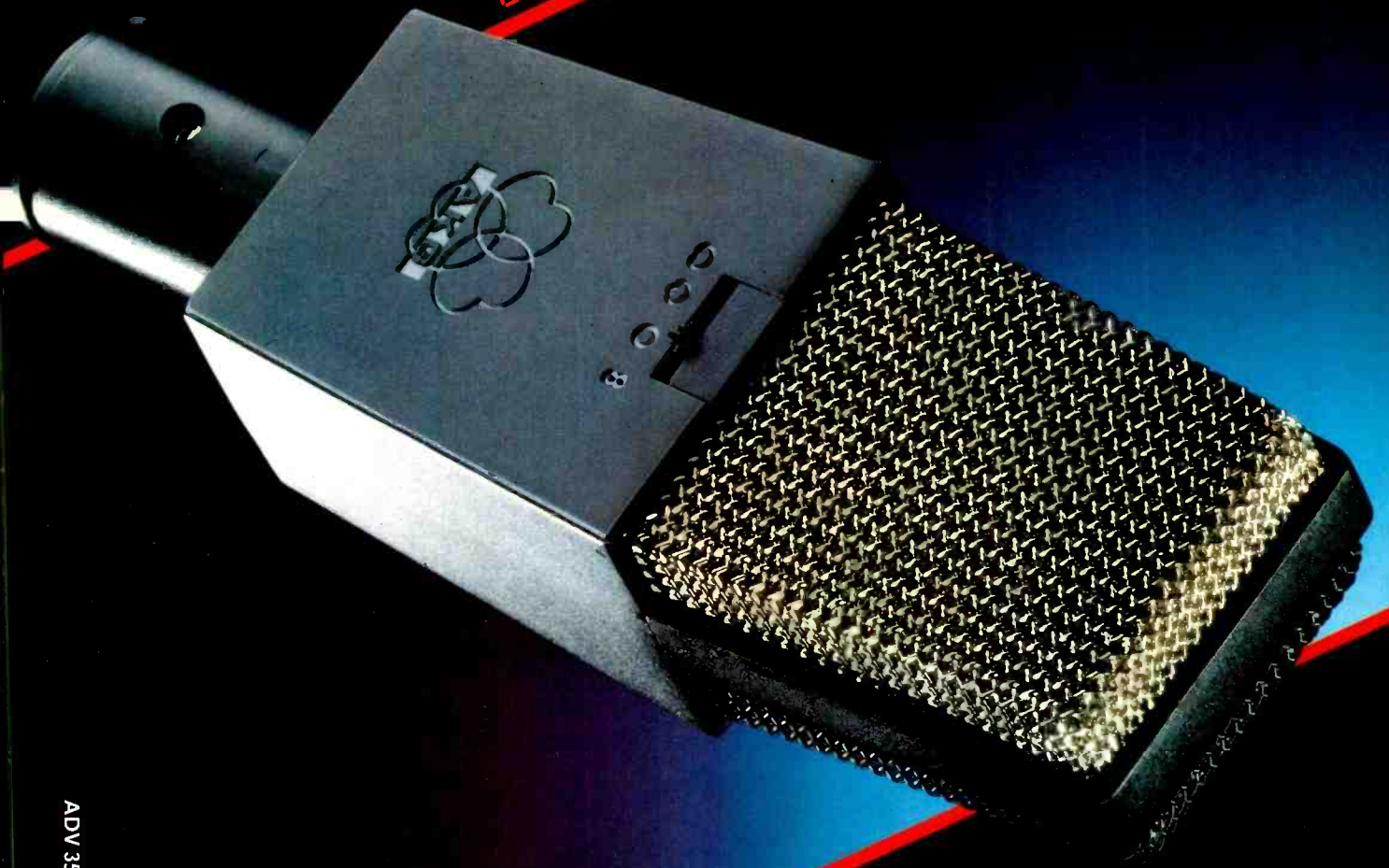
UK: Roland (UK) Ltd, 983 Great West Road, Brentford, Middx TW8 9DN. Tel: 01-568 4578.

USA: Roland Corp US, 7200 Downsvew Crescent, Los Angeles, CA 90040-3647. Tel: (213) 685-5141.

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MUSIC NEWS



Roland's D-550 linear synthesiser



Roland's S-550 digital sampler

Oberheim DPX-1

Oberheim Electronics have announced updates for their *DPX-1* sample player. The *HDX-1* is an optional rackmounting hard disk drive that takes up 2U of rack space next to the *DPX-1*. The disk drive will store sounds originating from disks designed for the Sequential *Prophet 2000*, E-mu *Emulator II*, Ensoniq *Mirage* and Akai *S900* sampler. *S900* compatibility is the result of a new software update, version 1.5, released at the summer

NAMM show in the US.

It is also now possible to fit separate outputs to the *DPX-1*. The eight outputs will be fully responsive to the flexible output assignment available on the *S900*.

Oberheim Electronics Inc, 2250 S Barrington Avenue, Los Angeles, CA 90064, USA. Tel: (213) 473-6574.
UK: Sound Technology, 6 Letchworth Business Park, Avenue One, Letchworth, Herts SG6 2BB. Tel: 0462 480000.

Roland latest

Roland have announced the Version 2.0 software update for the *S50* sampling keyboard. The separate outputs on the keyboard are now implemented, as is the facility for multiple MIDI channel operation. The 16 voices can be divided between the four outputs in several ways and the new software (which is free to existing users) can be copied on to existing *S50* disks quite simply.

Available as an option is the *Maestro 'S'* software, which gives the *S50* the facilities of a multichannel MIDI sequencer. The software uses the *S50*'s monitor output for a detailed display and offers six songs containing 200 patterns or 2500 steps playable in a chain mode, and 36

songs stored on a single disk.

Full editing features down to individual MIDI events are offered and external instruments, as well as the *S50*'s internal sounds, can be sequenced.

Roland have also announced the *S550*, a rackmounted version of the *S50*, which offers several upgraded features including eight individual voice outputs and a time variant filter.

The *D550* is a rackmounted version of the popular *D50* synthesiser. Using the same Linear Arithmetic Synthesis method as the *D50*, the *D550* can also use the same RAM and ROM memory cards, of which several more are becoming available.

Steinberg RAMs

Steinberg have announced the availability of new RAM cartridges for the Yamaha *DX7* and Ensoniq *ESQ-1* synthesisers. The *YAMRAM* has 256 sounds arranged in eight banks and the *ESGRAM* has 320 sounds, all of which can be overwritten with new patches.

Lithium batteries and steel casing, plus LED indicators to show which bank is in operation, are provided to

make the RAMs as practical as possible for use both on stage and in the studio.

Steinberg Research, Billwerder Neuer Deich 228, 2000 Hamburg 28, West Germany. Tel: 040 7898516/66.

UK: Steinberg Research, The Spendlove Centre, Charlbury, Oxford OX7 3PQ. Tel: 0608 811325.

Sequential Prophet 3000

Sequential have launched the *Prophet 3000*, a 2U, rackmounting sampler with remote programmer. It samples at 48 kHz, 44.1 kHz or 32 kHz and onboard memory is one MegaWord, which can be divided between 64 sample locations. Memory is expandable to four MegaWords and the number of voices can be expanded from eight to 16 with the addition of an expander chassis.

An SCS1 port allows it to connect to a hard disk drive; it should be possible to use this for direct-to-hard-disk recording on a 100 to 300 Mbyte drive.

The *3000* automatically detects the pitch of an incoming sample, assigns it to the correct note on the controlling keyboard and re-allocates existing samples accordingly. No

user-assignment is necessary. The remote control unit has a large LCD display that is capable of showing waveforms and envelopes during editing, and the *3000* features a SMPTE Time Code Cue List facility for patch changing.

For the existing *Prophet 2000/2002* samplers, Sequential have made available a 1 Mbyte memory expansion, separate output modification and software update to the *2002 Plus* specification.

Sequential Circuits Inc, 3051 North 1st Street, San Jose, CA 95134-2093, USA. Tel: (408) 946-5240.

Europe: Sequential Circuits/Europe, Nijverheidsweg 11c, 3641 RP Mijdrecht, The Netherlands. Telex: 12721.

E-mu Emax

E-mu Systems have announced a hard disc version of the *Emax* sampling keyboard. Known as the *Hard Disk Emax*, it is available for around £300 more than the conventional *Emax*, and retains the floppy disk drive normally used.

The 20 Mbyte hard disk version is

capable of storing 35 disks worth of data with access time of around 3 s.

E-mu Systems Inc, 2815 Chanticleer, Santa Cruz, CA 95062, USA. Tel: (408) 476-4424.
UK: Argent's, 20 Denmark Street, London WC2H 8NA. Tel: 01-379 6690.

Kurzweil

Kurzweil have announced new UK dealers for their *MIDIBoard* mother keyboard. The unit features an 88-note wooden weighted velocity- and aftersensitive keyboard, simultaneous control of up to eight MIDI instruments, polyphonic or monophonic aftersensitive response, dedicated slider controls for attack and release velocity sensitivity, touch sensitivity, pressure sensitivity and trigger threshold, 12 fully

assignable controls including two wheels, two sliders, four buttons, two control pedals and two switch pedals, 60 program locations, All Notes Off button to eliminate hanging notes, and many other useful facilities.
Kurzweil Music Systems, 411 Waverly Oaks Way, Waltham, MA 02154, USA. Tel: (617) 893-5900.
UK: Chromatix, 73 Princedale Road, Holland Park, London W11 4NS. Tel: 01-229 2041/5139.

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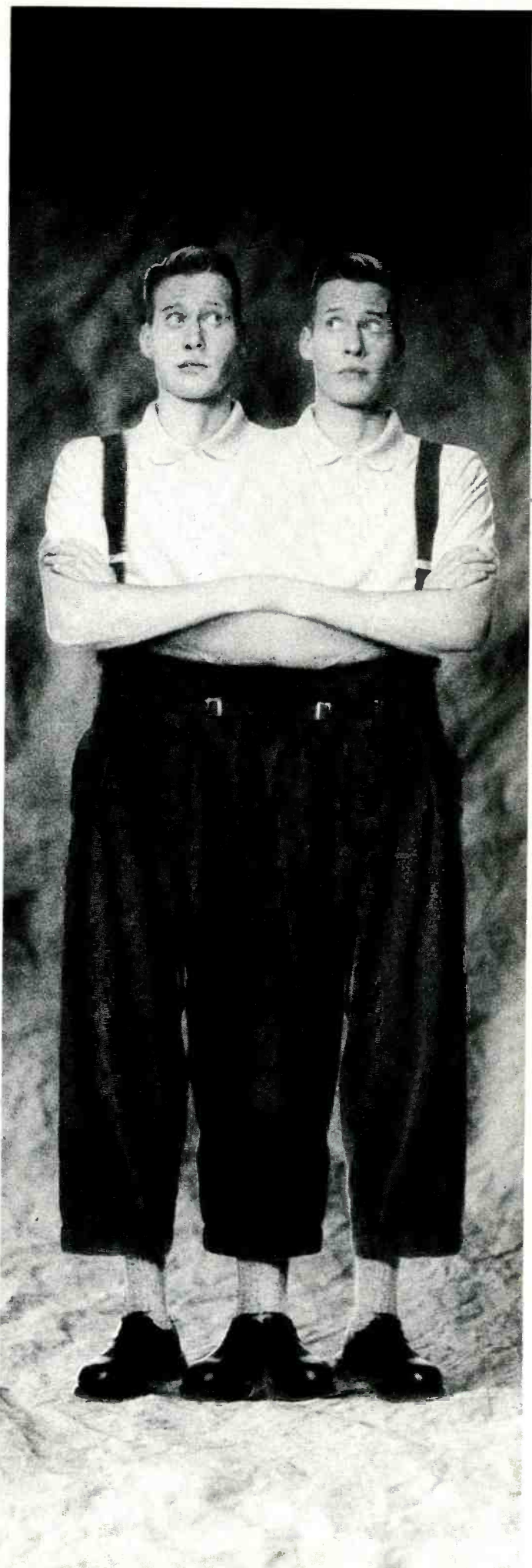
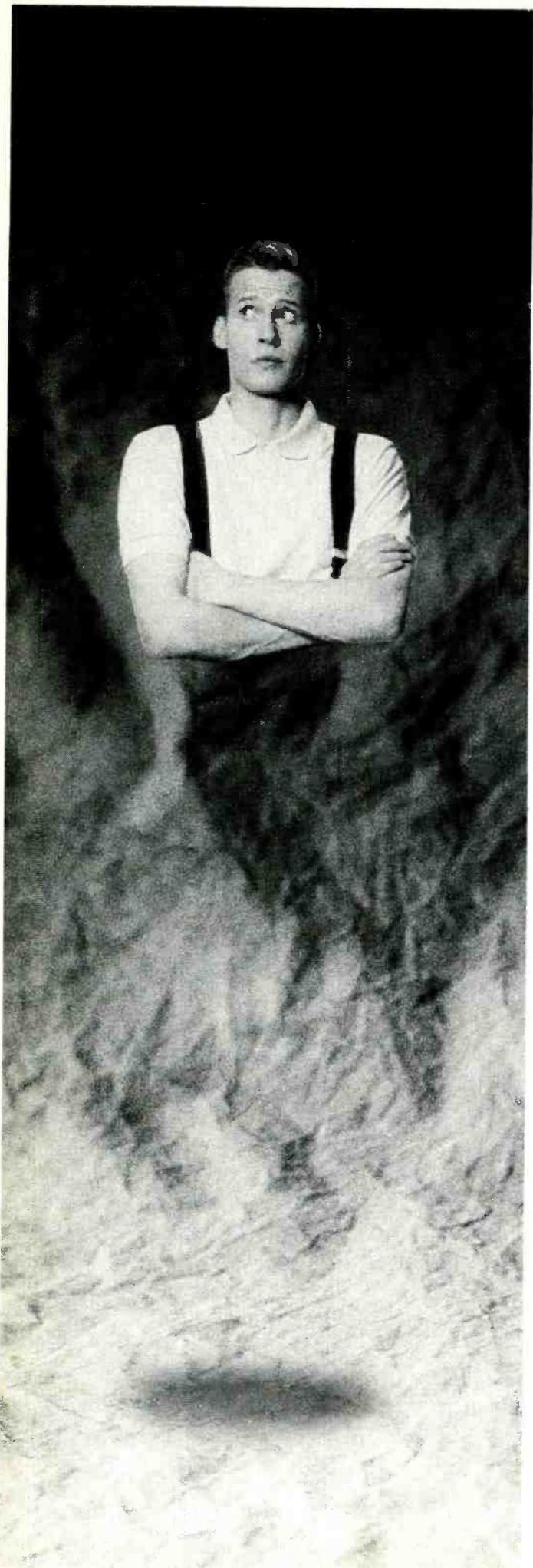
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MARTIN POLON'S PERSPECTIVE

The real estate salesman was pleased with himself. It was a fine bright day and he had a charming Victorian residence to sell. The couple he intended to 'close' today, was due any minute. He heard a muffled boom and turned around to stare at the house next door, a frown of displeasure apparent on his good-natured moon face. When he turned back to the street, Mr and Mrs Carpenter had arrived. Stepping from their car, they were all smiles and polyester. Mr Carpenter began the questioning: "We like the house and all, that is fine, but you must tell us about the neighbours."

"Well," began the real estate professional, slipping into a well polished presentation, "the neighbours on the left are really quite charming but a bit unusual. It's no good my saying they are not. You would soon find out. But they are nice enough folk."

At that moment, the air is rent with the sound of a shotgun firing. On the porch of the house on the left, the wife has fired a volley over the head of her hastily departing husband.

"Tsk, tsk, tsk," murmured Mrs Carpenter.

"Oh, not to worry," said the real estate tout, "she is just trying to get him out and to work on time."

At that moment, another muffled boom shook the firmament. "What is that?" uttered the Carpenters in unison.

"That's just the young son—in the garage. A great wizard with chemistry, they tell me."

At that moment, the front door of the house opens on two young adults. One is a young woman in jeans carrying a medium sized hatchet and chasing a large calico cat out of the house. The other is a man wearing a woman's dress and heels but with a distinct moustache. The Carpenters gasp.

"The girl is named Lizzie and she is harmless enough, unless you're a cat. The boy is named Gerald or is that Geraldine. He just likes to be comfortable when he goes down for a drink."

The Carpenters buzz together for a moment and then Mr Carpenter says, "I think we'll take it. It is such a good value for money and homes are so expensive these days." Mrs Carpenter pauses thoughtfully. "Oh, I'm sorry. What about the people in the blue house?"

"Very quiet," stated the realtor. "You never see or hear them. Something to do with music. They have a home recording studio inside."

With that, Mrs Carpenter turns a sickly shade of grey, grabs her husband and the two drive off in a cloud of smoke. The realtor is left with his thoughts. "The home studio will get you every time," he mumbles.

Well, boys and girls in the 'real' recording

studio business—does the 'home studio' get you every time? Is the 'home studio' a 'real' studio or is it just a recording enthusiast's wet dream? In short—which twin has the Toni? The answer my friends is written on the wind—the home studio has forever changed the studio recording industry and the way the recording business works. The question is really whether the 'home studio' marketplace is about building relatively high quality studios in 'adjunct' spaces or whether computer technology has created a whole new range of audio recording products to service a new spectrum of customers.

It appears to this observer that the latter is the case. The emerging technology of the computer industry, especially from the world of the personal computer, has helped to beget the whole range of electronic music and 'home studio' products. Incidentally, many people in the electronic music industry feel that the term 'home studio' is a derogatory one for such products. It certainly seems that labelling such products as 'music studio' or not differentiating at all makes more sense these days. It is true that the concept of building small studios with powerful but inexpensive equipment began in the home or in other such alternative spaces. Musicians, composers and groups all took advantage of the new developments with the incentives provided by tax laws. Studios were built to provide each music maker with his or her own facility.

Exact figures for the number of studios in the US and the EEC are difficult to validate. Nevertheless, it is estimated by industry sources that there are about 10,000 'legitimate' studios in the US and in Western Europe and about the same number of 'home studios' in existence. The term 'legitimate' is a difficult one since it implies that other studios—'home studios'—are 'illegitimate'. Of course, some are just that. Many were the result of elaborate tax sheltering and tax credit schemes; especially in the United States. Many other 'home' operations were conceived to take advantage of these new technologies and provide a location for affordable experimentation and creativity. Many new and established groups invested in home studios and took the fees from a schedule of sessions at an established studio to pay for the cost of the 'build' of the 'home studio'.

The concept of cost with the 'home studio' comes up again and again. In many cases, so-called 'home studios' are the province of artists such as Stevie Wonder and Jan Hammer. These facilities are equipped with the same state-of-the-art professional studio hardware found in every major recording centre in the world. The same can be said of many other installations belonging to individual artists, composers and groups. But, a whole new trend in recording hardware evolved

initially from musical equipment makers Casio, Fostex, Roland, Tascam, and Yamaha and has spread to many other names with similar respectability in professional audio equipment. Conversely, many top-flight studios have added 'home studio' rooms to allow groups the option of inexpensive rehearsal time, to provide a venue for voiceover and commercial work that does not require a full-size room and to experiment with the usage of such equipment. One studio owner put it thus, "For much less than the cost of a conventional console, I can equip an entire room. The console, the tape recorder, the equalisers are all very good. For voice work, this is marvellous and frankly some of my clients turn out musical work that sounds as good as it would in the big rooms."

Quality was initially the turn-off of 'home studio' equipment for the professional. Accessibility, affordability and convenience made creative efforts possible for the musically minded. But the genesis of such equipment has been twofold. The Japanese manufacturers have discovered the demand for relatively inexpensive recording and MIDI products. If sales figures are accurate, the market for 'home studio' products is very profitable; perhaps more profitable than for so-called professional items due to the unit volume. Quality has swung upwards, with Japanese equipment designers building in features and specifications only dreamt about by pro studios 10 years ago. Quality is no longer an area where the two schools of recording equipment can be easily distinguished. The possible (*Potential—Ed*) quality obtained from a Yamaha digital mixer feeding a Sony professional DAT recorder in a live performance of classical music cannot be bettered by any investment in 'professional' 2-track digital equipment. Yet the entire equipment package can be assembled for less than half the price of a single professional 2-channel studio digital recorder.

This trend towards equal quality in the musical instrument and 'home studio' area is not a new one. For several years now, the quality of top-end home audio components has been equal to that of professional units. The trend, at least with equipment from Japan, has been the shift of research and development emphasis to the audio cash cow—the home marketplace.

Secondly, forward motion in the computer industry is feeding much of the technology that has evolved into the 'home studio' product. A computer researcher whose sideline is audio development felt strongly about the connection between the two areas. "Look," he said, gesticulating wildly with his hands, "everyone doing research into tapeless recording wants to pretend that there is some great hocus-pocus to the whole process. The reality is that ordinary, everyday computer hardware is being used to lay down audio. The hard disc drives that currently make up the 'guts' of most tapeless recording systems are either off-the-shelf type components or require very little modification. Yes, there are modifications and special circuits but there is no black magic here. Check out the specs for one of the successful tapeless recording systems on the market right now and you will find 632 Mbytes of hard disc and 16 Mbytes of RAM memory and a 80386 processor running at close to 10 meg clock speed. The system sells far in excess of \$100,000. The exact same specs are found on the new IBM Operating System/2 (OS/2) model 80. This computer, loaded, retails for far less than \$50,000. How long do you think IBM is going to leave this market to the mom and pop audio providers? It took IBM almost 30 years to really discover the

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MARTIN POLON'S PERSPECTIVE

bank marketplace in the United States with at least 10,000 banks or branches as the potential marketplace. It isn't going to take them very long to see 5,000 studios here and 5,000 studios there and they are going to prove how easy it can be to upgrade the entire market. And don't forget, the Japanese and Apple are not going to abandon their segment of this market either."

Musicians and composers swear by this new technology as the tool that allows them to perform their works *in situ* without the astronomical costs of a session with live musicians. Although much criticism has been levelled at the replacement of 'live' music with 'synthesised' music, composer after composer swear that without these new technology tools they could not develop the musical works they have brought forth. Even conventional composers have adopted these new technologies to test and evaluate compositions without the expense of gathering up a group of musicians.

The area of scoring and creating sound 'tracks' for film and television has been one of the most visible areas for 'electronic music' and 'home studio' equipment. Achieving high visibility with Jan Hammer and his compositions/scores for *Miami Vice*, the use of home scoring suites has been recognised as a virtual standard for much of the sound produced for film and television. Even if these AV suites are built into a formal studio complex, they allow the co-ordination of MIDI and SMPTE into a cohesive synchronisation system without requiring large staff or equipment budgets.

It has been estimated that over 50% of all film and television scoring done today is accomplished via MIDI systems in alternative environments. That means that 50% of the venues for the employment of musicians in film and TV scoring have also been eliminated. Cost has become a major issue in film and TV work. The savings of \$10,000 per episode on a network TV series for

sound work and musical scoring can translate into the figure of \$¼ million per year. Over a 7-day network programme schedule, that kind of saving could translate into the range of \$11 million per season.

We know that nearly 50% of all 'legitimate' studios offer some kind of audio for video service with full synchronisation lockup. Nearly 70% of these same studios offer MIDI capacity, most usually with the two service areas being related. In fact, many studios have entered the post-production area only because of the availability of these affordable, high quality 'home studio' post-production packages.

Now, one could say that using cost as the primary reason to use 'home' electronics is a bad one, since in many senses there is a revolution afoot in terms of how many people are making music and recording it. Nevertheless, cost remains one of the major concerns to all studio operators. In several recent studies of business concerns expressed by studio operators, the high cost of entering the world of digital audio and the threat of obsolescence for expensive major studio components were at the top or near the top of the list in virtually every response.

Now many of you are going to wonder why I have swung 180° about face and have issued an endorsement of the concept of the 'home studio' and MIDI. I have taken a strong position in the past and I still take a strong position against the replacement of real music with synthesised samples for the sake of cost control. If there is a musical reason to do something in a new way, that is fine. The point of all of this is the fact that we have one world of recording and despite the artificial distinctions of different trade shows and magazines, the recording world is at one again. It is this concept that I am endorsing: not necessarily all of the products and practices associated with it. I am also, for once in my life, being realistic. Nothing and no one will change

the reality of the studio marketplace. Downsized and downscale hardware have opened up new studios, created new functions within old studios and allowed for a whole new category of production involving electronic music. I have been to over a dozen studios this year who boast a resident composer or electronic musician and a specific room and equipment to support them.

The new technology is enabling dozens of educational institutions to offer their students a broader range of equipment than ever before. Once professional DAT enters the marketplace, schools will be able to afford a digital mixing and recording package. This is currently out of reach to all but several of the various institutions that teach audio in the Western World. Similarly, all the latest technology in audio synthesis and emulation is reachable and affordable for the educational institutions that need them.

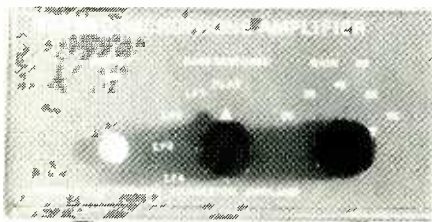
The down side of all of this is the fact that 'professional studios' are staring at rate cards that seldom leave the £100 or \$100 threshold by very much—digital or not. Almost half of all studios have some kind of discount available and many will cut rates for prepayment. Major studios blame that on the proliferation of 'home studios' and they are probably right. One can feel nothing but sympathy for the major studios with their equipment commitments in the hundreds of thousands of dollars range but nothing can turn the clock back on new technology. And it's going to get a lot worse before it gets better since many of the future advances in recording will come from the computer world and be as affordable for the 'home studio' as for the pro.

The problem has less to do with the 'home studios' than with the technology that created them. It is not the 'home studio' itself that has made so much competition for the professional studio. It is the rapid forward motion of technology that has reduced the cost of the basic building blocks needed to create a recording studio. Throughout this column, single quotation marks have been used to accentuate the two kinds of recording environments. This literary tool does not mean that there still are not significant differences between each segment of the studio population. It has been used simply to indicate the progress made in 'home studio' equipment. The 'professional studio' is still the zenith of the recording Art.

The problem here is that the marketplace probably cannot support 10,000 domestic studios in the United States. The same kind of imbalance exists in the EEC. This competition for business has become extraordinary and the need to stabilise the financial climate has affected all but the most successful of the many large scale studios. The difference between a 'home studio' and a 'pro studio' is not in equipment alone. The hardware is crossing over to both kinds of applications, and both kinds of studios buy professional and 'home studio' equipment.

The difference that establishes 'what is' a studio supplying professional audio services is diversity of facilities and functions, the depth of equipment available, the quality of acoustical facilities available for live recording and most of all, the quality of studio staff. The 'home studio' cannot provide this range of services and indeed service has to be the byword of the professional studio in the 1990s. It would be nothing more than nostalgic to assume there will ever be a return to the studio climate of the '70s. For the rest of this century, the studio interested in the professional marketplace will have to be a diversified business. That is the legacy of the 'home studio'. □

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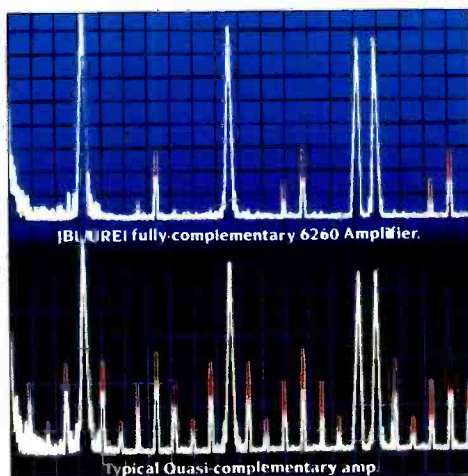
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A TRIP TO THE PROMS

An annual event, the PROMs at London's Albert Hall bring together many different orchestras and moods. Janet Angus talks to the men who broadcast and record the sound

The world-renowned annual season of Promenade Concerts began 92 years ago on October 6th, 1895, when the composer and conductor Sir Henry Joseph Wood held the first concert at the Queen's Hall, London. The success of these concerts had a wide influence on English musical life, systematically introducing the entire range of 18th and 19th century orchestral music and later the contemporary romantics.

In 1927, the BBC took over the management of the Proms which, after the destruction of the Queen's Hall in World War II, were transferred to the Royal Albert Hall. The broadcasting of these concerts widened their appeal further. Each season comprises eight weeks of diverse programmes featuring soloists, orchestras and conductors from all over the world, culminating in the rather irreverent 'Last Night of the Proms', which can only be described as rowdy!

The 1987 season comprised 66 concerts, all of which were broadcast live by Radio 3, 11 covered by BBC TV for simulcast, and 16 recorded for BBC Transcription Service. Quite apart from their musical content, these concerts provide a rare opportunity for the various recording teams to work within one acoustic environment and refine their microphone techniques.

Each team has a specific role to fulfil, especially in terms of the type of recording and sound they wish to achieve. Radio 3 are concerned primarily with the music, broadcasting as faithful a reproduction of a night at the Proms as possible. When simulcasting on Radio 3 and TV, the radio balancers concentrate on what is going out to the viewers—so even though they are not mixing to picture, you can at least hear a particular instrument if it is being shown. The television crew have their usual problem of working with picture while not upsetting the musical balance.

The work of the Transcription Service is for

resale abroad, to other broadcasting companies who will then transmit the programme themselves. The recordings may be distributed on vinyl disc, CD or cassette.

The Transcription Recording Unit also have to bear in mind post-production, if only to remove an audience cough or a kicked microphone stand. Radio 3, on the other hand, broadcast live—if someone kicks the microphone stand it's too bad. TRU therefore record on 24-track.

Most of the equipment is installed at the Albert Hall for the full PROMs season. The main control room is manned by Radio 3 who balance on a Calrec custom console. The balance is then fed to a control room at the back of the stalls, which is linked to Radio 3 continuity. This control room also takes the programme announcer's feed, which is mixed together with audience applause and atmosphere noise via a small Glensound mixer. The audio is finally sent back up to the main control room from whence it is sent to Broadcasting House.

The situation is further complicated when the Neve DSP digital console in the BBC's Digital Control Vehicle is piggybacked to the main Radio 3 control room's microphone feeds. The digital signal is sent through another small Neve digital console also in the stalls control room, and then via a NICAM link to continuity at Broadcasting House.

Each recording unit has its own favoured recording techniques but since all microphones can feed to all the control rooms, they could, in theory, use any combination they like. While techniques may vary slightly from one balance engineer to another, each unit tends to use its own methods to achieve its own specific type of sound.

These interviews took place during rehearsals for the 62nd and 63rd Proms this year. The programme for No 62 was Stravinsky Firebird Suite and Schubert Symphony No 9 in C major, played by the BBC Symphony Orchestra and conducted by Gunter Wand, chief guest conductor since 1982. Leonard Bernstein conducted the Vienna Philharmonic Orchestra in No 63, playing Mahler's 5th symphony and Mozart clarinet concerto with soloist Peter Schmeidl.

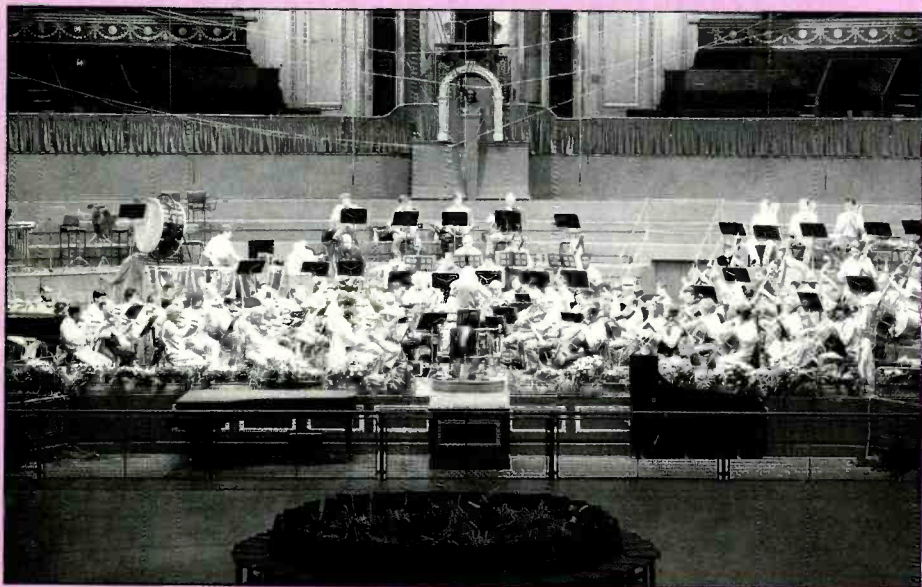
John Rushby-Smith, senior music studio manager at Radio 3, broadcast the first night of our coverage in the main control room, while James Hamilton broadcast the second night in the digital control vehicle outside. Gareth Watson of TRU, working in the TRU control room (strategically placed backstage).

Individual approaches aside the hall with both Radio 3 and TRU have agreed on the somewhat unexpected move away from cardioid to omni microphones for recording the orchestra, stimulated by the development of the Bruel & Kjaer 4006.

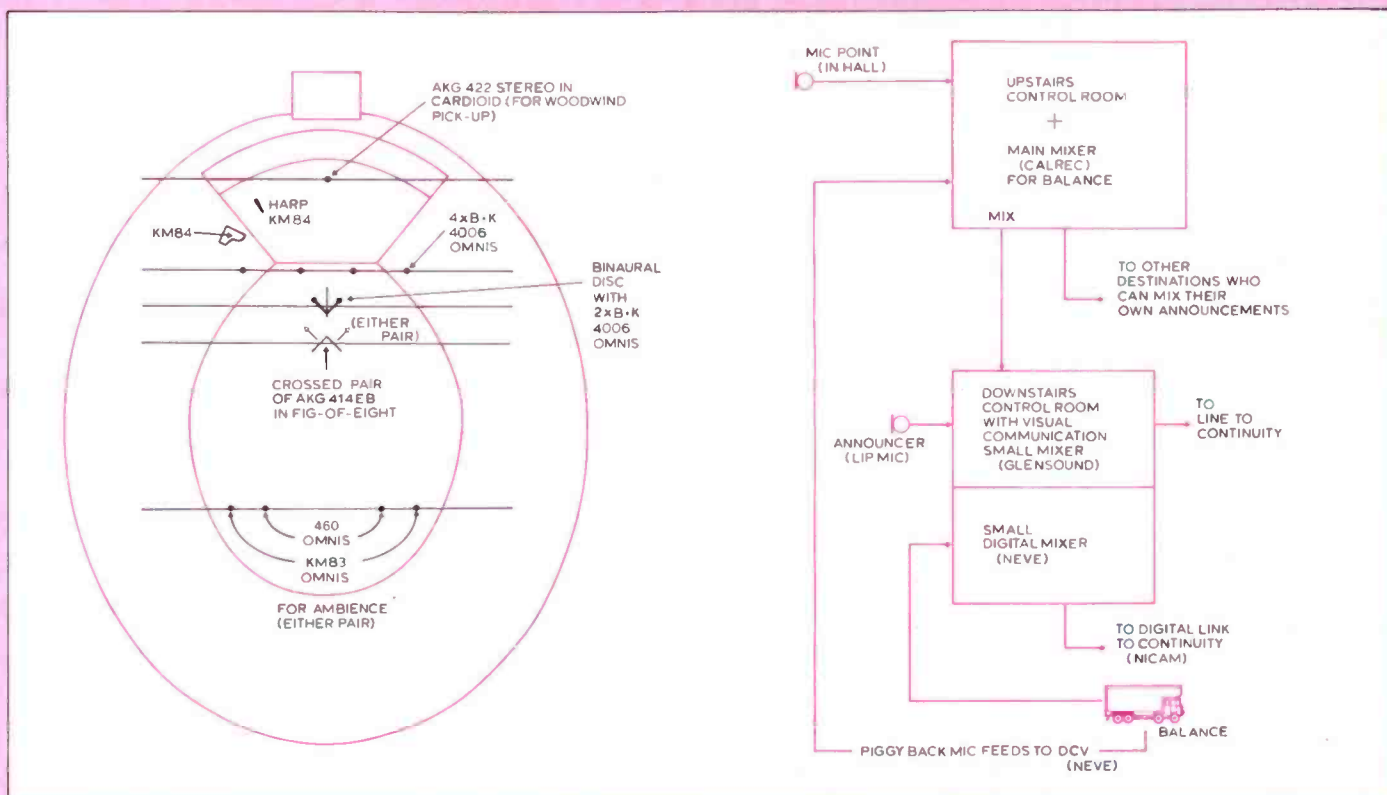
John Rushby-Smith: "Prior to that, we all used the traditional Blumlein technique. Advocates of this however choose to overlook the fact that fifty per cent of the information is out of phase. Admittedly, omnis lose a certain amount of the precise positioning information but you can do something about that. People listen to the overall sound anyway, not simply to the positioning. The B&K has a very special sound, very open; the strings have the bite without having a rasping edge."

The basic microphone setup is decided upon and installed at the beginning of the season, remaining there to the end. This year Radio 3 and TRU used most of the B&K microphones they had.

Radio 3 suspended a 'curtain' of four B&K



BBC Philharmonic Orchestra in rehearsal



microphones, panned across the front of the stage and behind the conductor, which served to spread the picture from the binaural pair of 4006s on a disc suspended above and behind the conductor's rostrum. An alternative, in the form of a crossed pair of AKG 414EBs in fig-of-eight configuration, was suspended slightly behind these for the traditionalists. Ambience microphones were suspended at the back of the hall: a choice between AKG 460 and Neumann KM83 omnis. An AKG 422 stereo cardioid mic was suspended over the woodwind, and another 422 as a close main mic behind the conductor's head. Any other spot microphones—for, say, orchestral piano or harp—would normally be Neumann KM84s.

TRU used five B&Ks in what was effectively a 'W' shape, again panned across the stage, but this time actually above the strings of the orchestra. One problem at the Albert Hall is that all too often the strings will be swamped by the brass and percussion who, being seated on risers, manage to project their already penetrating tones across the top of the string players and straight out to the audience and microphones. The 'W' arrangement was chosen to combat this problem.

Gareth Watson: "We used to use three microphones across the front of the stage but then we had the problem of how to pan them without distorting the imaging. By using five the imaging is more realistic and convincing. It's still not perfect but generally it's more consistent with what's on stage."

Another TRU special is the 'hang glider'. A Gareth Watson experiment, this comprises two Schoeps BLMs placed about 2 ft apart on a large perspex sheet with a perspex barrier shielding high frequencies from each other in order to provide image width. This array is suspended fairly high up in the middle of the hall. Gareth came up with the idea to use the hemispherical response of the boundary layer mics to capture only indirect sound and place them as far away from the audience as possible, avoiding audience noise but capturing the sound of the hall ambience.

"We tried using microphones in the gallery but the audience noise can be a problem as people can

stand very close to the mics. Because they think they are a long way away from the orchestra they think they can do what they like and not be heard. Someone even brought a dog in once.

"If you suspend omnis at the back of the hall they still pick up a lot of direct sound. We did a comparison with them and the hang glider and you would swear the omnis were closer because of this direct sound whereas in fact they are much further away than the hang glider. I think it works quite well. The only problem is that with a limited size perspex sheet you still get the direct LF coming straight through so, for example, timps tend to sound quite strong."

John Rushby-Smith has been recording Proms for Radio 3 for over 20 years, during which time the Albert Hall has gone through a number of changes, the most dramatic being the introduction of the famous acoustic 'flying saucers' which rid them of a very noticeable double echo. The other

significant change came with the introduction of stereo recording techniques.

"After that," John explains, "techniques did not change much—we used C24 stereo microphones, then the AKG C12A, which came before the introduction of the 414. They were all basically coincident pair arrangements and for many years we did the Proms using those in a variety of positions depending on programme content and personal preference. The different microphone positions are always permanently rigged at the beginning of a season. We used to have the ambient mics installed up in the gallery but had problems with noisy audiences and you could hear the glasses being washed up in the bar in quiet passages. Although the natural ambience of the hall is very exciting, the audience noise was too much of a problem."

The problem was solved with the advent of artificial reverb which was introduced discretely



Radio 3 main control room with John Rushby-Smith

A TRIP TO THE PROMS

to some extent in place of the gallery microphones. "This was made possible by the new digital technology. The *EMT 250* arrived first and with that we could synthesise the ambience of the Albert Hall quite convincingly. Now we supplement that with an *AMS RMX16*, which gives a slightly different quality of sound. Then came the advent of *Bruel & Kjaer* microphones; this is the third season we've used them. Originally we had just two which we rigged as a binaural pair; now of course we have the luxury of having four more."

Although a good musical balance is Radio 3's priority, their ultimate aim is to reproduce the sound as it is taking place in the Albert Hall. "We are aware of the nature of the venue and aim to give the impression you are sitting in the perfect seat—the one that gives the correct balance with a desirable amount of acoustical ambience.

"We like to use *4006s* for their quality. The main pair on binaural disc is suspended at a favoured distance from the orchestra but the snag is that they do not give a particularly good

left/right spread—it's a slightly narrow picture—so the curtain of four *4006s* is used to widen it. Then that (depending on the size of the woodwind section) is supplemented with a single *AKG 422* stereo microphone over the wind, because they are relatively further away. Brass can look after themselves most of the time because they sit up high and play directly at the mains mics; same applies to the percussion.

"In a hall that has a very nice natural acoustic you only need spotting mics on soloists and choruses. In a hall like this, when you have the soloists in front of the orchestra, they can often get lost and lack focus in the hall itself so some help from mics is necessary."

Balancing during rehearsal obviously means balancing in an empty reverberant hall. "A sound which uses the natural ambience can be very live indeed at rehearsal. In the actual concert it is very much dead, so during rehearsal you go for a very live sound."

Artificial reverb: "This live sound can be controlled with the *EMT* or *AMS*; it is possible to achieve a very convincing synthesis of the overall

Albert Hall sound, particularly since we are driving them from ambience microphones inside the hall. You have to be careful not to use too much, of course. Some people think that using synthesis is wrong because you are creating the sound electronically but paradoxically you can use artificial means to create a more convincing sound."

Soloists can sometimes introduce new problems, especially singers. There is a certain sound that's become the 'expected norm' on record, involving the singer's voice being very prominent. This is, of course, different than having a singer singing without amplification in front of a full orchestra. So singers often feel that their voices should be further forward on the radio balance too.

"Because there is an expectation that the singer be heard like that, we do try to lift them out a bit but not unrealistically so; these are performances given in a live situation and some of that needs to be captured."

The Albert Hall is notoriously live—pick your seat carefully if you want to hear a balanced performance. It came as some surprise, therefore, to discover that it is in fact relatively easy to record in. "A hall like this is in many ways a gift—it's very pleasant to work in. You have to be aware of certain problems—too much brass or something—but because it is such a large hall the reflective wall surfaces are a long way from the orchestra and so even microphones that are a long way away will hear the sound before it is reflected. So it is very dry.

"You get a boxy sound hanging mics over the platform, in a big hall you can get back quite a long way and not sound distant—it all has to do with the proportions of direct and distance-related sounds."

James Hamilton uses a slightly different microphone configuration to Rushby-Smith, incorporating some of *TRU's* spots as well as the hang glider. "The microphones are rigged before the first night by whoever is recording it, and it tends to be a kind of compromise which you think will more or less do for the 10 different people that do the balances of the 66 Proms.

"We still tend to work from a central coincident stereo pair idea and when the *B&Ks* came along we wondered how to incorporate them in the same kind of technique. Because they are omni, you can't just put up a coincident pair and expect good stereo, so we decided to use the binaural technique to separate the two mics, which gives the best of both worlds. There is a basic main mic and we fill in with spots that we often need on the strings, which can be swamped by the brass in a big romantic work, and so we use the 'curtain' to reinforce the strings."

Because of the interchanging of microphone feeds, it is impossible to talk about Radio 3 without looking at what *TRU* is doing and why. James Hamilton: "*TRU* tend to go for a slightly closer sound. As I understand it, they are not so interested in the occasion aspect whereas we, with our main distant mic technique, try to set it in the context of the Albert Hall. There is no other concert hall that we use in which you would put the microphone that far back. In the Festival Hall, for example, it would need to be a good deal closer. It also depends on how much ambience you want.

"The *B&Ks* have a really natural sound. In the Mozart clarinet concerto, we are using the *B&K* cardioid prototype, which *TRU* has at the moment for tests. Earlier this season we used it for the soloists in Britten violin concerto and Falla *El Amor Brujo*, which has a mezzo soprano solo. We put up three different solo mics in rehearsal—the



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A TRIP TO THE PROMS

two normal choices, which were a *KM84* and a ribbon *4038* (which was BBC-designed originally), alongside the new B&K cardioid, and I was very interested to find that it has a very smooth response. It really made the *KM84* sound rather harsh and metallic in comparison. Comparing it with the ribbon mic, it sounded just as smooth but had higher gain, higher output and even a slightly nicer sound. We often use ribbons on singers and strings; on other solo instruments we would tend to use a *KM84*. The ribbon has no HF peaks and the new B&K seems to be quite similar to that."

James Hamilton, more often than John Rushby-Smith, would opt to incorporate some of TRU's spots. "For orchestral piano I would tend to use the *KM84*, but I'm sure if we had the B&K cardioid we'd use that. The *KM84* is very much a workhorse mic for spot and solo miking and we've got an awful lot of them. They are reliable and fairly robust, which the B&Ks are not, I must say. That's the only problem with them—they seem to be very delicate.

"With the hang glider, I have found that the principle seems to work very well. The mics are completely shielded from the direct orchestral sound, so all you get is ambience, which is what you want. This year they are using much better quality microphones and it's very good for ambience."

Downstairs, behind the stage in the Transcription Unit control room, the concert is recorded on both multitrack Otari *MTR90* and Sony *FI* stereo.

Gareth Watson: "We usually just use the digital stereo recording but if there is a major problem, for example, a noisy mic or a horn player kicking over a mute, we can patch a short section of a remix. In this way, we can save something that could have been written off.

"We add announcements later and assemble these links over applause with the music using the *1610* format for editing. The finished continuous master is then kept on U-matic as a library master and the discontinuous *FI* copy is made for cutting to vinyl disc, which is still our biggest selling medium."

It should be explained that the Transcription Service is part of BBC External Services and hence is paid for by grants in aid from the Foreign Office, not out of the television licence fee, thus they are necessarily commercially minded in their approach. Their presence at a concert has to be justified at the end of the day with sales.

On the day of the Bernstein Prom, the Vienna Philharmonic had decided on a very compact seating plan, which made microphone placement somewhat problematic and rather untypical for the kind of work being recorded. In the end, Watson decided to use three *C460* woodwind spot mics, and a *KM84* on brass, chorus, timps and the harp—all of which James Hamilton used to some degree or other on the Radio 3 recording. "If Gareth hadn't put up spot mics I would have put up my own."

Gareth: "On stage, the reverb happens a long time after the actual sound and in quiet passages there is hardly any reverb at all. A *stacato fortissimo* chord will have both a long initial delay and a very long decay which somehow sounds removed from the stage. You find the same effect at Kings College, Cambridge—if you put a microphone in the choir stalls it sounds surprisingly dead; further away the sound bounces about. In the Albert Hall there is an absolutely unique quality of reverberation. It is very hard to get the effect out of artificial reverb. If you could find a really good ambient mic configuration with no audience noise problems, you wouldn't need to use artificial reverb at all.

In spite of the hang glider's success, there was a moment when doubt was in the air as one night it started singing to itself. Eventually the problem was tracked down to the fountain situated in the middle of the promenaders. The four fountain lights have two controls: one a dimmer for all four lights and the other controlling their cyclic dimming. If the lights are faded but not switched out, a slow pulsing thyristor RF signal is produced and picked up on the microphone circuits.

Although TRU is not concentrating purely on the event itself, they nevertheless endeavour to capture the sound of the Albert Hall. "We try to go for a consistent sound throughout the PROM season, even though there are four different mixing engineers—one engineer sets the method for the season. We don't want people to try anything totally different. The Albert Hall should sound like the same hall every night."

The PROMs provide a unique opportunity to work on microphone technique. The repertoire and range of performers are enormous: symphony orchestras, opera companies, contemporary music groups, chamber ensembles, electronic music, brass bands and jazz groups. No doubt the PROMs will continue to be a fertile ground for the development of new mic techniques in live serious music. □

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"Digital recording is currently in a transitional stage where expensive and sophisticated digital technology is simply being grafted onto existing analogue tape recording machines. To move ahead from that transitional stage requires a totally new recording medium."

Andrew Stirling, Stirling/ITA, October 1986

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Pro-Sound News (USA), March 1987

"Although at present the AudioFile uses hard disk there is provision within the system for that to change should a better and more suitable system be developed. For example, a read/write optical disk would be a useful improvement, but such practical developments are a few years away."

Keith Spencer-Allen, Studio Sound, November 1986

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INTELLIGENT PA SYSTEMS

Ben Kok of Stage Accompany describes the operation and design criteria of their recent microprocessor-controlled PA system developments

Although professional audio has a reputation for being a 'hi-tech' industry it is amazing how primitive most live sound systems are. They have remained relatively untouched by developments in other areas. For instance computer control is to be found in cars and washing machines but 'hi-tech' professional sound systems still rely on manual control. Of course microprocessors are being used in pro-audio equipment such as digital effects devices and automated mixing consoles, but largely they are all just dedicated to operating that one device. The operator still has different devices to control, each with its own front panel controls and physical position. Accepting that these devices

have internal microprocessors and that there may be inter-equipment triggering, they all need individual attention.

The sound engineer in work mode needs all his attention for the creative part of his work and should not be bothered with complex operations of specific devices, moving around to adjust controls or guarding operational limits, etc. From this point of view it is clear that automation of a pro-audio system should take over those functions that limit the sound engineer in his creative process. This implies that the intelligent control should be used for signal level and protection devices while providing a central operating point for all the component devices.

Further signs of slow development are that today's sound systems still make use of the basic

designs as developed in the early '20s. This is especially true in the field of loudspeakers where no basic changes have taken place since that time. Despite its commonly recognised disadvantages such as relatively high distortion, limited bandwidth, and so on, the compression driver is still the most widely used mid/high frequency driver.

A solution

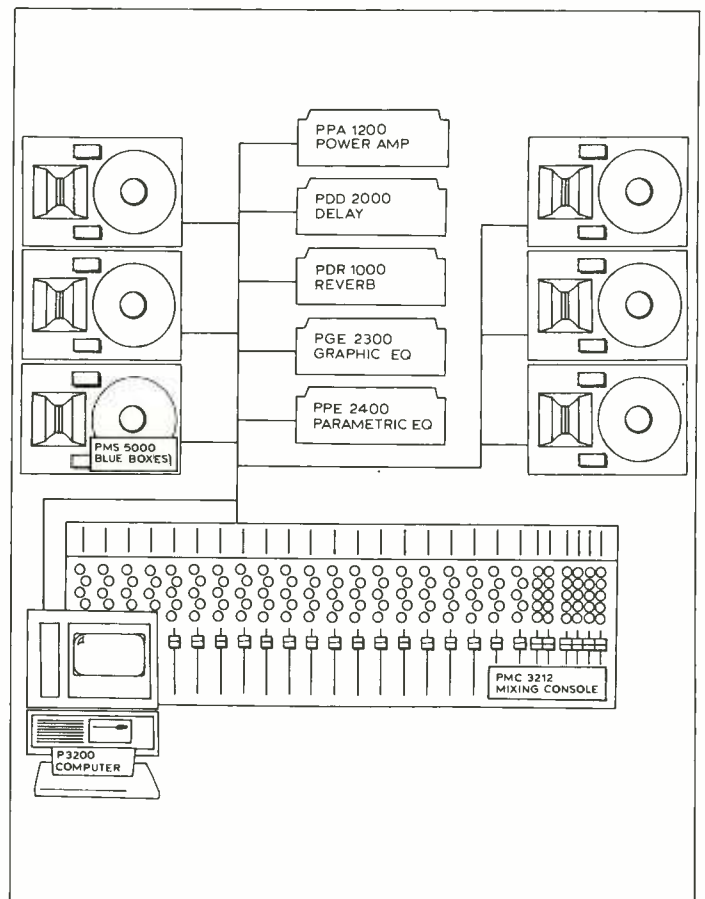
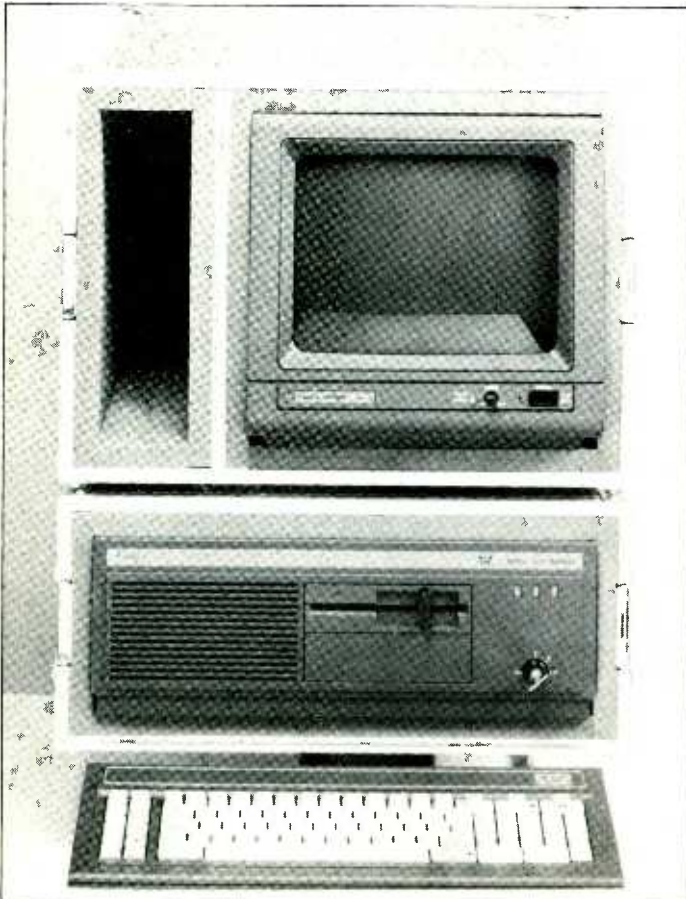
Based on the above considerations, Stage Accompany have developed a system offering improvements on two fronts: firstly, a significant improvement in sound quality following the development of the *Compact Driver* mid/high frequency ribbon-type drive unit; and secondly by the introduction of the *SA-net* for advanced remote control of pro-audio equipment. Both these developments have been implemented in an active loudspeaker system known as the *Blue Box*.

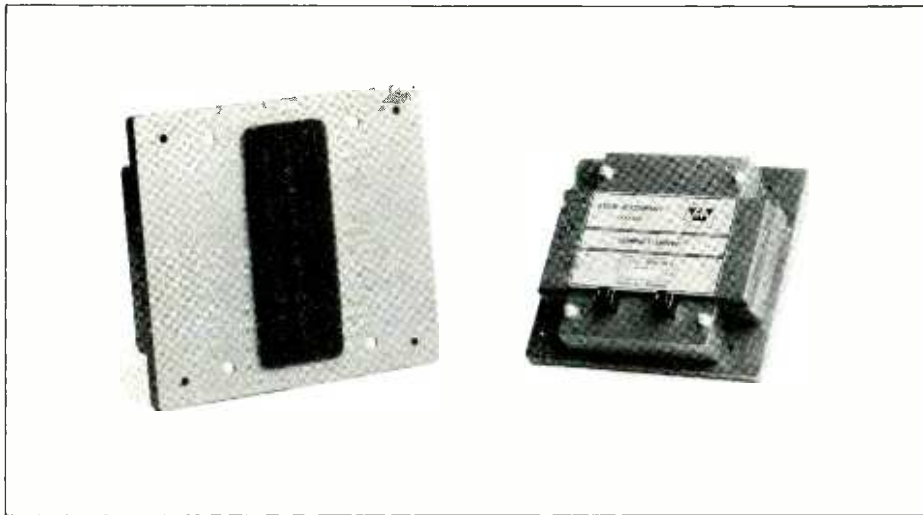
The Blue Box

The *Blue Box* is an active, 2-way full-range intelligent speaker system for high-level quality applications. The design criteria for the system included:

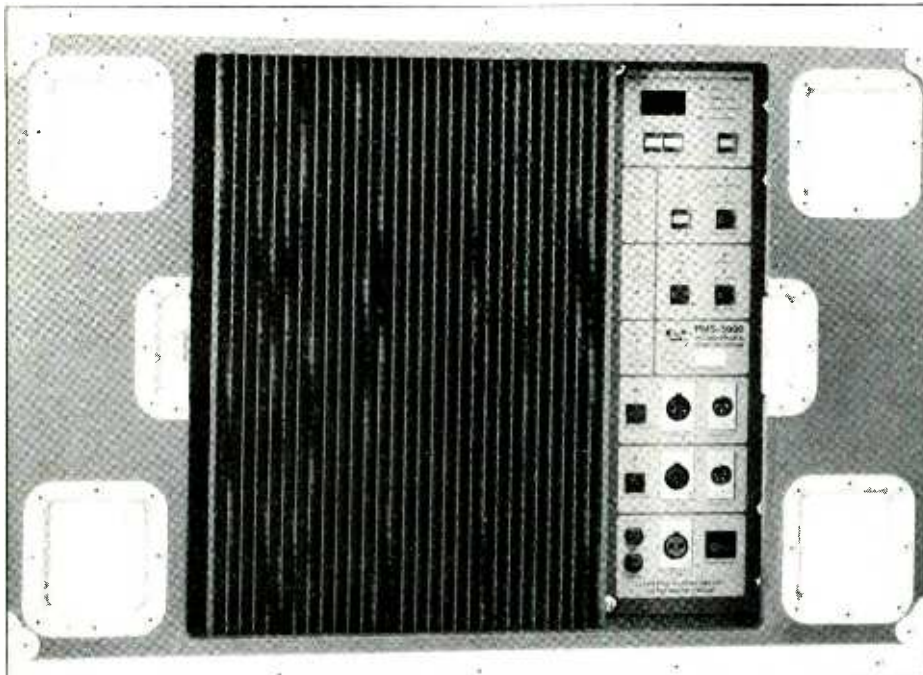
- good transient response
- low distortion
- good LF response
- high output level
- microprocessor control and protection
- high-speed (375 kbaud) *SA-net* interface
- intelligent overload protection (AEC)
- dynamic damping control (DDC)

For applications requiring higher output levels there is provision for the use of multiples of *Blue Boxes*. When used in these configurations the computer can manipulate the directivity of the





SA 8520 and SA 8525 compact drivers



PMS-5000



PMS-5000 Blue Box

total system.

On the physical side, part of the system is in a flight case design for on-the-road applications and during operation it may remain in the case, with only the front panel removed. Integrated into the flight case is a rigging system with different preset tilt angles. Additionally, the rectangular shape of the cabinets makes stacking easy and special fixtures to aid this are included in the case design.

Compact driver

The *Blue Box* uses the Stage Accompany *Compact Driver SA 8525* as the mid-high frequency drive unit. This handles all frequencies from 1 kHz to over 30 kHz. The ribbon design also exhibits low distortion figures and a very good transient response. Although the SA 8525 has a continuous power handling of a modest 60 W (output 120 dB SPL with horn) it can handle peaks greater than 1000 W of up to 100 ms duration without problems, allowing peak to average ratios of more than 10 dB at maximum output.

To make maximum use of the response of the *Compact Driver*, both the low frequency design and the crossover network had to be based on optimum transient response. This implies that a direct radiating driver is used for the low frequency reproduction and that the crossover is designed to achieve a linear phase response (Bessel). In addition, the Dynamic Damping Control (DDC) ensures a maximum control over cone excursion.

The LF driver is the SA 1503, which combines a rugged construction with an extended LF bandwidth and a relatively high efficiency. In the *Blue Box* cabinet this means a -3 dB point at 34 Hz which avoids the need for additional sub bass units.

Microprocessor control

All functions of the *Blue Box* are microprocessor-controlled. This includes the settings of gain, polarity, AEC, ground-lifts, and so on. The use of a microprocessor enables more advanced protection like AEC in addition to the traditional protection against overheating, short circuit and DC on output.

The microprocessor also allows readout on the back panel or parameters like average power, peak power and amplifier temperature can be read with a remote PC. Error situations like high temp, DC and overload are always signalled to the controlling computer so an online indication at the remote control post is at hand.

All control and readout functions are available from both the control panel and remote, using an IBM-compatible PC with an SA-net interface card. The built-in battery back-up of the *Blue Box* ensures all settings return to the last value after mains failure or power switch off.

Auto energy control

AEC is a threefold protection against clipping, average power overload and peak power overload, while maintaining the full dynamic range of the program material.

The microprocessor continuously senses the output power of the amplifier and operates on

INTELLIGENT PA SYSTEMS

both average and peak power. All levels are compared with the given settings of the AEC and when an overload is detected, the gain is reduced proportional to the amount of overload. Once the cause for the overload has disappeared, the gain is slowly restored to its original value. Attack and release times depend on the type of overload and are selected to ensure an inaudible protection.

SA-net applications

The possibility of computer-controlling professional audio equipment creates applications that were not practical before.

In situations where a loudspeaker stack or cluster is created out of multiple *Blue Boxes*, the directivity of the total stack can be manipulated by changing the mutual levels and polarities of the individual *Blue Boxes* within the stack (see Directivity Control). This makes possible the creation of a universal loudspeaker configuration for a given tour. The directivity of the total system is then adjusted to each venue by the *PC*. At the same time the computer can evaluate the influence of the cluster configuration on the frequency response and therefore dictate the needed equaliser settings for a flat free-field response of the total cluster. This will cut down the needed time for things like sound checks by a significant amount.

Another option with such a configuration is to divide the *Blue Boxes* in several groups within the cluster, where each group reproduces a different signal.

In large discotheques, amusement parks, conference centres, and so on, large quantities of equipment can be controlled from one central location, offering flexibility not available before.

The control and settings of the connected devices in an *SA-net* configuration are by no means limited to static one-time settings. It is possible to create a dynamic moving sound image by on-line changing of settings. These settings can be recorded and synchronised to a master like SMPTE timecode, MIDI or a compact disc. While it is possible to recognise each individual compact disc by its subcode tracks, it is possible to create your own library of effects for each CD. During replay of the disc, the correct effect will automatically be selected.

Due to the set-up of the *SA-net*, coupling to lighting computers, or any other computer, presents no basic problem, therefore making it possible to obtain one central operating device for all different kinds of effects.

Equipment

At present, the following *SA-net* interface equipment is available from Stage Accompany:

P 3200, IBM-compatible personal computer, AT type, with *SA-net* interface card;

SA 4525 Blue Box, programmable, active loudspeaker system;

PPA 1200, programmable power amplifier, 2×600 W.

Other Stage Accompany equipment with *SA-net* interface will follow soon but other manufacturers are encouraged to implement the *SA-net* interface on their equipment.

The PPA 1200

The *PPA 1200* is a full microprocessor-controlled, 2×600 W into 4 Ω, 2×900 W into 2 Ω, power amplifier with superb sonic qualities. Features of the *PPA 1200* include individual power supplies for both channels, DDC (Dynamic Damping Control), AEC (Auto Energy Control), built-in selectable crossover and the *SA-net* interface for full remote control. The performance of the *PPA 1200* makes it suitable for use in any high quality application, especially where the Stage Accompany *Compact Driver* is used.

It has several built-in presets for different types

of Stage Accompany loudspeaker systems. These include the AEC settings for an optimum performance of the specified system as well as the level settings and crossover selection. Using a *PC* the user can create his own presets and recall them at any time.

Directivity control

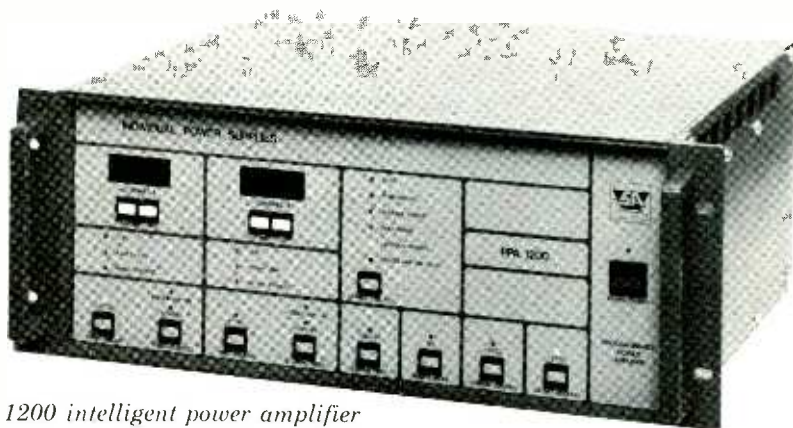
It is well known that in combinations of multiple loudspeakers reproducing a correlated signal, the dispersion of the loudspeaker combination is different from that of the individual units. The change in dispersion depends on mutual level and phase relations as well as their mutual physical position and orientation and on the frequency of the signal being reproduced. This effect is used, for instance, in the traditional sound columns, which show a strong (frequency-dependent) beaming in the vertical plane and a wide dispersion in the horizontal plane. More advanced applications include directional microphones, etc.

The most difficult situation to obtain is a combination of drivers that have the same dispersion as a single unit. This can be achieved by setting the levels and polarity to the loudspeakers according to a so-called Bessel configuration. For a combination of five loudspeakers, the power ratios should be 1:2:2:-2:1, in which the minus sign indicates inversion of polarity.

If a dispersion wider than the in-phase response and tighter than the Bessel (single-unit) response is required, a linear combination of both signal distributions may be created, which at a given frequency results in the desired dispersion. □

Literature

W J W Kitzen, 'Multiple loudspeaker arrays using Bessel coefficients', *Electronic Components & Applications*, vol 5, no 4, Sept 1983.



PPA 1200 intelligent power amplifier

SA 4525 Blue Box specifications

Frequency range: 30 Hz to 30 kHz
Max continuous output level: 120 dB SPL @1m
Peak output level: 130 dB SPL @1m
Noise output: <5 dBA PWL
Nominal dispersion: 70° horizontal, 40° vertical
Input sensitivity: 1.4 V
Input impedance: 20 kΩ
Max input level: +20 dBV (ref 0 dB=0.775 V)
Crossover frequency: 1 kHz
Crossover slope: 24 dB/octave Bessel
Max output power: 250 W RMS, 380 W peak (LF), 350 W RMS, 590 W peak (HF)
Total harmonic distortion (any output level): <0.01% (20 Hz to 20 kHz)
Intermodulation distortion: <0.01%
Slew rate: 60 V/μs
Damping (with DDC): >10,000:1 @1 kHz in 8 Ω
Power consumption: 75 W (standby), 600 W (max cont output)

Protection against: overload, short circuit, DC on output, switching peaks and overheating
Readout facilities: input gains, peak output power, average output power, temperature
LED indications: standby, power amp on, clipping, power limit
Other features: phase reverse, balanced/unbalanced input, standby/power amp on, system groundlift, *SA-net* groundlift
Dimensions (whd)
in flight case: 780×530×930 mm (including wheels)
without flight case: 730×470×700 mm
Weight
in flight case: 115 kg
without flight case: 84 kg
 The flying system is safety tested, according to international standards, for up to 5 cabinets suspended underneath each other.

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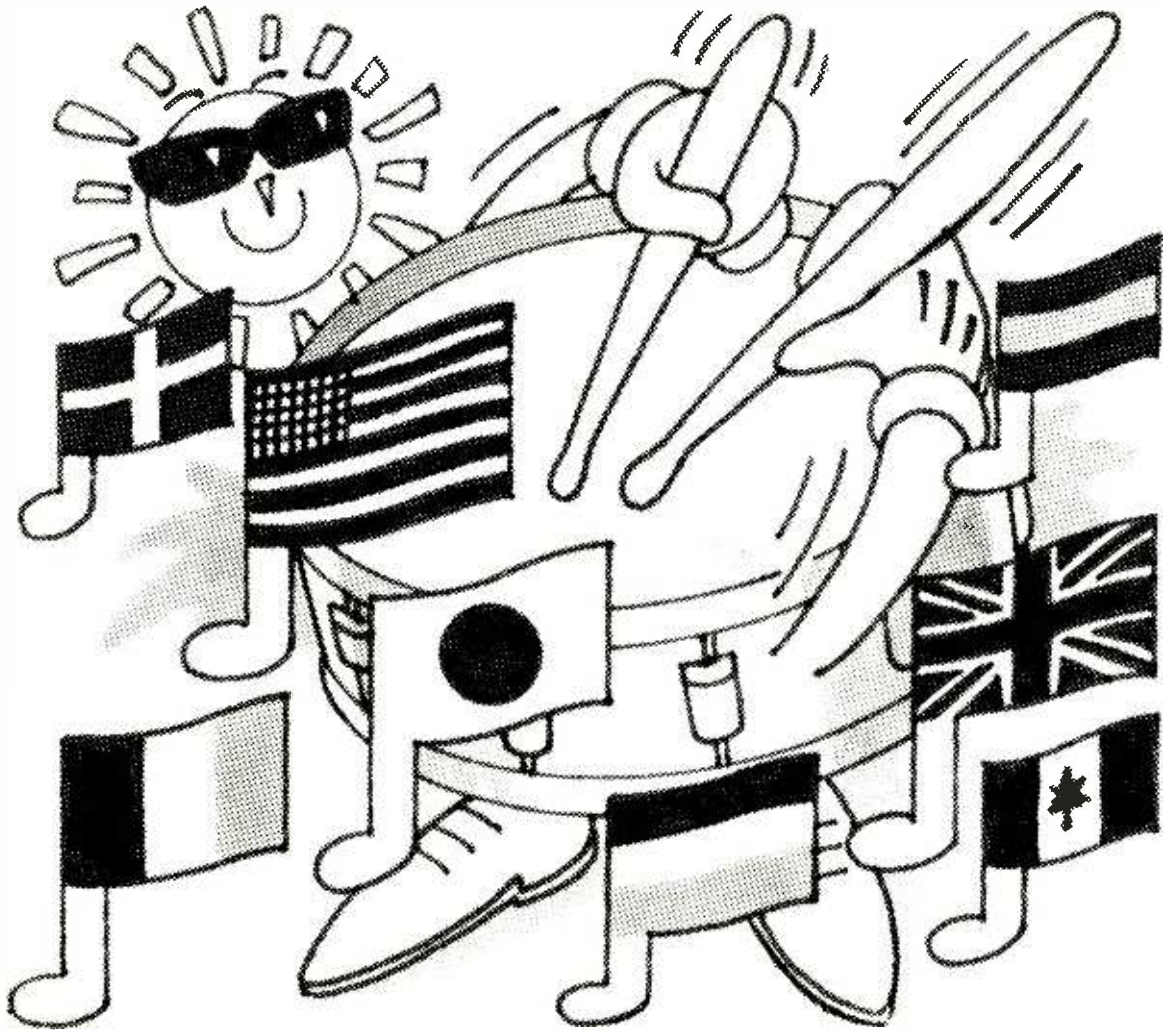
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Engineer Don Rodenbach

A demonstration model of the new TC 2290 was sent to Power Station by Martin Audio. The first engineer to use the 2290 was Don Rodenbach, who was so pleased with the sound, and features of the 2290, as well as "the clarity of the :32 samples," that he bought one for his own rack. His unit then started making the rounds of various sessions at Power Station. Today there are six TC 2290 units at Power Station and no waiting. Each unit has 32 second capability for sampling (and delay), can be locked in perfect synch with a second 2290 for stereo sampling (*The new stereo link update*), and has Sampling 2 software, along with "Fast Trigger," update.

Sampling 2 Features

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- 3) :32 second delay possibility
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- 5) Note counter for pitchshift of samples.
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DES DAMES

Terry Nelson and des Dames, Paris

The Studio des Dames is right in the heart of Paris between the Champs-Élysées and Montmartre. Its history spans over 20 years and until recently it was part of the Polygram group. When Polygram started closing down their studios, the two studio managers/engineers, Jeroen van der Klugt and Dominique Poncet, took over the complex with the intention of putting it back in the front line of European facilities.

The studios are situated in an old cinema with Studio A and the offices on the ground floor and Studios B and C on the first. There is considerable storage space in the basement and this also provides a home for the various mechanical reverberation devices as well as a natural echo chamber.

Studio A has been the first subject of renovation and it will be seen that no expense has been spared, as Jeroen van der Klugt explains: "Taking over the studio and keeping it as it was would not really have been a viable business proposition. The studio had a long-established reputation but tastes change. Though technically it was first class, the acoustics and general look of the place were starting to look a little old-fashioned and it was clear that if we were going to make a success of things an extensive facelift would be needed.

"At that time Tom Hidley had produced some new designs and Masterfonics in Nashville were to be his first 20 Hz control room in America, so we thought why not make des Dames the first in Europe? We had extensive discussions with Tom and were convinced that the new designs were the

right way to go, especially in view of the fact that we had the space here for Tom to work with.

"This meant we had the acoustics and monitoring decided, which, after all, is where your reference starts. The next most agonising choice (for every studio) was what console do we put in? Quite frankly we were put off SSL to begin with because that was what everyone had and we did not want to 'follow the herd' as far as the major decisions were concerned. Another significant factor was that we already had a high reference standard—the custom Polygram consoles, which, when they were built, were way ahead of their time and are still very much up-to-date today. It was clear that the new console would have to offer significant improvements in both performance and operational features.

"The obvious thing was to pool our ideas and have discussions with the major manufacturers. In most cases this meant customising and most people were unwilling to do this. Finally, the console which fitted the bill as far as we were concerned, in both sonic performance and ease of use, was the Harrison series 10 and there again we were in new territory. However, we are convinced that the Harrison is the only console on the market today that offers the features we require for now and the foreseeable future."

With all this, one would naturally expect that the studio would be digital as well but this is not the case. Van der Klugt: "We decided to stay with our two Studer A800s. Properly aligned analogue machines with Dolby give excellent results so there was really no need, in my opinion, to go digital. I will admit that analogue is my personal preference at the moment but I am watching the

digital developments with a lot of interest to see what is going to happen. It is clear that if clients request digital, we are only too pleased to hire in PD or DASH machines as required.

"As it also happens, the distributors of the digital multitracks are all very keen to let us have machines on trial as they all want to know how their equipment performs with the Harrison. The only reference they have at the moment in France is SSL.

"The studio is fully wired for 64-track and we have all the available software for our Timeline Lynx synchroniser so we can set up for any machine combination within an hour."

The control room is the first of Tom Hidley's new 20 Hz design rooms in Europe and features maximum internal dimensions of around 8.75×3.15×7 m (whd)—all of which adds up to a big room! The external finishing is a mixture of hardwood panelling and pale blue grille cloth (to match the console) together with a parquet floor.

The first impression is one of spaciousness and the fact that nothing appears particularly large—not even the monitors, though when you actually get up to them you realise how much bulk is there. The console has been placed fairly well forward so there is plenty of space behind for keyboard stacks, etc. or people. The tape machines are out of the way in soffits either side of the rear wall and there is a small rack room with a glass door for outboard gear and amplifiers to the right of the console. Other outboard gear and the console patchbay have been installed in two Hidley-designed double racks, which are slanted at 45° to send troublesome reflections up into the ceiling traps where they belong. These racks can be rolled into place at the engineer's convenience.

The monitoring is the Hidley Kinoshita V5 vertical system with the -3 dB point at 20 Hz, each speaker powered by an FM Acoustics FM1000 amplifier. In keeping with the studio's ancestry, the secondary monitoring is a pair of Philips 'lo-fi' speakers mounted on stands at either end of the console. "These have far more connection with real life than most of the other small speakers," commented Jeroen. "They are the sort of speakers that a lot of people actually have at home."

Two large video monitors are mounted into the monitor wall over the window for displaying deck functions, video programme, etc. Those at des Dames are also enthusiastic users of the NTP 377-100 multichannel PPM display: "You can see what is going on with a glance at the TV screen rather than scanning all the meters on the console—it's a very useful tool."

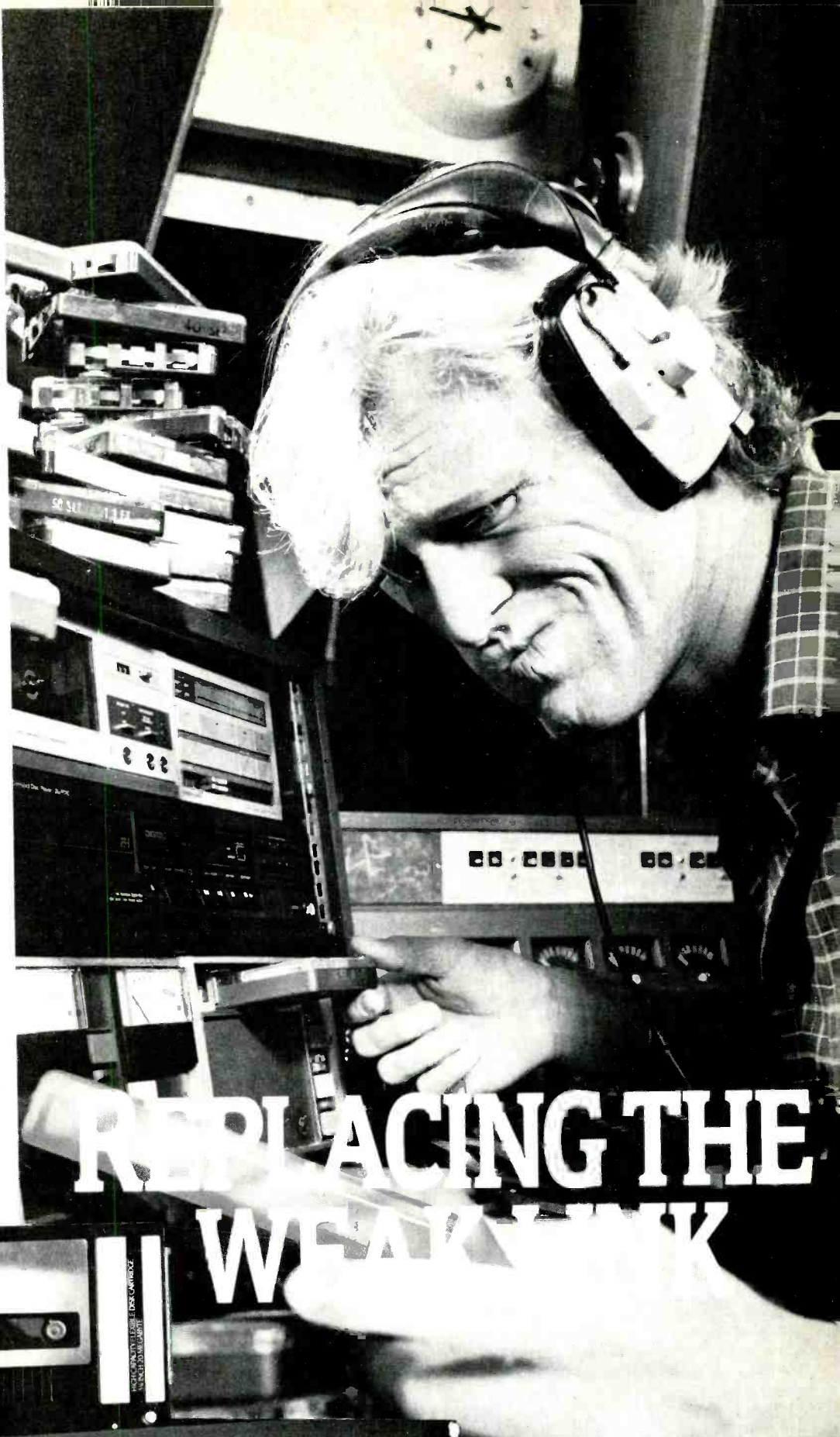
Tape machines are two Studer A800 24-tracks with Dolby, ½ in and ¼ in A80 master recorders also with Dolby and a ½ in A820 master recorder. Digital mastering is available with a Sony 701/U-matic and the studio often hires in a 1630 for CD mastering.

"I must admit I don't really like the 1630 because of the rotary head format and NTSC is hardly a European standard. However, we are obliged to use it at the moment because everyone else does.

"The problem with mastering CDs on anything else is that the pressing plants (in France) will usually only take 1610/1630. Having said this, we are very interested in putting the Studer D820 digital recorder through its paces as we can put down the PQ codes directly and prepare a proper CD master. In order to enable the masters to be cut from the tape directly, Studer have indicated that they are willing to lend a machine to the pressing plant so this is something I am looking forward to doing in the very near future."



Studio A control room



REPLACING THE WEAK LINK

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Playback is similar to conventional cartridge systems - i.e. START, STOP and CUE. But, in addition, there are editing features to allow 'topping and tailing' of recorded cues and the creation of loops during the preparation of new cartridges.

Cues are selected by the CUE button and the cue name is shown on the LCD display, together with a countdown.

Multiple cues on one disk mean less players are required in the studio. The cartridges are much smaller than NAB cartridges and can be used many more times. Audio quality and reliability of the digital system are far superior to analogue systems.

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DES DAMES



The isolation room

The effects range from Pultec programme equalisers and *LA-1As* to the latest in digital processing and it would almost be easier to say what des Dames don't have. "We don't tend to have a fixed complement of outboard gear in the studios. Requirements are different with nearly every session and the racks can be fitted out accordingly from our central pool of equipment."

The Harrison series 10 features a 5-section frame and is fitted with 48-channel modules, leaving room for a further 16 should expansion be necessary. However, this does mean the console has 96 inputs!

"One of the main features that decided us on the Harrison was its ability to store configurations of the console, meaning that we could run sessions almost back to back without any downtime or worries about resetting the console. Of course, for things to be really perfect you would need the same facility for the outboard gear and the patching.

"There have been the usual teething problems but this is to be expected when you are dealing with brand new technology. We now have the latest edition software and we are very pleased with the results. Engineers are finding it easy to operate once they get into it and I am very pleased with the open sound of the console."

In order to contain the amount of low frequency energy that can be put out into the room, the construction of the inner shell is massive. The monitor wall is built with concrete infill and the monitors are encased in concrete on a concrete pedestal. To further cut down on transmission, the floor under the front wall is decoupled from the control room and studio floors.

The control room and studio are accessed via a wide corridor running along the side of the building from the entrance hall, allowing musicians to enter the studio directly. An isolation door has been placed just after the

control room door, effectively forming an isolation lock between it and the studio door.

The treatment in the studio has mainly been confined to the walls, thereby retaining the original height of over 6 m. The parquet floor has been kept and the existing acoustic treatment on the ceiling has been covered with grille cloth for cosmetic purposes.

The floor area is a minimum 10×5.5 m so there is ample space for a full orchestra. The two side walls feature full height triangular traps with one wall completely open (just covered with grille cloth) and the other having a central section of concrete infill faced with hardwood panelling. The window is trapped underneath and a spectacular panelled hood rises above. The hood itself is trapped inside to catch reflections coming off the window.

The sound in the studio is very controlled and the reverb time fairly short for the size of the room.

A novel idea is the raised isolation room. This faces the control room window and is best described as an enclosed stage that can be opened at the front. The room is about half the size of the studio and is raised up about 1.5 m from the studio floor. A 6-section sliding glass door isolates the room from the studio, the rest of the wall being faced with hardwood.

Inside there is a parquet floor and the two side walls are faced with hardwood, the ceiling is painted hard plaster and the 'bent' rear wall is faced with hardwood and a large bronze mirror. The room is completely asymmetrical with a raked ceiling and the rear wall angled back from the floor. There is trapping behind the rear and one of the side walls as well as in the ceiling, with the latter having openings at the front and rear to catch reflections from the mirrored surface.

The iso room is very bright and has immediately found favour with string and brass

sections, but any instruments requiring a bright, open sound can be recorded here and even the most megalomaniac drummers would be hard pushed to fill the room up.

Visual communication between the iso room and the main studio is very good even when the sliding glass doors are shut. An interesting feature is the interactive effect between the two areas. Opening the iso room doors adds extra reverberation and brightness in the studio and adds 'space' to the sound in the iso room. The overall ambience can be adjusted by varying the opening and this provides many possibilities for ambient mic techniques.

Access from the studio is by a small flight of stairs leading up to a sound door opening on to a musician's lobby/lounge. A further sound lock with double doors leads into the isolation room. In the lounge musicians from either room can take refuge without causing a disturbance.

The basement provides storage space and it is also an ideal place to install a small bar as well as a row of EMT 140/240 plates and AKG BX20 reverb units. There is a central patchbay that allows the units to be patched into studios as required.

There is also a natural echo chamber about the size of a large bathroom. The opposing walls with painted hard surfaces are sharply angled in order to avoid standing waves or flutter echos. The reverberation effect is very clean and gives the impression of a much larger room. The floor is lowered about 1.5 m from the outside floor level and the lower part of the chamber can be filled with water for special effects, "though this is rarely done" said Jeroen.

There are outlet points for a couple of loudspeakers together with microphone lines.

"We had a rock group in recently and the guitarist just loved the sound of the chamber, to the extent of coming down here with his amplifier and playing as if in an isolation room. He must have been down here the whole day so he can't have been claustrophobic."

As the studio had not been operational for long, tapes were going out as soon as they were done. However, Jeroen had some experimental backing tracks, with lots of drums, guitars, keyboards, etc, which provided a good opportunity to listen to the control room's performance.

The first impression was that the sound was effortless with a lot of depth and power. The stereo imaging was almost 3-D with the sound appearing to come from the air rather than from the loudspeakers. The complete absence of peakiness and distortion means that it is easy to listen to at very high levels without realising it—until you try to speak. (Terry liked it! Ed)

"Some people are actually driving the *FM1000s* into thermal cutout," said Jeroen later. "It's as if they cannot get enough of the room—not that I am in there at that moment, I value my ears too much. To a certain extent we are paying the price of having had imperfect listening conditions in studios before, as some people feel its only loud enough when their ears start to hurt or the sound is distorted!"

"These situations apart, reaction to the room has been tremendous, whether it has been for orchestral sessions or rock and pop. The most common comment from clients is that they are 'hearing the music for the first time' and this convinces us that we made the right decision for the new studio."

Studios B and C are still in operation and at present no plans are in hand for updating. Studio B is medium sized with a 40 m² studio floor and iso booth providing enough room for 20 musicians.

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DES DAMES

Studio C is mainly used for overdubs, voiceovers and so on for A/V productions and commercials and provides room for just two musicians.

The consoles in both studios are Polygram 32/24 custom built with *Storemix* automation, electronic routing, full parametric EQ, nine VCA subgroups and eight auxiliaries. Multitracks are Studer A80/24 fitted with Polygram *Storemix* digital heads; mastering is on A80 1/2 in and 1/4 in recorders, "However, we are thinking of getting a second A820 for mastering in Studio B."

Storemix is an automation system developed by Polygram that stores the information on the multitrack tape using the space between each track, so leaving all audio tracks free.

The Studio des Dames has a very comprehensive maintenance workshop and a "set of Studer spares second to none! Proper maintenance is the lifeblood of any studio and even though it is costly to have a large stock of spares for all the equipment, it does mean that downtime in the event of a failure can often be counted in minutes rather than hours—or even days—which impresses the client and enhances the studio's reputation."

Opening in October will be a fourth room exclusively for synthesisers. This will have 32 permanent lines through to all three studios enabling pre-prepared sequences or live

performances to be patched through and recorded in any of the control rooms.

"The acoustics will be pretty simple but we will have properly isolated floors, etc. I would have liked to install Hidley Kinoshita monitors but the space is simply not there so we will be putting in UREI speakers, which should be satisfactory."

The heart of the synthesiser system will be a PPG *Realiser*, with two hard disk units providing a 250 Mbyte memory, and a Fairlight III; master keyboard for the setup will be a Kurzweil with 12 digital outputs. There will also be "a lot of rackmount synthesiser modules". The MIDI software packages will be run on a *Macintosh* computer and des Dames have yet to decide on which synchronising system to use for video with a U-matic, though Fostex and *Lynx* seem to be at the top of the list.

"The advantage of this new studio will be that a complete set of tracks can be recorded on hard disk and then transferred to multitrack for any additional dubs before the final mastering. The main purpose of the room will be for programming and the recording of sequences before doing the main production work in one of the other studios. And to help things along even further we will have remote control for the MIDI room from the three studios."

As mentioned earlier, the Studio des Dames are moving towards a decision regarding digital but, as Jeroen explained, the decision will not be all that easy.

"Tastes appear to change according to geographical situations: for instance, the Mitsubishi is probably the most popular in France right now. However, most US clients prefer the Sony, though they nearly all say that if it came down to a question of preference and not availability, then the 3M would be their first choice. The other machine that keeps cropping up in conversation with American 'golden ears' is the Ampex ATR 124—why they ever stopped making that machine has to be wondered at! Still, they did and it would be no use our trying to get some as spares are virtually impossible to get and keeping the machines running properly would be difficult.

"We still have to try the Otari DTR 900 and there is always the possibility that we will hang on to see what Studer bring out—as I say, it's a difficult situation."

Whatever the problems posed by digital decisions, the Studio des Dames is turning virtually 24 hours around the clock in all three studios, the majority of clients being French at the moment.

"Most of the international people are still locked into SSL and are unwilling to try the Harrison. However, we are engaged in talks with some important names and I think it will be a case of where one leads, the others will follow. As far as we are concerned, we have the best acoustics and the best equipment available to do the job—from then on it's down to the client." □

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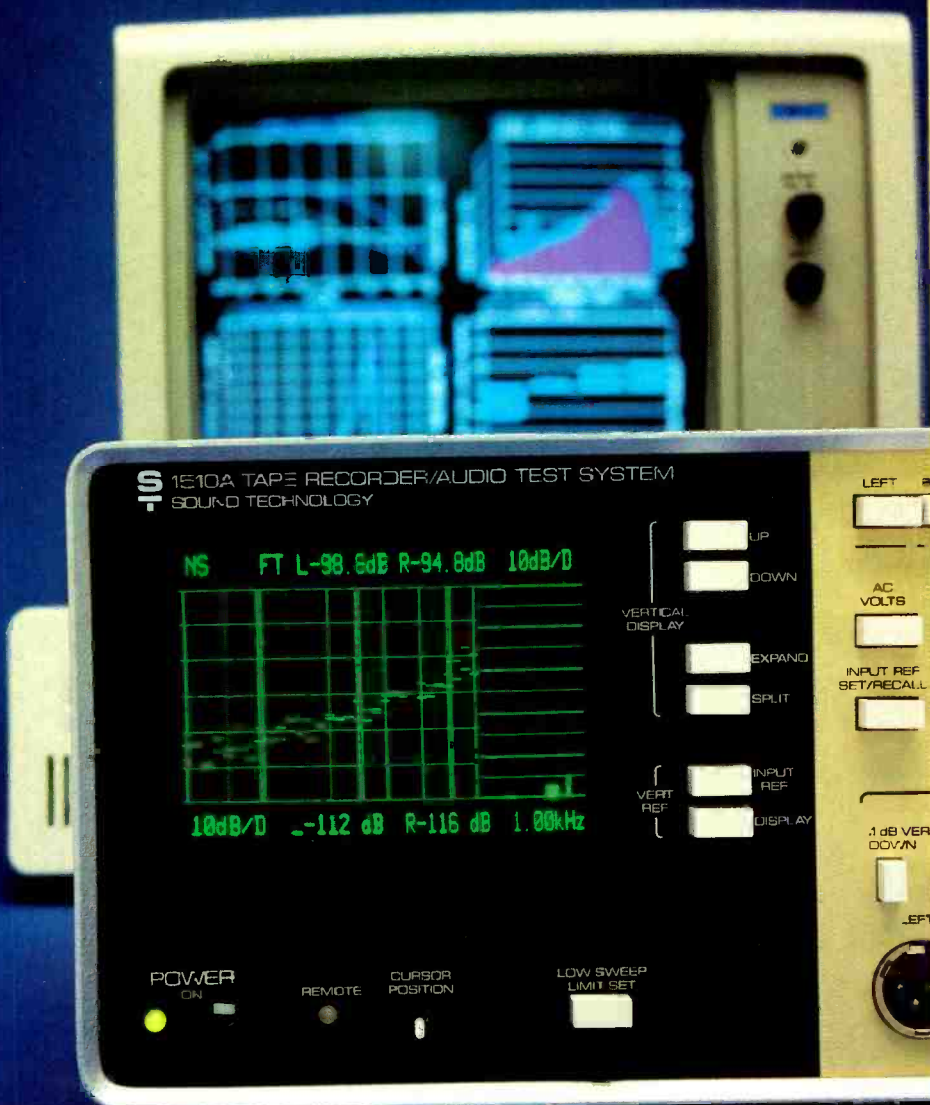
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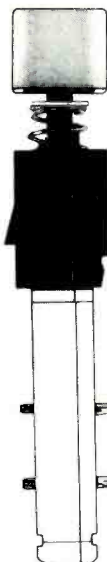
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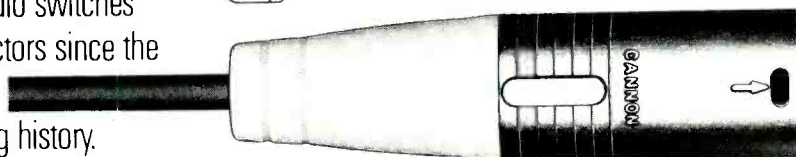


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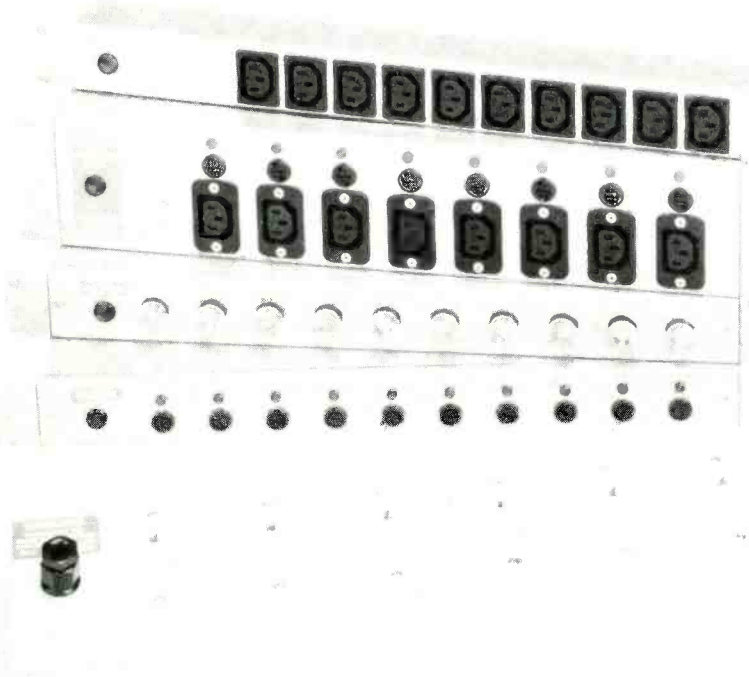
The fully overload protected remote sensing fourth order Linkwitz Reilly time compensated crossover unit is housed in a 3U rack unit.

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THE ORIGINAL

AUDIO INTERNATIONAL

With such a wide variety of work from music through TV and radio soundtracks to A/V, different requirements must be catered for as Janet Angus found out when she visited this London facility

This London-based studio has a long history as well as a former life. Originally Star Sound it was the venue for the recording of Radio Luxembourg's audience shows and as such was designed as a small theatre. Today the facility comprises two recording studios (music and speech) and the work is as varied as any facility could hope for—rock/pop music, jazz, TV commercials, film soundtracks, speech recording, A/V soundtracks and even compilation albums.

Audio International recently installed a new console. Having investigated all the possibilities, studio manager Richard Millard approached Clive Green of Cadac: "Recent Clive Green desks have been for theatres although he had built one for Jeff Wayne's home studio. We were very impressed by the standard of both the design and the construction.

"We considered SSL, Trident, *Di-An*, Neve V series and the Harrison automated console but this is a commercial studio and we have to see a return.

"A lot of London studios have SSL consoles and within the industry a lot of record companies, engineers and producers feel that SSL is the only one. But we looked at all the consoles on the market with a critical eye and tried to design a console



Control room

which overcame their various shortcomings.

"This Cadac is not in-line, which gives us more facilities. Engineers and producers often say there are not enough aux sends on many desks. This has 48 inputs and 24 separate monitor inputs which are switchable as inputs so in effect we have 72 inputs, each with 10 auxiliary sends. The 48 channels are fitted with *MasterMix* automation; there are completely assignable talkback and assignable muting systems for the entire 72 channels.

"It has a very clean sound—very quiet, very low phase shift, very expensive components and no skimping. For example a switchable mic attenuator is expensive but much more accurate." Metering is on LED PPMs.

Millard's career began in the research laboratories of EMI testing tape and he is therefore particularly conscious of the problems that can arise.

"We were originally going to have VUs but with PPMs you can take more care in recording. The transient response of for instance a snare drum or synthesiser can saturate very quickly and you won't notice with VUs because they don't give flux level on tape. A lot of engineers use them without realising. I think you are going to have to use PPMs for digital recording.

"With SSL you are paying a lot of money for *Total Recall*; what we've paid for is the facilities I feel we need with very high quality components. A lot of engineers are unhappy with the on-board EQ; Clive Green designed our EQ to our requirements. We particularly liked the original Neve one so he duplicated that curve. Funnily enough just after we placed the order with Clive Green, Rupert Neve phoned up and said that he was setting up in business as Focusrite but it was too late!"

Millard felt that computer mixing and assignable mixer technologies are too time consuming for the type of orchestral session work they are often involved in.

"When you are recording a large orchestra you are continually modifying the settings and doing virtually live mixing; you need instant access to all the controls, which you can't get on an assignable desk. If you see a musician suddenly standing up, you have to instantly move something on the desk."

Audio Kinetics *MasterMix* automation was chosen for simplicity and flexibility: "It only uses one track of the multitrack for the SMPTE/EBU code and up to four mixes can be stored on floppy disk. You can merge mixes. It's basically a system you can forget about; you don't have to keep typing things in."

The studio, owned by Radio Luxembourg and Chrysalis Records, has been designed in the former auditorium, the control room replacing the stage and the balcony becoming a speech studio. Sandy Brown Associates designed the facility with architect David Binns. Their first job was to remove the 300-odd seats and level the floor. False ceiling and additional walls for isolation and the removal of the proscenium arch completed the transition. The ceiling comprises a mixture of membrane absorbers, cedar strips on the walls act as mid frequency absorbers and elsewhere acoustically transparent fabric covers further membrane absorbers for the 200 Hz area to take out the boominess of the room.

"There are no bass traps because they take all the warmth out of the studio; they're going out of fashion now anyway. I think people realise that they made the sound very hard."

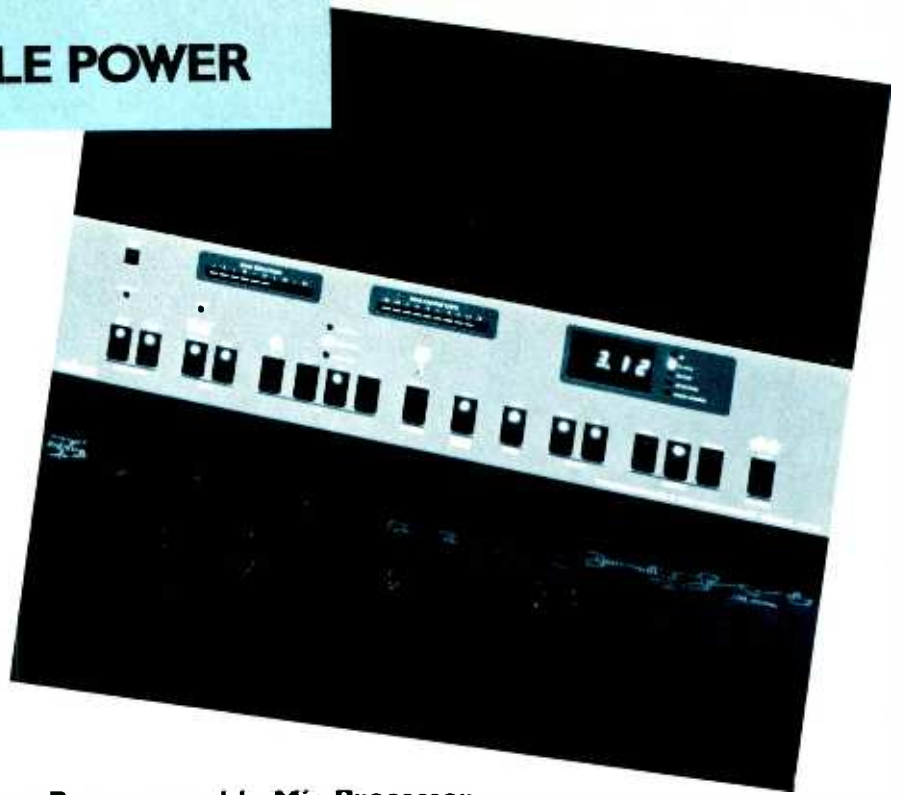
The studio area is some 1100 ft² incorporating two isolation rooms. A removable carpet covers linoleum on the front floor area with the rear half of the room acoustically more dead. By way of example of the complex sessions at Audio International, engineer Nick O'Donnell described a recording for modern jazz label ECM with Bill Bruford on drums and a collection of top American session musicians. Each had their own effects racks as if playing a live concert and set up their own sounds so the recording process itself was relatively straightforward.

In contrast the *Phantom of the Opera* called for a 16th century minstrel band mixed live on to ½ in. The variety of work calls for flexibility in the studio as well as the control room.

As for monitoring, Audio International have decided to stay with their tried and trusted Tannoy *HPD385s* which are suspended from the ceiling, driven by *FM 800* power amplifiers.

"They suit the room and they are very accurate," explained Millard. "We are also loath to change because we hear so many stories about people having problems with their monitoring. We go out a lot and sometimes I go into a room and think 'My God,

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AUDIO INTERNATIONAL

how can they put up with this sound? These Tannoys sound very good in here."

Nearfield monitoring is on Visonik *Davids* and Yamaha *NS10s*.

The multitrack recorder is Studer *A80* 24-track. The lure of digital multitrack has yet to make its presence felt: "We have seen what has happened with studios that bought them. Clients by and large fail to appreciate the technical aspects; so often it's more likely to be the coffee or the staff which puts a studio at the top of someone's list. We use 24 channels of Dolby *361* although having tried *SR* we are very impressed."

Outboard equipment includes AMS twin *DMX1580*, Eventide *919*, *H910* and *FL210*, Drawmer *DS201*, Lexicon *200* digital reverb, three EMT plates and an old AKG *BX20*; Marshall *Time Modulator* and a *Scamp* rack; UREI and Orban limiters complement Neve compressors which were retained from the



Studio area



Speech studio control room

studio's previous Neve mixing console.

"Because we do a lot of live sessions we have to maintain a high technical standard. For example, every microphone lead is checked end to end frequently. We measure the frequency response of every microphone once a month."

Mics include AKG *C12*, *C12A* and *414*; Neumann *U47*, *U89*, *87*, *84*; *SM69*; Sennheiser *224*, *202*, *C452*, *241* and *441*.

Upstairs in the balcony studio, engineer Peter Silver produces language courses incorporating dramatised scenes; dramatised comic strips; training drills; radio and television commercials; A/V soundtracks; slide projection projects and compilations, as well as accommodating very occasional overflow from the main studio area downstairs, providing a further alternative recording area.

On the day of our visit he was working on a Reader's Digest compilation: one of hundreds that pass through this studio. Silver has been firmly ensconced at Audio International for the last 14 years and may fairly be considered an expert at his art.

"First we have to acquire each track from the original publishers or the large holding libraries and all of them will have been recorded to different standards and at different levels. Often more than one version has been produced and you have trouble locating the right tapes. I try to be very meticulous and go back as far as possible. A librarian would tend to give you the first one they came across, which is in fact the latest and may be 20 generations away from the master during each of which buttons will have been pushed.

"My job is to try to sort them all out. For example with Reader's Digest you may well get an 8- or 10-record set which has over 100 tracks. I recently did a set of music from 1940 to 1980 and you can imagine the variation in quality there was. First I have to iron out the clicks, hums, dropouts and surface noise. Then I have to try to blend it all together and make good any deficiencies.

"During the '60s they introduced the electronic stereo processing which sounds pretty awful and is obviously not a direct copy from the master. It is also very difficult to cut on to disk, so I put it back to mono and maybe add a little reverb sometimes.

"A lot of new material that comes in now is supplied on Sony *F1* format which is much easier—they can't really go wrong with that. It can't be off azimuth and it doesn't matter if it is a low level recording, all they have to do is set up their machines for the right tape!"

The room is pretty well packed with equipment, so much so that whenever possible a grand clearout is effected in order to keep the equipment to a minimum. The 18/4/2 Soundcraft *400* series mixer with 8-track monitoring is the centrepiece. An Otari 8-track *MX550* with dbx *150* fulfills tape recorder requirements with three Studer *B62* ¼ in machines each with Dolby *A361s*, a Tascam *34* ¼ in 4-track and Sony *PCM701*. Two Technics *SSP10 MK2* grams provide a means of playing in sound effects along with Luxman or Sony cassette machines. A *Scamp* rack holds noise gates and parametric equaliser ("Very useful for rescuing the ancient material"). Other outboard effects include two UREI *1176* compressors, a Lexicon *F760X*, Eventide *H910*, and Orban de-esser.

Monitoring is again on Tannoy *HPD385s* for compatibility with the downstairs studio. "Monitoring is very critical because we are listening for hiss, clicks and pops," adds Silver. He also has a pair of Rogers *LS3/5As*.

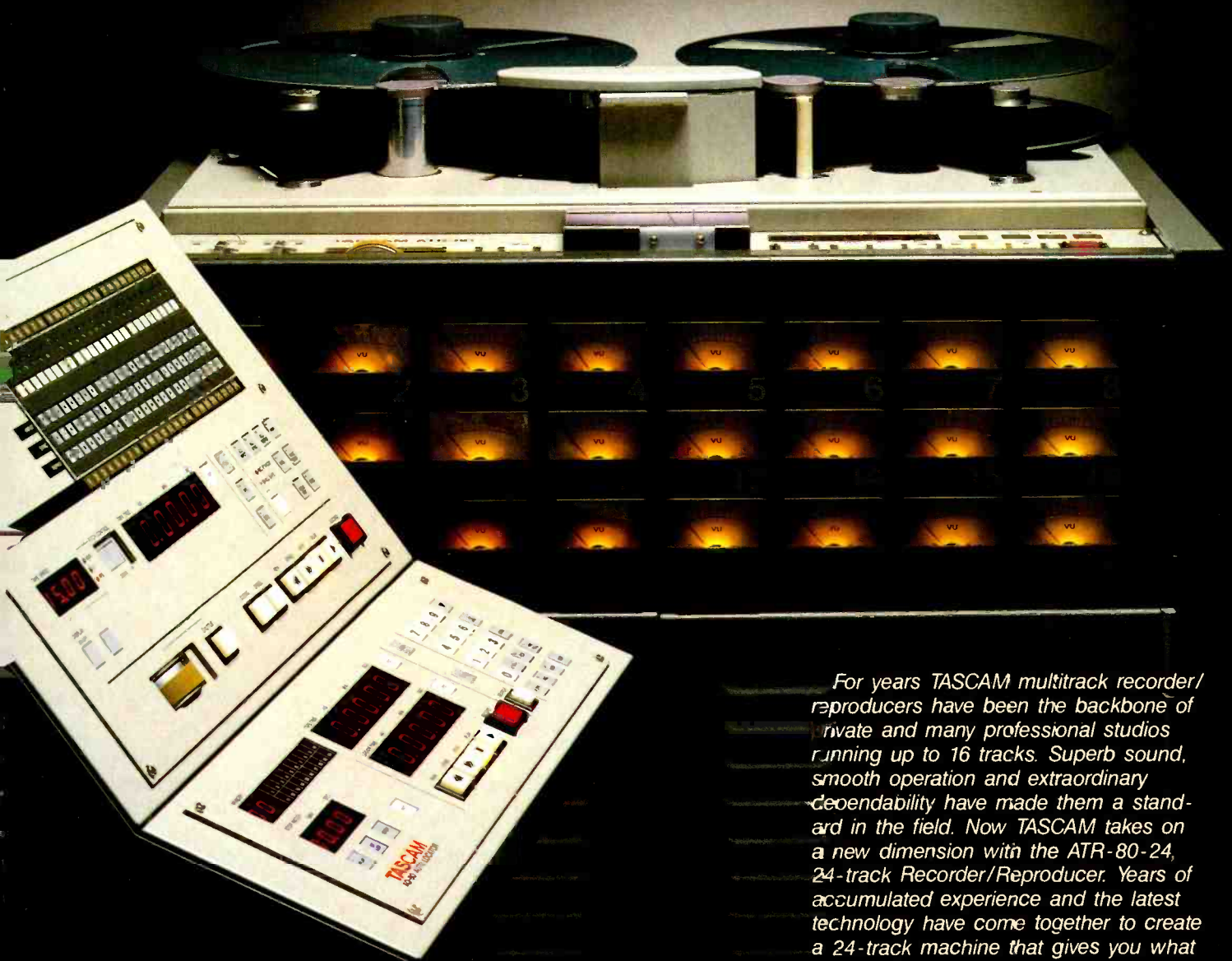
The remaining wall space is taken up with the studio's background music and sound effects libraries. Adjoining this control room is the smallish voiceover room.

But the cause of the excitement in the air is the new mixing console as they enthusiastically introduce all their clients, producers and engineers to it and its ways. "The attractive thing about this console is the attention to detail throughout the design. Clive Green has been very amenable to any modifications we have wanted to make, and since it was installed a few little details have been altered. We are hoping that it will be a forerunner of more studio desks to come from Cadac.

"Audio Kinetics were great about the installation of the *MasterMix* and *Q.Lock*. Producers are always talking about mixing on SSL but *MasterMix* is very simple and fast."

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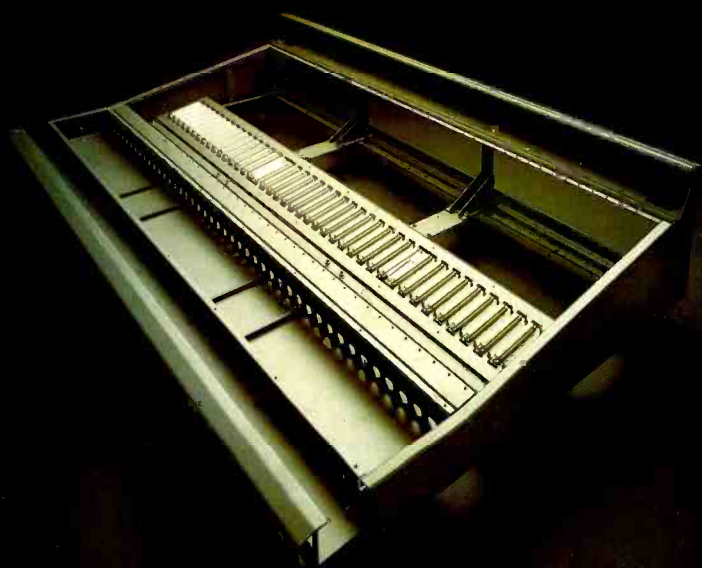
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Ask your dealer whether the consoles you are interested in use a printed circuit motherboard bussing system with gold plated DIN-standard edge connectors, or ribbon cables to mate the modules with the system. The world's top recording consoles use a motherboard as it is the only way to ensure that the signal busses are ultra-quiet and that cross-talk is kept to a minimum. Ribbon cables dramatically increase the length of the bussing and are therefore noisier and less reliable. But they make the manufacturing process cheaper.

Ask them about close-tolerance capacitors and 1% metal film resistors. Ask whether the IC's in the console are socketed, or soldered in directly. Socketing IC's means that you don't risk destroying the module should one need changing. Direct soldering is cheaper.

Demand to know whether your proposed investment protects its modules and bussing system from external stresses and impact with an all steel chassis rather than a flimsy, if cheaper, alloy. Ask your dealer if he minds you lifting his showroom model at one corner to see how much it bends in the middle. The results may surprise you.

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BARRY FOX'S BUSINESS

Sony recently filed a patent application on a 'multichannel stereo reproducing apparatus'. The circuit and description are quite unashamedly aimed at mimicking the Dolby film Surround Sound system.

A simple sum and difference matrix decodes left front, centre front, right front and rear surround signals, from the main stereo pair. The rear signal is channelled through a de-emphasis circuit. Why? Because in the Dolby Surround system the rear channel information is encoded in Dolby B domestic format, which of course involves a degree of HF pre-emphasis. The patent says the circuit 'is capable of favourably reproducing sounds' from 'signals based upon a so-called Dolby system'.

Sony, like all the other consumer electronics companies who make pseudo-Dolby Surround circuits, will doubtless be able to mimic the B decoder perfectly well. But they still remain prey to a pounce from Dolby's lawyers. To sell the system, Sony will need to use the word Dolby, with advertisements along the lines 'suitable for decoding Dolby Surround recordings'. That's like selling tooth rot and saying it is 'just like Coca Cola'. Using a trademark in this way is taboo because the trademark owner can argue that the competitor is capitalising on someone else's goodwill and thus infringing the registration.

It would be an interesting test case, if someone tried to sell a pseudo-Dolby Surround Sound decoder with an advertising tag like 'suitable for decoding you know who's Surround recordings'. But in the long run it would surely be cheaper, and more honourable, to take a Dolby licence. After all it was Dolby who, in the early '70s, poured millions into the thankless task of persuading the cloth-eared film industry that they should do something to improve sound.

The annual Japanese Audio Fair, held in Tokyo, spreads over two large halls in the Harumi Exhibition Centre. Harumi is a man-made island that was built by dumping rubbish in Tokyo Bay. Unfortunately, no-one thought to run a subway line out there. It's a long walk back to downtown Tokyo.

The two halls used for the Audio Fair are identified as L and R, for left and right. Exhibitors cast lots for a stand in L or R. This seems quaintly ironic, because the Japanese language is not known for distinguishing reliably between L and R.

This year, the big news in audio was the use of optical fibre links to carry digital audio between system components, domestic DAT and CD-Video.

The Japanese are letting Philips make all the running on CD-Video. It was Pioneer who pushed laser video disc in Japan. Not surprisingly, the company is sticking with the hard-sold name *Laserdisc* instead of switching to the new name confusion of CD-V, which is supposed to mean

laser video discs of all sizes, but not surprisingly means 5 in (12 cm) video CDs to the public. There have been technical problems with the PAL 5 in format but at Harumi there were reasonable numbers of 5 in NTSC discs on demonstration, giving pretty good pictures—but almost all were in the large Philips demonstration booth.

Matsushita/Panasonic hung fire, despite a previous commitment to CD-V, and instead showed a couple of VHD videodisc players to keep subsidiary JVC, inventor of VHD, happy. A string of other firms showed 8 in and 12 in laser video discs and blithely continued to call them 'Laserdiscs'.

On the strength of the Tokyo showing, and yawns from the American trade, it looks as if Philips would have done far better in NTSC countries to stick with the names *Laserdisc* and *Laservision* for the large video disc formats, and keep the CD-V tag for 5 in video clip discs—aiming first at the jukebox industry, and then at the domestic market with portable players. Firms like Pioneer and Yamaha, who have for several years been selling Combi players (which play CD audio and laser video discs), might then have shown more enthusiasm for the clip concept.

In Europe, where there have never been any Combi players—and there is to be a significant format switch from analogue soundtrack to digital soundtrack—the idea of changing to the umbrella name of CD-V makes more sense.

The 3 in (8 cm) CD audio single, with 20 minutes playing time, did not make its bow, as expected, at the Tokyo show. Sony say they are still experimenting with an adaptor, which will clip round the edge of a 3 in disc to let it play on an ordinary 5 in CD system. The most likely form of the adaptor is a white plastic disc, shaped like a thin flat doughnut. Although it is sometimes possible to centre a 3 in disc very carefully in the 5 in tray of a conventional player, the player may still refuse to play the disc if it senses the disc's presence by checking from the outside before reading the table of contents at the disc's centre start point. Hence the need for either an opaque adaptor or a modified player loading tray.

By chance, a few days after the Tokyo show, I was shown round a Sony factory that makes 5,000 CD players a day. None of the players on the production line had a disc tray modified to take a 3 in single. Much flustered when questioned on how this tied up with the company's supposed commitment to the 3 in format, the factory manager said the tray design would be 'changed soon'.

Philips fear that Sony may be planning to launch the 3 in single as a new format, using ADPCM (adaptive delta pulse code modulation) instead of conventional PCM, and lower sampling frequencies, to double or quadruple playing time. This would make the 3 in single play as long as a 5 in, with FM radio quality. But it would shatter the CD standard.

The 3 in disc can also be used as a data carrier. The 5 in disc stores 600 Mbyte of data, which is too much for most purposes; the 3 in disc has

200 Mbyte capacity, which is enough for most purposes. All the text (without pictures) for a 26 volume encyclopaedia soaks up only 110 Mbyte (60 Mbyte for the contents and 50 for the index).

Psychologically it makes more sense to sell separate reference works on separate discs, instead of charging a one shot price for a single 5 in disc containing a full reference library.

All the major manufacturers at the Harumi exhibition were showing DAT but still in the high price bracket. Total sales figures for DAT in Japan, between the launch in March and this Christmas, look like being around 30,000. Most of the pent-up demand for DAT was in the professional or semi-pro fields. Once that demand had been satisfied, sales dropped off badly, some say to around 500 a month in the summer. In the Akihabara audio/video shopping centre in Tokyo, all the DAT hardware was very much in a corner, with heavy discounting; I was offered an Aiwa for 139,800 yen (around £600) dropped from 188,000 (over £800). Aiwa was first maker on the market in March. Sony's CD factory makes DAT for Aiwa, Kenwood and Pioneer. A single short line makes only 100 a day. The mechanism and QC are the same for domestic and professional units. The chips are designed to prohibit recording at 44.1 kHz. The professional DAT decks have an extra unit that jiggers the microprocessor to enable recording at 44.1 as well as 48 kHz.

Several of the Japanese manufacturers were showing DAT portables for professional use, at a Japanese price of £1,000 and up. Most interesting of these, the Panasonic portable is tiny, consumes only 3.9 W and runs for 2.5 hours on a battery charge. The Panasonic portable is the first to use a small size DAT head-drum, 15 mm instead of 30 mm in diameter. The track formation remains the same because the tape is wrapped 180° round the drum instead of 90°. Drum speed remains the same at 2,000 RPM.

The most interesting demonstration at the Audio Fair, Harumi, Japan had nothing to do with consumer electronics and wasn't in either of the two halls, L and R. It was on an open air concert stage in between. Once an hour on the hour fusion group John Kaizan Neptune played some rock, Carmen McRae sang *Prelude To A Kiss* and the Count Basie band rounded off the set with a track featured on the CD album *Long Live The Chief*. The concerts weren't live, they were off tape. What made them special was the system used.

Out of sight a Mitsubishi 32-track played Denon master tapes into a TAC SR9000 desk. An engineer used the 32 channels to create 40 feeds and sent them to 20 Accuphase stereo amps. On stage there were 40 loudspeakers, of all different types. At first sight it looked as if the speakers were arranged in higgledy-piggledy fashion. But then the penny dropped.

The loudspeakers were arranged in exactly the same layout as the Count Basie band. Drums high at the rear with JBLs stacked even higher to handle the ride cymbal tracks. At left of stage clusters of speakers took the piano track, the bass track and guitar track. Over on the right, a front row of sax speakers sat in front of a trombone row and a trumpet row, each raked higher than the one in front. For the Carmen McRae number, only the piano, drums, bass and vocal speakers were used. For Count Basie the mixer opened up to hit all 40 channels. The effect was truly remarkable and the sooner someone tries it in Britain the better.

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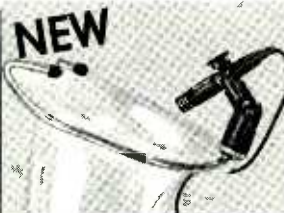
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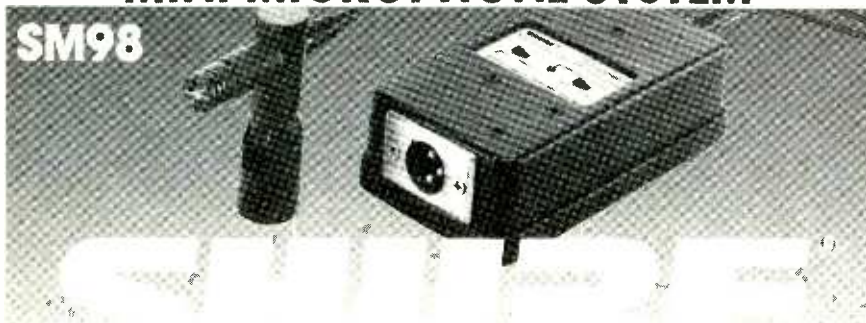
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BARRY FOX'S BUSINESS

At the Berlin Funkausstellung, Denon staged a demonstration, which was especially interesting because I suspect most visitors did not realise the significance of what they were hearing.

For several years now Denon has been recording live music in Europe using a 4-channel digital audio system. Sometimes two channels are used for stereo with the remaining two for ambience. Other times two channels are used for the main stereo stage with solo instruments, eg violins, closer miked on the extra channels. Or for opera two channels may be used to record the stage stereo with the other two used to record the orchestra sound.

Normally the four channels are mixed down into stereo for commercial CD release. But at Berlin Denon was demonstrating a 4-channel replay system, based on an apparently conventional CD.

When CD was first proposed, it was suggested that four channels of surround sound could be recorded, instead of two for stereo, by halving the playing time. But the Denon demonstration delivered four equal bandwidth channels for 74 minutes. How come? The Denon Quattro disc is encoded using the format set for CD Interactive. For purely political reasons, because CD-I has not yet been launched, the Denon disc is described as CD-ROM.

Each channel is sampled at 37.6 kHz, to give 18.8 kHz bandwidth, and the signal coded in either 8-bit or 4-bit Adaptive Differential PCM.

ADPCM coding captures only the difference between adjacent samples, in other words the amount by which the sound increases or decreases relative to where it was at the time of the last sample. This normally only works well when the music is free from surprise transients. But with predictive coding, the system guesstimates what will happen next.

Demonstrations of both 8-bit and 4-bit ADPCM sounded surprisingly good. So incidentally did a live demonstration of an opera recording made at the Semper Opera House in Dresden, with the stage stereo reproduced from one pair of loudspeakers and pit orchestra reproduced in stereo from a second pair of loudspeakers set slightly in front of the stage pair. It's a new and interesting approach to 4-channel replay that gives a more realistic front image, rather than surround sound ambience.

If Denon uses CD-I to release 4-track masters in unmixed form, it could start a new trend. Music and hi-fi buffs will be able to balance their own stereo mix to taste. EMI could then issue the early Beatles albums in unmixed 4-track. □



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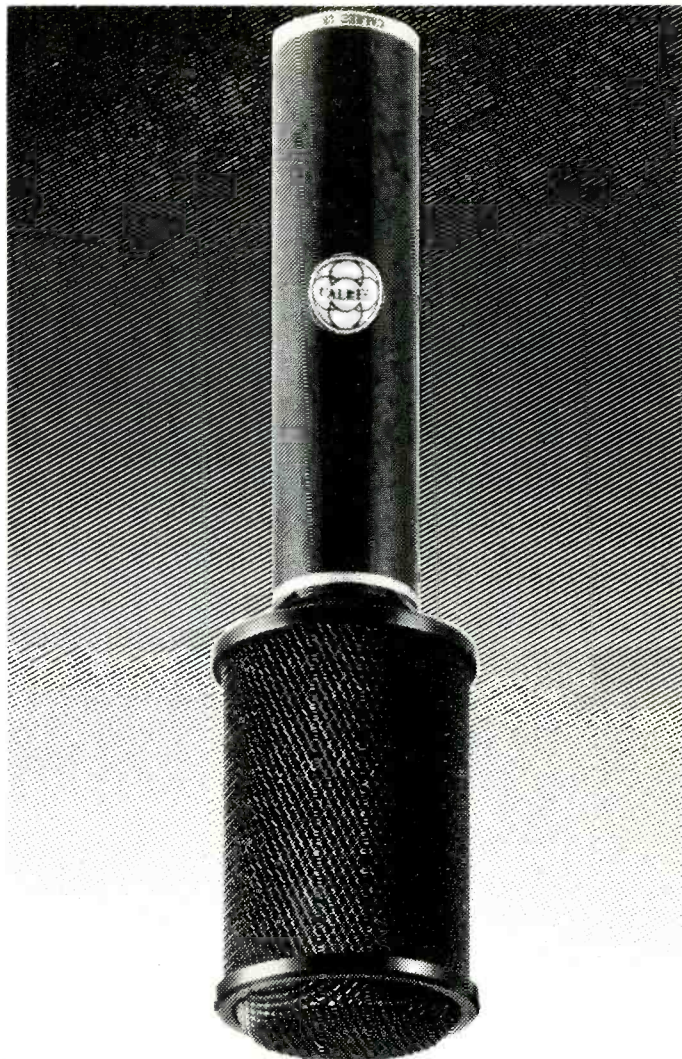
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LA SYNTHESIS— A NEW FORM OF SOUND CREATION

Mark Jenkins looks at the Roland D50, one of the first synthesisers to use LA synthesis, and contrasts this with previous methods of synthesis

Roland's *D50* synthesiser is a 5-octave, 16-note polyphonic keyboard that uses a new form of sound creation—LA Synthesis.

LA, or Linear Arithmetic synthesis, combines Roland's long experience of analogue sound creation with several new ideas in the use of short digitally sampled sounds and digital processing. In the case of the *D50*, this involves the combination of different types of sound, known as *Partials*, and their processing through a built-in digital equaliser, chorus and reverb unit.

The *D50* has been widely acclaimed as the most exciting introduction in sound synthesis since the Yamaha *DX7*. The two have little in common except their divergence from the basic system of analogue synthesis. On most analogue synths, an analogue-based oscillator circuit feeds into a multimode filter, both filter frequency and overall volume being controlled by multistage envelope generators. Effects are provided by low frequency oscillators, which modulate pitch, filter frequency and overall volume.

The main method of creating new sounds here is to subtract harmonics from the basic oscillator output using the filter, so this method (subtractive synthesis) is inevitably limited. Additive synthesis, the summing of basic harmonics to create any basic waveshape, is more expensive to implement but Yamaha succeeded in launching a

form of additive synthesis with the *DX7*, based on the FM (Frequency Modulation) system.

Yamaha's FM synthesisers use four or six sine wave oscillators (operators) in various combinations (algorithms), which can be chosen by the programmer. When one operator is used to modulate the frequency of another it is known as a modulator; if its output is instead processed through the audio envelope generators it is known as a carrier. FM synthesisers generally do not have analogue filters, since the relative frequencies of the operators can determine limitless numbers of harmonic structures.

If the *DX7* were seen as the *D50*'s spiritual predecessor, the main reason must be the striking quality of its sounds. *DX7* sounds were striking when the machine was launched five years ago because they seemed very clear, precise and cutting compared to the analogue sounds of contemporaries such as the Sequential *Prophet 5*, Roland *Jupiter 8* and Oberheim *OB8*.

Until recently Yamaha has insisted on the superiority of FM synthesis over all other methods of sound production, including digital sampling. But while FM synthesis can create lifelike sounds and is highly variable, it is simply not capable of matching digital sound samplers in realism. Nor is it capable of some of the rich effects afforded to analogue synthesisers

Since FM synthesis was until recently licensed only to Yamaha, competitors tended to combine the best of analogue and sampling technology in attempting to knock the *DX7* off its top spot. One notable release in this category was the Ensoniq *ESQ-1*, a very obvious forerunner of the Roland *D50*.

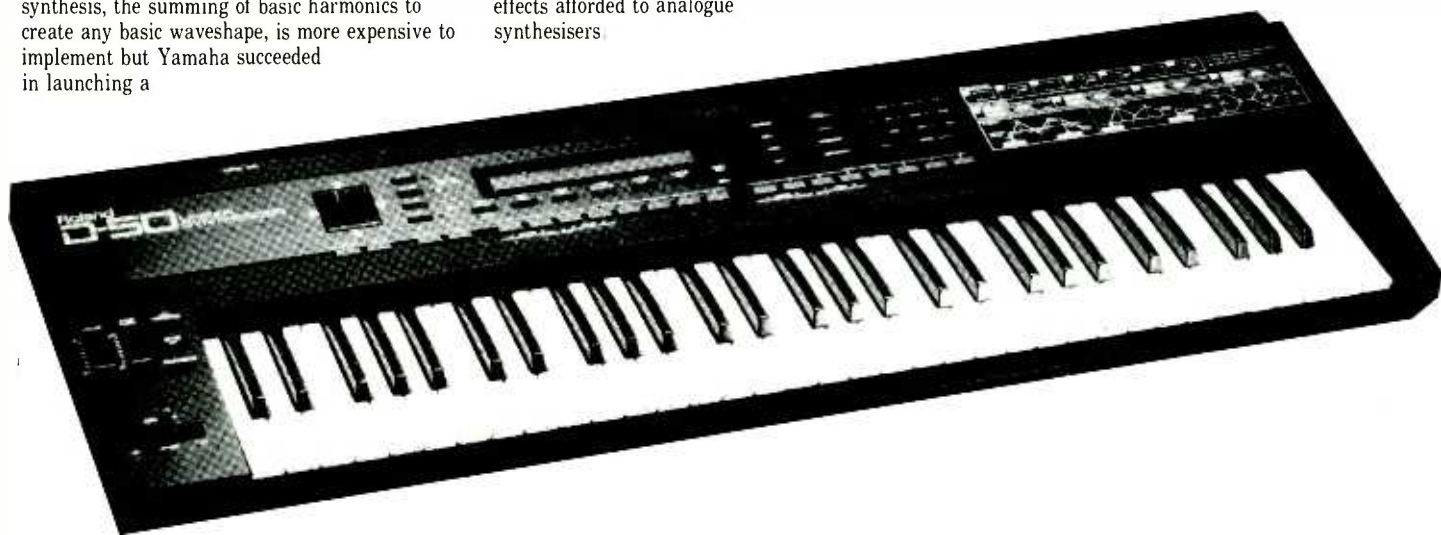
The *ESQ-1* stores sampled wave shapes from the piano, guitar, flute, drums and several other acoustic sounds. These single wave shapes are looped to make sustained sounds possible, then processed through analogue filter and amplifier circuits controlled by multistage envelopes. Thus the *ESQ-1* combines the realism of digital sampling with the flexibility of analogue synthesis.

At this point we can appreciate the philosophy behind the *D50*, which must have aimed to end the *DX7*'s dominance in the world keyboard market without damaging Roland's substantial sales in the area of sound samplers. Obviously Roland's experience in analogue synthesis was likely to come into play but it was necessary to offer something more than had already been seen on the Ensoniq *ESQ-1*.

The solution to these problems was to offer sound samples much longer than a single looped wave, combined with powerful analogue circuits and digital processing. The *D50* holds 100 sampled attack portions of acoustic sounds in memory, and these include piano, string, voice, percussion and many others. It's possible to hear these sounds in isolation with some editing and they are generally clear and lively. Some of the last sounds in the table—Spectrum 1-7, Male and Noise, for instance—seem rather eccentric, since they consist of loops, combinations and reversed versions of other sounds.

All these sounds are sampled by the pulse code modulation method and are referred to in the *D50* manual as PCM Sound Sources. When a PCM Sound Source is combined with a Synthesiser Sound Source it is referred to as a *Partial*; two *Partials* are combined and processed by envelopes, LFO's, equaliser and digital reverb/delay to make up a complete sound known as a *Tone*.

This may sound complex when compared to conventional analogue synthesisers, and in fact there are very many parameters to be handled. However, the *D50* has many routines intended to simplify sound creation, as we'll see. It is unfortunate, though, that the designers have chosen to use new terms for some quite easily recognisable features; a PCM or Synthesiser



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sound source becomes a WG (Waveform Generator), a filter becomes a TVF (Time Variant Filter), an output amp becomes a TVA (Time Variant Amplifier) and so on. When this basic confusion is overcome, programming can seem little different from working with the familiar *Prophet 5* or *Jupiter 8*.

For budgetary reasons the *D50* does not have a control for every parameter but since there are many parameters to handle a single Data Entry Slider, as on the Yamaha *DX7*, would not be sufficient. Accordingly the designers have introduced a pair of Increment/Decrement keys and a Joystick to control the volume balance between Partials and several other parameters. The joystick must not, of course, be confused with the performance control joystick of, for instance, Korg's *DSS-1* sampling synthesiser.

A 40-digit LCD display on the *D50* shows the current Tone Name and number and various other pieces of data. Under the display are five buttons—Key Mode, Split Point, Balance, L Tone Edit and R Tone Edit—each of which call up a new display on the LCD. This allows you to carry out specific editing tasks. The synthesiser is capable of simultaneously creating two sounds (the Left and Right Tones), which can be played either side of a programmable keyboard split point.

Two additional buttons, Tone Detune and Patch Edit, also act as scroll buttons, allowing the user to move a cursor in the LCD display to underline the currently desired parameter. Values are then altered using the Increment/Decrement buttons, while hitting Upper or Lower Partial Balance, Local or Value Edit will bring the editing joystick into play. It is not entirely clear why these two editing systems could not be combined into one, although it is true that the physical placement of the joystick gives a better idea of, for instance, the current volume mix between Partials, than would the Increment/Decrement buttons.

The *D50*'s memory holds 64 sounds (64 pairs of Tones) with another 64 accessible from a plug-in RAM or ROM card. The sounds are selected by choosing one of eight banks and one of eight memory positions, so two key presses will call up a new sound; obviously it is also possible to call up new sounds with a MIDI patch change command from another unit such as Mother Keyboard. Studios owning a mother keyboard may opt for the keyboardless *D550* version of the synthesiser, although the fact that the *D50* is both velocity- and pressure-sensitive makes it highly suitable for use as a mother keyboard in itself.

Generally speaking, a push on the Exit button will get you out of trouble if the editing process is becoming confusing. Even the functions of the footswitch and foot pedal sockets are programmable, with Patch Shift, Portamento, Chase (a built-in echo-like note repeat function) and Keyboard Off available on the former, and Tone Balance, Aftertouch, Vibrato and Keyboard Off available on the latter.

While editing a sound, the original sound can be regained for comparison by pushing the Compare button. It's possible to alter the performance of the synthesiser quite substantially without changing the sounds themselves; Keyboard Mode offers you 16-voice performance, layered dual 8-voice performance, split dual 8-voice performance, split 8-voice/monophonic performance and other options, while the Chase function repeats notes with variable spacing and use of sounds to create complex delay effects.

The built-in digital reverb unit also has a couple of Delay settings, the overall effect being a very

LA SYNTHESIS— A NEW FORM OF SOUND CREATION

complex and 'busy' sound. Reverberation quality is good although the digital chorus is a little noisy. However, the combination of the two, which is programmed into many of the *D50*'s factory patches, has gained the keyboard a reputation for being highly impressive on first hearing.

Certainly the String, Brass and Church Organ patches improve on anything previously heard on analogue synthesisers; this is due to the combined effects of the sampled attack portion (the ear seems to accept simple analogue sustain portions as long as the attack portion of the sound is lifelike) and the built-in effects.

Editing out the effects leaves the *D50*'s sounds in isolation, and in fact they are far from overwhelming. But many synthesisers are now marketed with built-in effects units (the Korg *DSS-1* sampling synthesiser and *DW-8000* synthesiser for instance) and so it is obviously necessary to take this factor into consideration when purchasing synthesisers and outboard effects.

It is fact of life that synthesiser-based studios are now having to invest much less money in effects units. A programming suite comprising a *D50* as mother keyboard, a Yamaha *TX81Z* FM synth module, a Korg *DSS-1* sampling synthesiser and a Korg *EX-8000* expander, would certainly need none for the synthesisers themselves; each has built-in effects units capable of providing delay and/or reverb and/or flanging and chorus effects. While such a studio two years ago might have called for two outboard digital delays and a reverb, nowadays one small multi-effects unit (as inexpensive as the ART *ProVerb* perhaps) would do the trick for vocals and mixdown.

It would even be possible to mix some of these synthesisers through a simple line level mixer rather than a conventional desk, since they have quite versatile control of EQ on-board. The *D50*, for instance, has Lo (63 to 840 Hz) and Hi (250 Hz to 9.5 kHz) EQ settings with variable resonance on the Hi band, in addition to a conventional low pass filter with variable resonance. The built-in chorus has variable depth, and in an attempt to add some unusual 'digital' effects reminiscent of Yamaha's FM synthesisers, there's even an onboard digital ring modulator that mixes the output of Partial 1 with the ring modulated sum of Partials 1 and 2.

Several computer editing packages based on the Atari *ST* are becoming available for the *D50* but in the meantime the best way to simplify programming is to add the *PG-1000* programmer, which has straightforward slider controls for most functions, although even using this method there are two functions for every slider. The programmer makes sound creation on the *D50* much faster but does not remove the necessity of

learning the distinction between Partials, Tones, TVF's, TVA's and so on.

Conclusions

On first hearing, the *D50* is highly impressive. Its sounds range from those expected from mid-price samplers to those of the classic analogue synthesisers. There are several factory sounds reminiscent of FM digital synthesisers—the Ring Modulator and other effects coming into play here—and the performance options using pedals, footswitches, velocity and pressure sensitivity, the Chase effect, keyboard modes and so on, are many and varied. There are also many sounds—such as Digital Native Dance—which are simply indescribable.

Many of these sounds are made doubly impressive by the use of onboard reverb and delay. The ability to rapidly edit and store these sounds (which comes much more easily using the *PG1000* programmer) is invaluable.

Stripping the factory sounds down by removing the programmed effects leaves the PCM attack portions sounding fairly basic, and the Synthesiser portions (which are produced entirely using processed Pulse waves) often sounding very ordinary. So the fullness of the *D50* sound is created by the pairing of sound sources and their processing through generous numbers of onboard effects.

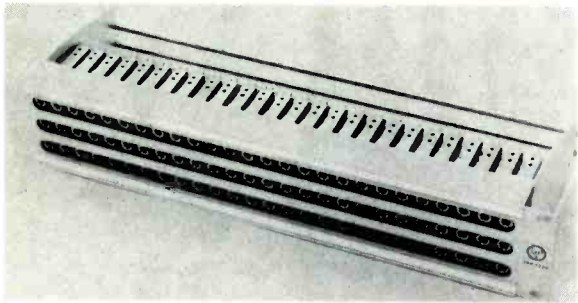
The provision of onboard effects is bound to become an increasing trend. In the case of the *D50*, the reverb is of very high quality, while the Chorus seems a little hissy. The danger is that other manufacturers may market instruments with built-in effects of a lower quality that in order to preserve the illusion of highly complex sound generation, cannot be edited out.

This leaves the studio engineer with something of a problem. As the situation stands at the moment, keyboard-based sessions are certainly going to find many outboard effects lying unused due to the increased abilities of the keyboards themselves. The provision of these facilities within the keyboard instruments are certainly keeping their price levels relatively higher but if impressive performance such as that of the *D50* is a result, few keyboard purchasers will complain.

The conclusion must be that studio engineers must become familiar with those instruments offering large numbers of onboard effects. If many keyboard sounds are already 'wet' when recorded, final mixdown may become very difficult. To avoid this problem the engineer must, to some extent, learn to become a synthesiser programmer, so that these effects can be edited out if desired. □

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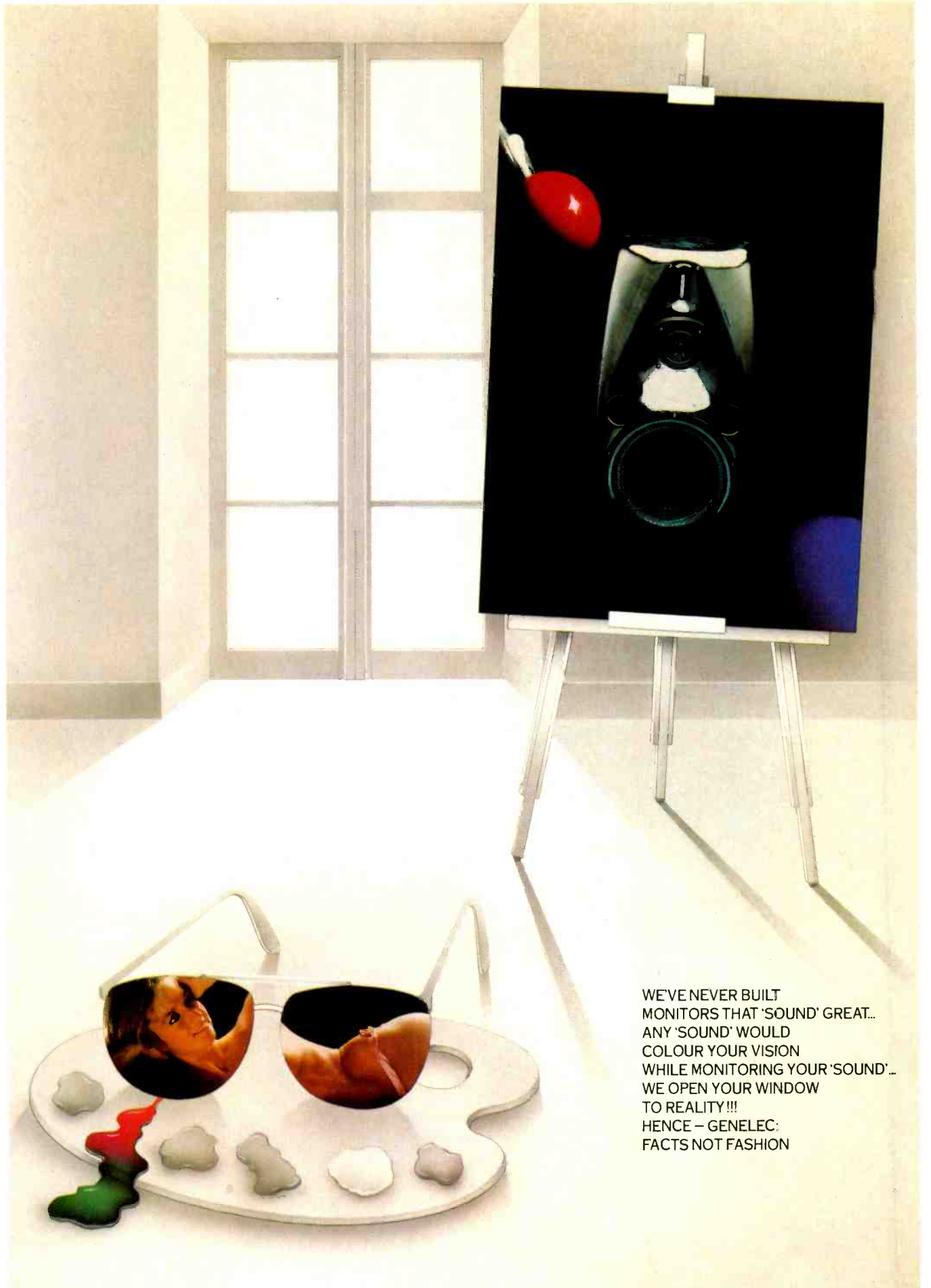


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3. Studer A807 ¼" (new), with console, V/U model	£3,550.00
4. Otari MTR 90 Mk2 with auto, 3 years, 4,000 hrs	£17,500.00
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6. 2 Studer A80, Mk2 stereo machines (each)	£3,500.00
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Lexicon PCM 70, 12 months old	£1,350.00
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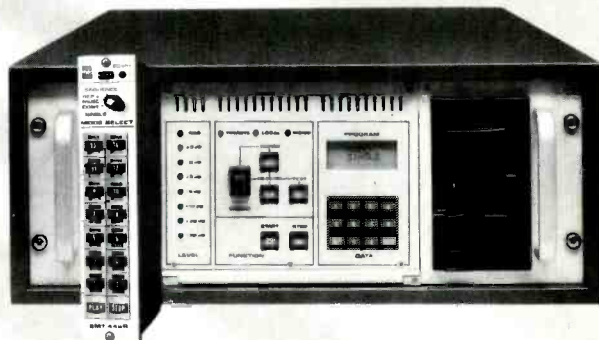


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MAGNETIC PRODUCTS

Phil Trickey gazed questioningly into his chocolate mousse. 'to set up a recording studio or not to set up a studio?' Would 'additive' synthesis in Liverpool University's canteen lead to additive synthesis in a recording studio? With a degree in computer sciences already under his belt Phil did not relish the idea of sitting at a computer terminal for the rest of his life.

"I'd already had some studio experience. Nothing big, just a small 8-track set-up and then some time at the University studio had given me some production experience. I managed to get on a course called the Graduate Enterprise Programme, for which I was selected to be one of 40 participants out of 2,500 applicants. It was six months long and we learned about the accounting, marketing and business side of everything and, with a small grant this actually helped me to do my market research and studio feasibility study."

Phil's exhaustive market research embraced the whole country, posing questions such as: where is the best location? who would use it? how often? how much would they be prepared to pay? what distance would they travel? did they understand MIDI?

"I visited hundreds of studios personally all over the country, places that had lots of studios and a thriving music business, places that didn't have any studios at all but a lot of musicians. The results were all plotted and eventually I decided that my studio would either be somewhere that had a massive music industry but also a lot of competition or somewhere that seemed not to have such a thriving music industry but also not so much competition. I went with the latter and ended up in Exeter where there are a lot of very talented musicians."

Exeter is a university city famed for its beautiful cathedral and 'olde worlde' shopping malls amid canyons of ancient half-timbered shops. More up to date, the swimming pool has a wave generator but the real beaches of the Torbay riviera are a pleasant drive south through picturesque countryside and thatched cottage villages.

The studio is a short walk from the heart of the city and Tinnies cafe, known for its tea that seems to get darker the more water you pour on it.

"Fortunately, the Arts Centre had some premises available, a single-storeyed annexe. But the big problem, having acquired the premises, was raising the money. The initial requirement being for £26,500 to get going, I went to the bank with no collateral, nothing, saying that I wanted around £30,000 to set up a recording studio, and surprisingly, they were very receptive: 'You raise half and we'll match it.'

"So I thought, aahh! Where the hell do I go to raise £14,000 or £15,000? I approached the Local Authority who owned the premises but said to them I wasn't prepared to rent if it meant me spending £9,000 on sound proofing the place with no guarantee that they mightn't kick me out. So, they offered £4,500. Then my mum loaned me £1,000, I got £2,000 through the Youth Enterprise Scheme. But I couldn't for the life of me raise the other £3,000 so, I went 'Limited' and got an outside investor who, because of the Business Expansion Scheme, could get tax relief on the outlay. I went back to the bank who said, 'OK!'

"Actually, I was offered more than I needed from outside investors but I wanted to keep control of the company, I own 95% of the shares."

The Arts Centre annexe had a lot going for it as far as housing a recording studio was concerned.



TRICKEY SOUND

David Hastilow visits a small studio in Exeter, Devon—England's West Country

Firstly, it already had planning permission for such a development—this could have been expensive elsewhere—secondly, a ready-made constituency in the public who already used the premises—art students make good pop-stars. And the centre already had social and performance space, which would prove an added bonus to the siting of a sound studio plus, a professional arts and administration staff available, particularly for community-based projects.

"Then came the chore of getting the equipment package. I wrote 50 letters asking equipment suppliers how I might spend £13,000 on a budget system. Only 20 replied. Eventually, I went to Dave Simpson at Thatched Cottage Audio. He did us the best deal and the best service and in fact offered us the opportunity of becoming Thatched Cottage Audio South West and we're now part of that company. It means that, as well as being a recording studio, we're also a retail outlet. Any item of equipment in the control room is for sale plus all of the other equipment in the organisation. It's good because it subsidises our income. But that was something Dave offered to me after we'd negotiated the package which is based around a *B16* and *Studiomaster* mixing console. As it turned out the desk was 10 weeks late and arrived the day before our first session. We were up until four in the morning and then again from 7 am wiring it in. For the first couple of months, all the studio time was free, while I experimented and ironed out teething problems with the gear. Then we started charging and, in our first year, we've done very well. Updated from 16- to 24-track, renewed the mixing desk, bought more outboard. But, having said that, I'm still not drawing a wage for myself because I'd rather put the money back into the studio."

In detail the initial equipment package consisted of a *Fostex B16* and the *Studiomaster* series 2 16/16/2 with an extra module to make it 24. The

outboard equipment was fairly basic: a *Bel BD-80*, *XT:c* digital reverb, *SPX 90*, *DOD* and *Yamaha* compressors, *Scintilator* and *MTR* noise gates. "But my love is synthesisers. I already had a *JX3P* and we bought an *Ensoniq*, which was at the forefront of technology at the time, and I had an *MSQ 700* and an *RX11* drum machine. It was a fairly basic set-up with a *Tascam 32* for mastering on and a couple of cassette machines."

The studio building is similar in design and appearance to a typical school or army barracks canteen. Single-storey block construction with many windows, enclosing 800 ft².

"I had to find out how best I could soundproof it with limited funds, who would do it and how to design it. All of which I eventually did myself because I couldn't afford a consultant. However, I looked in *Yellow Pages* under the heading 'acoustic engineers' and got as much free advice as I could, and also, I'd gained a lot from looking at studios during my market research. Also, Dave was very helpful because he also runs a 24-track studio. Unfortunately, the only way to solve the window problem was to block them in. It's a bit of a shame, because it's nice to have some daylight, but we couldn't afford it—temporarily anyway. Partitions were built to create the drum booth control room and an entrance corridor. The arrangement allowed the existing fire escape to be used as an access into the control room without the need to go through the studio. The biggest mistake was using stud partitioning instead of block work. It's not brilliantly soundproofed.

"Then a ceiling was suspended over the whole lot. Second mistake, which we're in the process of rectifying, was not to take the stud partitioning right up to the existing ceiling. Sound gets over the top, although, it's not too bad, there is 40 mm of *Rockwool*. But we will take the partitions up to full height soon and lay in more *Rockwool*."

Even a basically designed building may impose design limitations: "Yeah, the choice was either

ripping out all of the existing radiators to enable us to put the walls anywhere we wanted, or leaving them where they were and building the control room wall either near one end or half way down the room. At that time, I knew we would be recording local bands and I thought that a good selling point would be to have a larger studio but, on reflection, we're now veering more towards control room working, as most studios are, and it would have been nice, perhaps, to swap them over, but there is adequate space in the control room. We did have the room spectrum analysed but I've just sold the graphic that handled the monitoring so, that's the one thing being part of Thatched Cottage Audio, you tend to lose bits of integral equipment. The good thing is, it's always replaced with the latest technology without having to wait until the studio rates can afford it. At the outset though, I was more concerned with setting the right studio atmosphere. It had to look and feel right so that musicians would enjoy the sessions and get a good feel on tape. Selling the place to local musicians was of prime importance then because they weren't likely to notice deficiencies in the monitoring as much as

"When we started it was nearly all local bands. They came in, saw the studio, said 'Wow', and spent some money in here. We did a lot of demo work. Surprisingly, I also got a lot of people who just came in with lyrics and said, 'I want to record this but I haven't got the music to it', and, being a musician, I ended up playing keyboards for them. Gave them packages that they went away with. We then began to get more work from the Arts Centre, we did soundtracks for videos and the Tiverton Fire Show, bits and pieces for their dance company, Jump Leads. Got into things like yoga music as well, which was quite interesting. From there we did some work with the Exeter-based ABR Records, owned by Ian Lodge, who were doing 16 recording and then bouncing to 24 in London and remixing. Through that I started thinking that we could do with the remix work too and decided to go 24-track. But, prior to that I knew there must be work with schools and colleges in the area. I put out a mail shot inviting them to an open evening to see the studio. I got one response and the chap turned up, but from that I got masses of work because he was in an a cappella group, they booked. He

could write your music on the screen and it would then play it. It was geared towards people who could write manuscript but not necessarily play a keyboard. I got to know MIDI very well and it's just money that holds you back really.

"I went up to Movement Audio and played around on the *Synclavier*, *Fairlight* and *Emulator* and I felt that although the machines are brilliant and user-friendly people, don't get enough out of their technology. Even down to, say, a *JX3P*, you can do a lot more with it than people will give it credit for. And especially FM synthesis, such as the *DX7 Mk 2*, because it's so difficult to program, even top studios tend to use the presets. It's a bit of a shame. I'm trying to get the most out of the equipment we've got before we update and after Easter we're getting the new *DX7* and an *Akai S900* sampler which will give us the sort of quality we now need."

Phil hopes that his synth and growing production expertise will materialise into some chart success for his own compositions.

"I spend ages mixing textures of sound although one of the best ways of expressing sound is just to do it with your own voice, take a sample and use that. I tend to come in during the night when ideas happen because the studio has been block booked since it opened and I just haven't been able to do my own work, just other people's. I'm so into it, though, that whether I get the right money or not doesn't really bother me. And I'll never let anyone walk out of here just to put the tape on the shelf. I like to help them promote their compositions as far as I can.

"The service continues afterwards using the contacts that we've built up. We can recommend publishers suited to different styles of music and in some cases we can even do the admin for them. Get them a portfolio together, do photo sessions in here and get them distributed. Even take them up ourselves and represent them. We've actually started up a management agency for local bands but the problem with that is, it's very very difficult to break in and sometimes I think we're flogging a dead horse. Dedication, perseverance and with production experience getting better and better, and I'm convinced we'll pull something out of the bag. Everyone in the music business is waiting for something different to happen but I think it'll eventually mean someone doing something incredibly radical and against the grain with all of the present day recording techniques. Which, for some reason, everyone adheres to.

"For us, I feel that it's a matter of getting the product out. One day this chap walked through the door with gold and platinum discs under his arm, a video. Turned out, he'd had a hit record in Finland and wanted to record some song and for me to produce them. He just strummed through them on acoustic guitar and said 'OK, away you go' and I had to write the arrangements, sax parts, everything. Anyway, the tapes were sent off and didn't hear a thing for ages then one day, the phone rings, and apparently he's getting masses of airplay in Finland, they're releasing a compilation, they want the three songs that we did, and they want me to play keyboards in gigs over there, so, like a year later, it's all paid off. A lot of studios, in this strata and below, cut their own throats by just doing the local bands whereas I'm convinced that the only way to get anywhere in this business is by getting percentages on actual projects and being really involved with the artists." □

Trickey Sound, The Arts Centre Annexe, Bradninch Place, Sandy Street, Exeter EX4 3LF, UK. Tel: 0726 66770.

TRICKEY SOUND

professional operators such as broadcasters and cutting rooms would. I just trusted that the equipment was 'flat' and never applied too much EQ.

"As the studio progressed this strategy proved itself immeasurably, for earnings were immediately used to upgrade the technical aspects thereby preparing for professional usage as its reputation blossomed. Now, it is being used by Devonair Radio and Television South West and record production.

"Most cutting engineers think our sound is good and what suggestions they've made I've followed up immediately. Such as changing tape brands and re-aligning the equipment accordingly. Also, we got *NS10* monitors, which we use all the time now."

Phil's computer background and love of synthesisers manifests itself everywhere in the control room. A computer VDU lurks in one corner, blinking cursor awaiting creatively to drive banks of keyboards stacked along the back wall and to the left of the console.

"I wanted to try and get a range of all the different types of synths including the wave distortion technique, which is Casios, and amongst others, there's the *JX8P* and *JX3P* for analogue.

"We went from Tascam *16B* to 2 inch over Christmas '86. The machine is an Aces, which although manufactured in England hasn't been heard of very much yet because they're a fairly small company. It performs quite well and is really meant for the budget operator such as ourselves. It suffered slightly on the move down here from Bedford but fortunately we have a British Telecom engineer who's glad to service our equipment whenever necessary. It's settled in quite well now and I'm very pleased with it. The autolocator is not brilliantly accurate but they're sending down their new capstan pinch wheel which should help accuracy. The locator has nine memories, cycle facilities and runs at 15 or 30 in/s. It's quite handy."

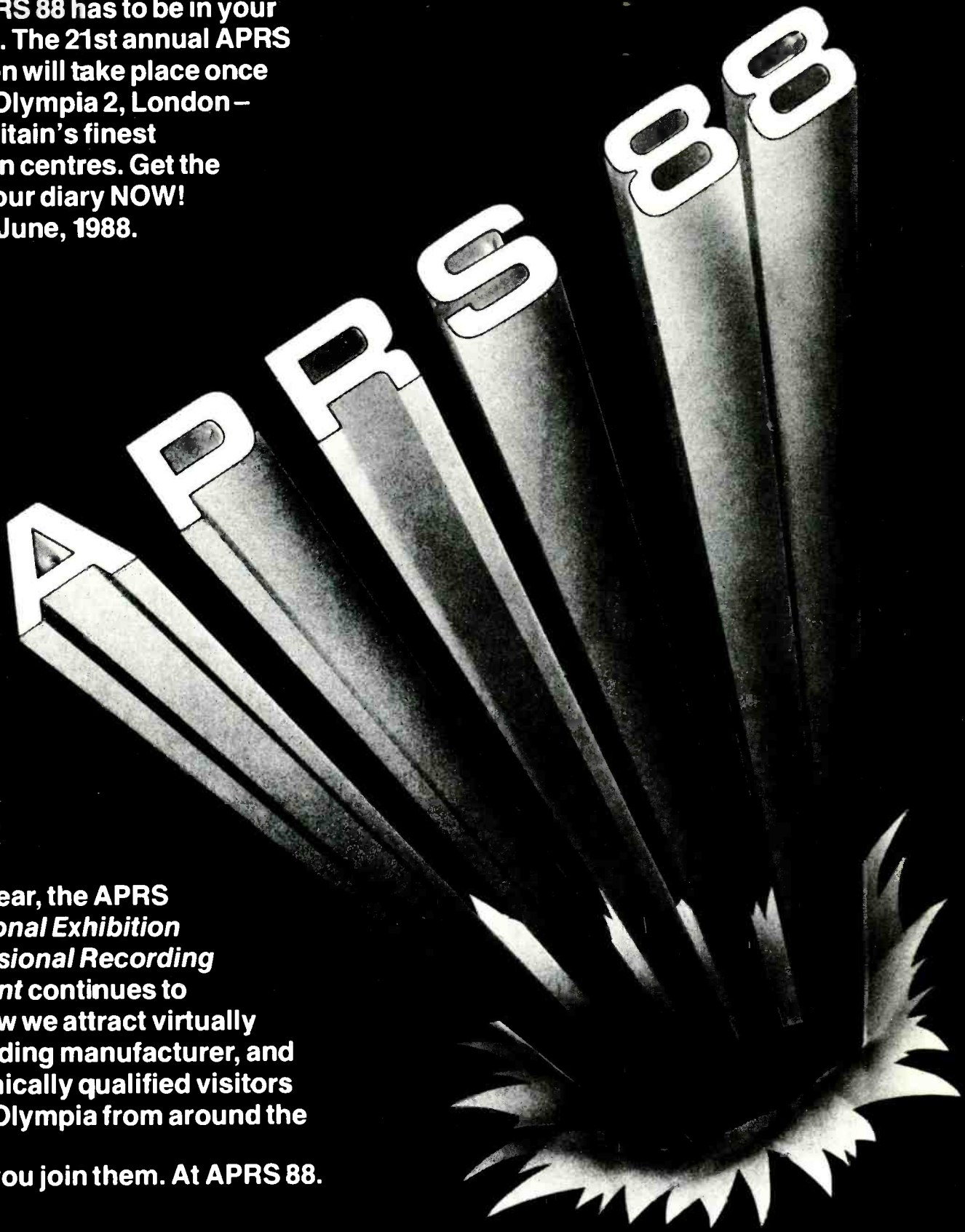
Trickey Studios has certainly come a long way since the 'local band' days. It has actually been featured on a regional TV news programme.

brought the school in, they did a cassette album, he knew somebody who knew somebody, a school with many talented musicians who booked the studio through the school because I gave a discount. In fact, one of the girls came third in the ITV Wide Awake Club 'Song for Christmas' competition. She got a publishing deal out of it. Then the head music teacher decided they were going to do an album. He's actually already got pre-sales of about £1000 and they haven't even finished recording it yet. It's such a lucrative market. You get 100 schoolchildren in the studio, they've all got aunts and uncles, friends to sell to. But I'm still trying to break into the university, I think there is a market there. Also, I take on a lot of 'work experience' people because I realise how hard it is for young people to get this sort of training, especially in Devon.

"However, I'd really like to get more work in from London and now that the studio is ticking over with albums, ABR Records artists and jingles work, I'm hoping to set up an office in London for liaison with future clientele. A package with an accommodation-type deal depending on what sort of relationship I can strike up with a publisher.

"The MIDI system is based around the *Pro 24* and I use a Yamaha MIDI thru box, which enables us to switch inputs. It's actually based on a 'star' system but it's like a double star system because there are two inputs that are switchable. Originally we based it around the *MSQ 700* but that went out of date. We've had problems with the *Pro 24*, even though it's a very good machine and the potential is enormous but there are various bugs in the program which we've come across. A bit of a nuisance. And we tend to eat up the memory fairly quickly. Mind you, we would because the first project we did was a 15 min 12 in single. Then we bought SMPTE to run it and it all locks together quite nicely. That's my speciality really, my degree being in computer science and my final year project I did in MIDI. Then, three years ago, it was fairly new. In fact, the *JX3P* incorporated one of the first MIDI implementations so I worked on a computer interface to the BBC *Micro* and designed a composer package whereby, using a light pen, you

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REVIEW

Dave Foister reports on the operation of Bel's BDE-2600E stereo digital editor

The Bel BDE-2600S is a logical development of the delay lines-cum-samplers of the kind made popular by Bel, among others, some time ago. As with most technology, progress has brought improvements in specifications undreamed of when early models were current, such that the BDE-2600S in its basic mode as a delay line provides 13 s of delay in full stereo at 18 kHz bandwidth, or 26 s in mono.

For use as a straight delay line, a few of the usual controls are provided: modulation depth and speed, feedback and direct/delay mix. Delay time entry is via a numerical keypad and nudge buttons, giving a minimum delay time of 2 ms. In fact the provisions for this mode of operation are so basic that it hardly seems worth having put them on at all. The modulation waveform is fixed, there is no independent control of the two channels, no programmability, no phase inversion:

most cheap DDLs could outperform it in every respect except signal quality and length of delay. But this aspect of the unit is of course incidental to its main function as a sampler and editor, enabling large chunks of audio to be sampled in stereo and then edited in a variety of ways.

Audio is entered into the memory in one of two ways. In the first, space is allocated in the memory by defining the start and end points of the place where the sample is to fit. These can of course be the extreme ends of the memory, giving a possible 13 s of recording in stereo at full 18 kHz bandwidth, or 26 s if the mono mode is selected. Recording is then triggered either manually or by an audio trigger, which can be either the input signal or an external key. The trigger threshold level is only adjustable with a screwdriver, which is a big problem when you consider how critical this adjustment can be to the success or failure of a sample; it really should be a proper knob. As it is, the audio trigger is

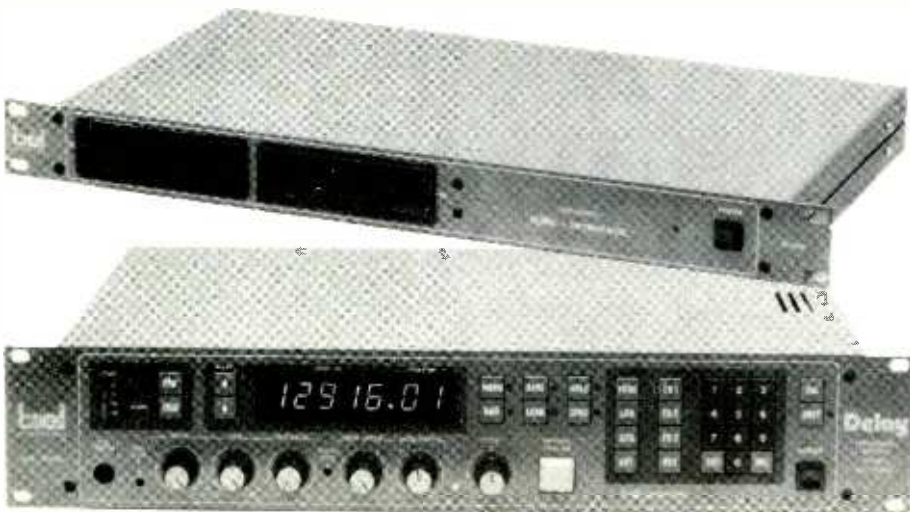
virtually useless unless you're prepared to keep sticking a trimmer tool into the front panel to make it work properly. It is much easier to use the manual trigger button to start recording just before the required sound happens—any rubbish at the start can be edited out later. Once triggered the unit records until the previously-defined end point is reached. The sample is then held in memory by pressing a Hold button, and playback can be triggered manually or again via an audio trigger. Alternatively, the recording can be heard by means of a so-called quick playback function, which actually takes longer to execute than the conventional method but plays the sample only for as long as the trigger button is held down.

In the second mode the start point in the memory must first be defined, after which the unit records for as long as the manual trigger button is held down: when recording stops the display shows the actual stop point in ms. In both modes samples may be stacked in the memory by setting the start point of new recordings at the end of existing samples; any number of samples can be stacked in this way until the audio memory is full. The recording is then held and replayed as in the first mode. Normally, playback restarts from the beginning each time it is triggered but it is possible to select Single Trigger Playback, which ignores all triggers received while the sample is playing. At this point the DDL modulation controls can be used to add vibrato or similar modulation to the recorded sample, or more usefully to tune it up to a semitone either way.

Once the audio is in the memory it is possible to begin editing it. This is done by moving the start and end points (known as ED1 and ED2, respectively) to create a window containing the required portion of the memory; the window can be any length from 2 ms up to the full size of the memory. Adjustment of these points is done either by direct entry from the keypad or by using the nudge buttons (or a combination of both). This gives adjustments in increments of 1 ms, which can make finding the required points a rather longer process than it might be since the nudge buttons move the points quite slowly. They do speed up when held for a while but Roland-type 2-speed buttons would make the job easier. A further editing option, ED3, moves the whole window around the memory, moving ED1 and ED2 together and maintaining the time difference between them. This is useful, for example, for selecting different sections of identical length that can later be sequenced together to create accurate rhythms. A further facility allows the memory to be played in reverse and this can even be done during recording.

Once the best points have been found there are two ways to optimise the window further. An automatic de-glitch function searches the start and end of the window to match them where possible for glitch-free looping. This generally produces a good join but since it can trim up to 64 ms from the window length it is often done at the expense of the carefully chosen start point—it can easily remove the initial transient from a percussive sound. Where this is a problem, the alternative is to perform the final trimming manually, which can be done on a byte-by-byte basis—the nudge buttons move in steps of about 25 μ s when the shift key is held down.

Having seen the benefits of a visual waveform editing display on other sampling-type units, editing on the Bel can seem a little like guesswork by comparison but sufficient control is certainly available to perform very aurally



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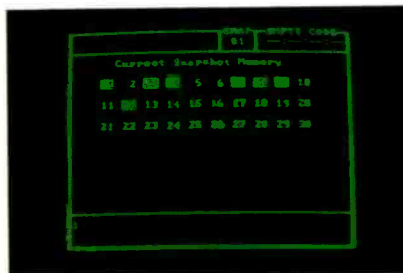
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REVIEW

accurate editing, which is after all what matters. In any case, the display on the Bel is a large LED alphanumeric display designed to be visible from a distance; showing waveforms on it would be impossible.

So far the facilities of the *BDE-2600S* are familiar from several keyboard-based samplers and indeed the samples can be played monophonically from a MIDI keyboard over a range of about three octaves. Where it differs from them and becomes an editor rather than a mere sampler is in its ability to program several windows from the same sample or group of samples and sequence them together. Up to 99 separate numbered windows, or programs as Bel choose to call them, can be created using the above techniques, and each can start and stop at any pair of points in the audio memory. Each program can be individually pitch shifted over a 3-octave range, or fine tuned to any point within that range with a resolution of $\frac{1}{512}$ semitone. If one program needs to be a variation on an existing one, the parameters of the first—start and end points and pitch shift if any—can be copied to a new program location then edited.

Once the audio has been divided up into the desired programs, the programs can be linked together to form sequences. This is extremely quick and easy to do, and editing the sequences is also simple—programs can easily be deleted from or inserted into the sequence at any point. Four separate sequence memories are provided, with a total capacity of 500 events, which should be

adequate for almost any purpose. Clearly the sequence can be longer than the audio memory itself, since all the sequence consists of is a set of pointers to locations within that memory.

The possible uses for these facilities are clearly enormous. It is possible to lift musical lines from a multitrack tape and pitch correct individual notes, to edit voiceover tracks to make them fit, to construct rhythmic patterns of samples, to lift sizeable chunks from one point in a song and fly them in accurately elsewhere, making alterations as necessary and so on. It is indeed a very powerful tool.

The MIDI implementation is reasonable—in addition to playing the samples (with pitchbend if required) in either loop or single play mode, programs 1 to 32 can be remotely selected using MIDI patch numbers. Unfortunately, I found that playing the unit from one of my synthesizers locked it up completely—the display went haywire and few of the controls responded. Apparently this problem, which is to do with the varying ways in which different instruments transmit note information and their system exclusive messages, is familiar to Bel, and they can re-write software to order to overcome this difficulty with specific instruments.

Conclusions

The sound quality of the unit is very impressive. It uses 14-bit quantisation (a 15-bit upgrade is on

the way) and a sampling frequency of 40 kHz to achieve its 18 kHz bandwidth with excellent noise and crosstalk performance. It is possible to run it at sampling frequencies of up to 55 kHz to achieve even better HF performance but in this mode the time readouts are no longer correct.

Operationally, the *BDE-2600S* has its good and bad points. Most functions can be executed very quickly and the remote control is very comprehensive—the large front panel display makes this easy to use some distance away from the unit itself, so much so that the review model had a remote buffer supplied with it to enable the data to be transmitted from as much as 30 m away; this will be fitted on board on future models. The only drawback is that many functions use combinations of keystrokes usually involving the shift key, and the only reference to these functions is in the manual (which itself is to be reprinted since it contains a couple of errors); although few keys have more than two functions the secondary purposes are not labelled above the keys as they could be—even initials would help. The result is that many commonly-needed functions use non-obvious, easily confused key sequences that have to be learned parrot-fashion.

Unfortunately, mistakes can be costly—for instance, although the Abort key is frequently used to exit submodes such as pitch setting, accidentally pressing Shift and Abort instantly erases the entire audio memory, and while shifted 1, 2, 4 and 5 all perform frequently-used but harmless functions, shifted 3 resets programs 1 to 89 to 2 ms windows starting at the top of the audio memory. Either of these simple slips could ruin hours of work, and neither produces an 'are you sure?' prompt. There are other more trivial but potentially annoying examples and they could all be avoided by better labelling, or even an 'edit map' printed on the front panel. In addition the control buttons need firm treatment—it is fairly easy to enter a command wrongly because the buttons have not responded.

The audio memory and program memories 1 to 89 are volatile; programs 90 to 99 are battery backed-up on power down. Longer-term storage is provided by the *D-400* dual disk drive, and the software for interfacing with this is sensible and user-friendly. Dumping the entire audio memory to disk requires three disks and takes some time, although the operating system prompts for disk changes. Dumping individual edited samples, which is a more likely requirement, is faster and easier, and the software contains utilities for checking disk-free space and contents, and allocating file numbers to stored samples. Sequences of programs, including edit point and pitch shift data, can also be stored on disk. Samples loaded from disk can be stacked in the memory by setting the ED1 point to the end of the existing used space before loading. Using these facilities it is very easy to build up libraries of samples culled from various long audio dumps.

The facilities offered by the *BDE-2600S* are normally only found on devices costing several times as much. It goes way beyond simple sampling to provide powerful and eminently useful editing and processing facilities, and although it has a few operational foibles it could offer a quick, high quality solution to many of the problems encountered on the average session, saving time and consequently everybody's money.

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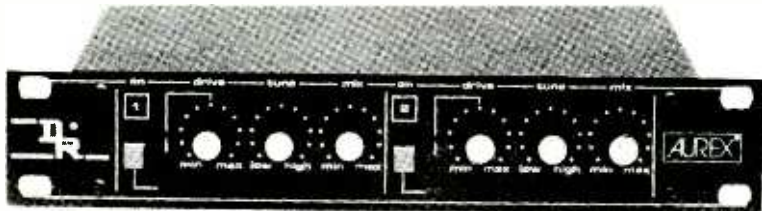
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REVIEW



normally be used in conjunction with the external Key input, switched on the front panel and routed via the filters. This input will also accept a positive or negative DC key signal (CMOS and

TTL compatible) on the ring of its 3-pole jack; for normal audio keying a two-pole plug is required to short the ring to ground. The main balanced input and the unbalanced output are via A-type 3-

and 2-pole jacks respectively.

Although the *Multigate* is a single-channel device, up to 25 of them can be chained together for slave operation; once connected, any one of them can be made the master unit by pressing its Master Link switch. The control bus used for this interconnection gives direct access to the VCA control, suggesting many additional uses for the device.

Niggles include the appearance of the unit; it looks more like its price than its performance. It is also annoying that despite the plethora of LEDs on the front panel, in bypass mode none of them are on, which can give the disconcerting impression that the device has packed up.

None of this, however, detracts from the excellent performance and high specification of the *Multigate*. Most studios these days aspire to owning a gate per track, or even per channel; with this unit the idea becomes more of a realistic possibility, with little sacrifice on quality.

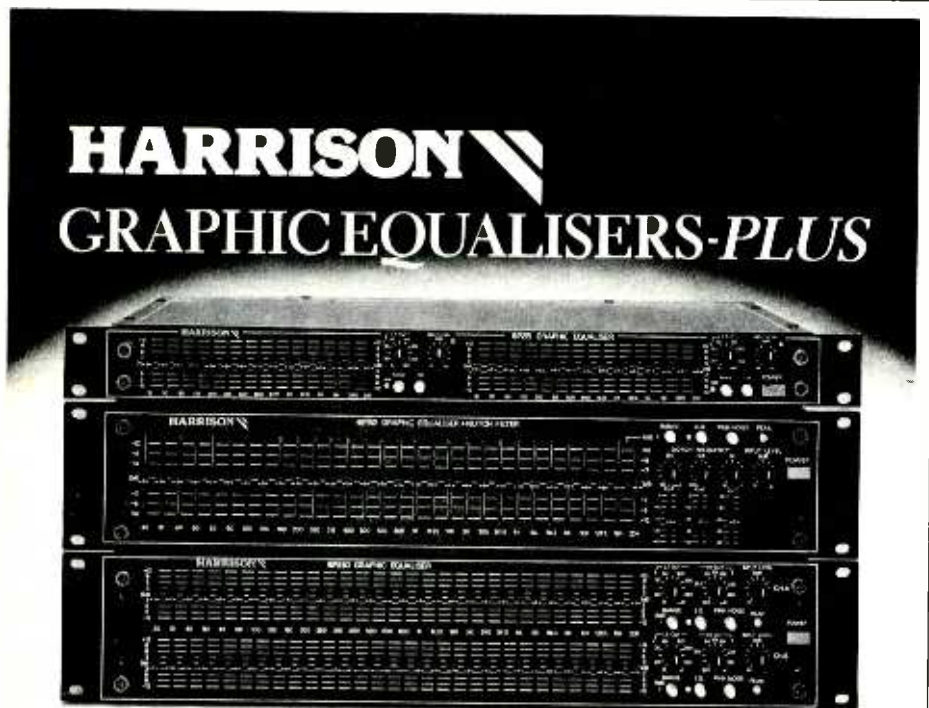
Aurex

There can be little doubt what this model is intended to be. Apex *Aural Excitement* is a widely used and sought after effect despite the controversy and mystery surrounding it. Imitation is the sincerest form of flattery, and Apex should be flattered indeed by the number of imitators their products have spawned, few of which are quite so blatant as D&R's *Aurex*. From the product name to the layout and naming of the controls D&R must be sailing pretty close to the wind.

Unfortunately that is where the resemblance ends. The effect produced by the *Aurex* sounds more like EQ than genuine *Aural Excitement*. There is obviously a certain amount more to it than that—it certainly lifted individual tracks, particularly vocals, in a rather different way to straight EQ—but using it on a complete mix did not turn out to be a good idea. Instead of separating instruments out and adding clarity, it turned the whole lot into a trebly, middly mush. Used subtly it certainly brightened up the sound but a halfway decent outboard equaliser could have done the same thing under more control.

Operationally the *Aurex* has one or two little foibles, brought about presumably to keep the cost down. In the first place the input socket, referred to in the instructions as a standard ¼ in jack, is in fact a 3-pole A-type socket. The tip is the input, the sleeve is ground, and the ring, when shorted to ground, switches in an extra 20 dB of gain at the input stage. This is fine for domestic setups where insertion of a 2-pole plug automatically introduces the extra gain, but for pro-level work special leads have to be made up with no connection to the ring. How much would one switch for operating level selection have cost to fit? Secondly, as with the *Multigate*, with the unit in bypass mode and no signal present there is no indication that it is even powered up—again this can be a little disconcerting.

I found I used the *Aurex* more than I might have envisaged, particularly on vocal tracks where a small amount of enhancement genuinely helped the sound, and on guitars to help them cut through. But it is no substitute for the original, and its chances are not helped by its downmarket appearance. D&R are capable of producing excellent products; sadly this is not one of them, and it seems a shame to mar the corporate image for the sake of jumping on a dubious bandwagon. D&R Electronica BV, Rijnkade, 15B, 1382 GS Weesp, The Netherlands.



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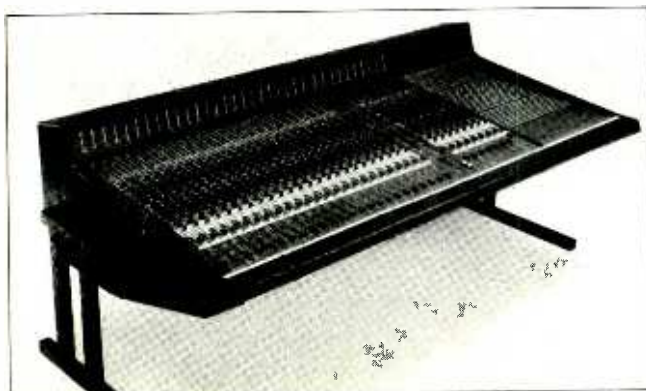
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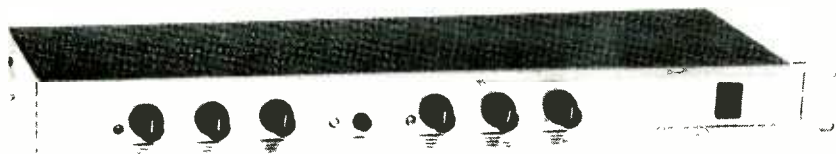
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REVIEW

Dave Foister looks at the Aphex Aural Exciter Type C



Aphex Aural Excitement aroused controversy and debate when it was first introduced, and 12 years and many imitators later the arguments have still not disappeared. Whatever it did was too subtle for easy categorisation, and the bold claims and secrecy surrounding it were in themselves sufficient to attract the derision of the sceptics. Opinion was divided between those who thought it was God's gift to the recording studio and those who maintained they could duplicate its effect with EQ or other means—I even heard of people using Dolby A record processors as a 'poor man's Aphex'.

The idea that Aphex could restore information lost in the degradation of the recording process was bound to attract comment both favourable and not so favourable, as was the bizarre leasing arrangement whereby instead of buying a unit a studio had to rent one and was charged per minute of final mastered running time. All this may of course be seen as inspired marketing, since the name Aphex rapidly acquired a high profile in the industry, gaining credibility with the manufacture of high quality VCAs. The Aural Exciter range now comprises five models (all of which can be purchased) including a broadcast version, a small dbx-style vertical rackable version, the budget-conscious Type C and the new Type E.

The Type C provides the same basic Aural Excitement circuitry as the more sophisticated versions in a package geared to the smaller studio, even the home studio—the standard model operates at -10 dBV, although a +4 dBm option is available. The principle is the same: a variable

amount of signal is sent through a side chain, consisting of a tunable high pass filter, for removing bottom and low-mid information from the processing path, followed by the crucial section, the Harmonics Generator. This apparently generates musically related harmonics in quantities controlled by the signal amplitude, and also introduces frequency-dependent phase shift. The enhanced signal is then added to the dry signal in small, variable amounts.

The controls are considerably simplified compared with the full blown model II-S. The Damping, Timbre and Limiter adjustments are missing, leaving Drive, Tune and Mix controls for each of the two channels, an overall in/out button and level and status indication LEDs. Possibly to save money or because it's a fashionable gimmick, the level indication is by means of a single tri-colour LED, which is all right as long as you can remember which colour means what: on the Aphex, off means idle, green means low level, yellow means healthy signal and red means overload. On, for example, the Alesis Microverb, the green and yellow states are reversed. This seems an unnecessary source of possible confusion.

Since the direct signal gain is fixed at unity, all these LEDs show is the level being applied to the side chain, set by the Drive and Tune controls, which interact since lowering the cutoff frequency of the HPF increases the resulting signal level. Adjustment of the Drive level is quite critical. The side chain distorts fairly easily if overdriven, and when underdriven produces not only noise (with a distinctive and not very pleasant spectrum) but a very thin and squeaky version of the intended effect. Bearing this in mind, along

with the interactive controls, more informative metering would seem to be quite important even on a budget-conscious unit such as this. Also useful would be the facility to slave one channel from the other's controls; the unit is intended to be used in stereo and accurately matching the settings on the uncalibrated controls is virtually impossible.

Inputs and outputs are unbalanced on ¼ in jacks alongside phono sockets, which for some strange reason have priority.

Not being overly familiar with Aphex, I must admit to having been sceptical about the Type C. The idea that the unit can restore missing information lost in any part of the audio chain (as if all processes degraded the signal in the same way!) surely cannot be taken seriously. The idea that one magic box can instantly improve the sound of anything you've ever slaved over goes violently against the grain. The idea that after you've taken great pains to preserve the quality of a signal throughout the recording process, the addition of distortion (for that is undeniably what Aphex does, albeit in a controlled way) is going to in any way enhance it is anathema to the purist and pretty offensive to the rest of us.

However, another school of thought says 'if it sounds good, do it', and many great recordings and new techniques have come from this philosophy. There is no getting away from the fact that the Aphex Type C sounds good, genuinely enhancing most signals passed through it. Processing individual tracks or an entire mix through the unit added life, punch, clarity, intelligibility, impact, excitement—all the things the brochure promises, with no significant signal degradation. I don't believe the effect could be reproduced with EQ or anything else, and as promised any level difference introduced was undetectable on PPMs—the unit doesn't cheat by making things louder.

The danger is that while the unit is outstandingly effective when used with discretion, an excess of 'Excitement' can be almost painfully shrill. Since the Type C is affordable to the home recordist and small cowboy outfit, A&R men might do well to prepare themselves for a few paint blistering demos from over enthusiastic Aphex owners. Pro engineers should of course know better, and the Type C brings more of us an opportunity to experiment with this much discussed effect for ourselves, or to equip our studios with larger numbers of Aphex enhancers.

Paving the way for even wider use of Aural Excitement is the new Type E. This is a single-channel version of the Type C with the addition of a low-level input for direct connection to an instrument or other source. Aphex see this as bringing their effect into the domain of the musician on stage, although again it would have to be used with care. A further possibility is its use in conjunction with a medium-spec sampler to enhance the sample either on the way in or on the way out.

If you still haven't tried Aphex, these units give you the chance. It may be that some engineers will never bring themselves to use a faceless, blanket enhancement device whose precise effect has been deliberately 'veiled in secrecy' and 'apparent hype': however much more out in the open Aphex are nowadays, initial impressions still survive. On the other hand, for those who feel the proof of the pudding is in the eating, a few idealistic principles may well be quietly shelved. **Aphex Systems Ltd, 13380 Saticoy Street, North Hollywood, CA 91605, USA.** UK: Sound Technology plc, 6 Letchworth Business Centre, Avenue One, Letchworth, Herts SG6 2HR.

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REVIEW

A user report on the Technics SL-P1200 CD player from Carl Snape

The Technics SL-P1200 compact disc player is described by the manufacturer as a reference player with controls and features to satisfy a variety of professional users. The unit arrived looking somewhat the worse for wear

having taken a dive down a flight of stairs on its way over to us. Remarkably everything appeared to work quite normally apart from possibly the pitch control (see comments later). Quite a testament for what is after all a critically aligned electro/optical system.

The unit itself does not follow the now familiar

front loading format. Quite the contrary, in fact, with not only the loading mechanism located on the top panel but almost all the controls and function switches as well. In addition to the control features, special attention is claimed to have been paid to the overall sound quality. This is reflected, in part, by the effort paid to reducing unwanted vibration within the chassis and mechanical components.

The casing is die-cast zinc. This sits on a 3-layer, anti-feedback anti-resonance base. The chassis is also damped and the whole unit is supported by four large vibration absorbing feet.

The general layout of the SL-P1200 is similar to the Technics SL-P50P (reference system for CD manufacturers and costing 6 to 7 times the price of the SL-P1200 in Japan) although the most obvious difference is the less sophisticated metering display of the SL-P1200. This is understandable as it has been designed to play CDs rather than analyse them.

Below the wide meter 'bridge' and across the bulk of the slightly sloping top surface, lie the vast majority of the controls. These include a large search dial; numerical keypad; basic transport controls (Stop, Pause, Play); meter display switching (time elapsed remaining, total time/track time); track search, skip, repeat; Auto Cue mode; Search On/Off and, to the right of the machine, a large fader-like control for varying pitch ($\pm 8\%$).

To the far left of the machine is the CD compartment and relevant function key to gain access. A headphone jack and headphone level fader are located on the relatively narrow front panel.

Once the machine had been unpacked, plugged in and switched on, only the variable pitch facility failed to work. This was curious as the more delicate parts of the machine were in good order.

The review sample gave an excellent account of itself. There was no complaints about the sound quality, and the anti-feedback systems incorporated in the unit would appear to be a very useful addition, particularly as average sound pressure levels in a typical control room would be considerably higher than those encountered under normal domestic conditions.

Search and cue facilities are quite comprehensive and the large search dial allows for a wide range of search speeds all with audio output. These cover 0.1 s steps for the smallest increment up to around 2 min of programme for a hard flick of the dial in fast mode (20 s of programme in the slow position).

Other useful facilities include Auto Cue (takes you to the start of any track and awaits the Play command); an optional 3 s countdown (with display time) before the start of a track (hitting Play during the counting process extends the countdown a further 3 s); and a very good repeat mode, which tends to 'creep' slightly if left to repeat a very short segment over a long period of time but is more than adequate for, say, sampling sound effect discs.

Overall the SL-P1200 is a well thought out CD player. There's little heat dissipated—you can happily store CDs on the 'meter bridge'. In terms of professional ruggedness, any CD player that survives a trip down the stairs and then plays faultlessly a CD that the editor has been using as a coaster for his coffee—all the CD needed was a quick rinse under the tap!—certainly deserves more than a passing glance. □

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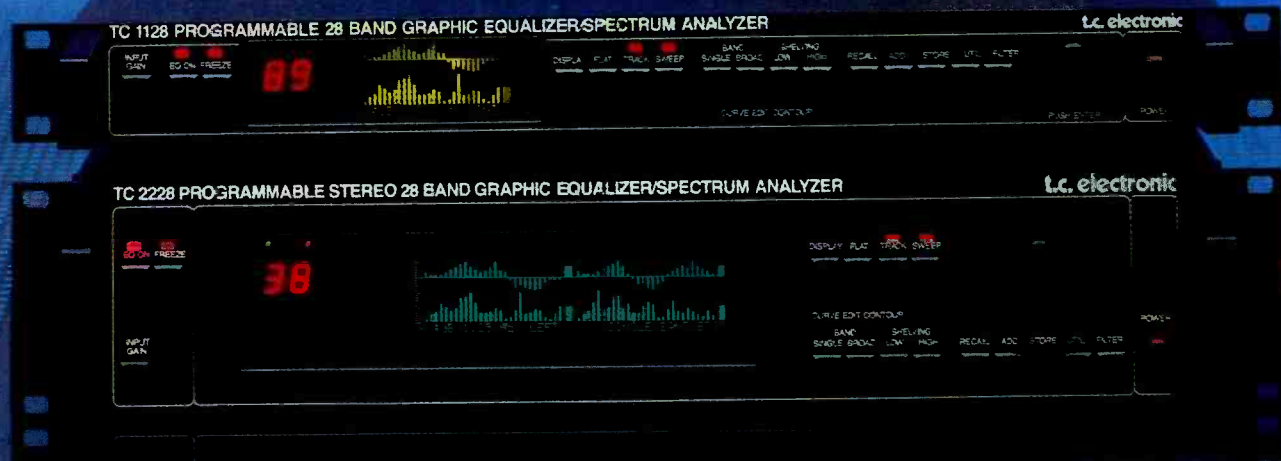
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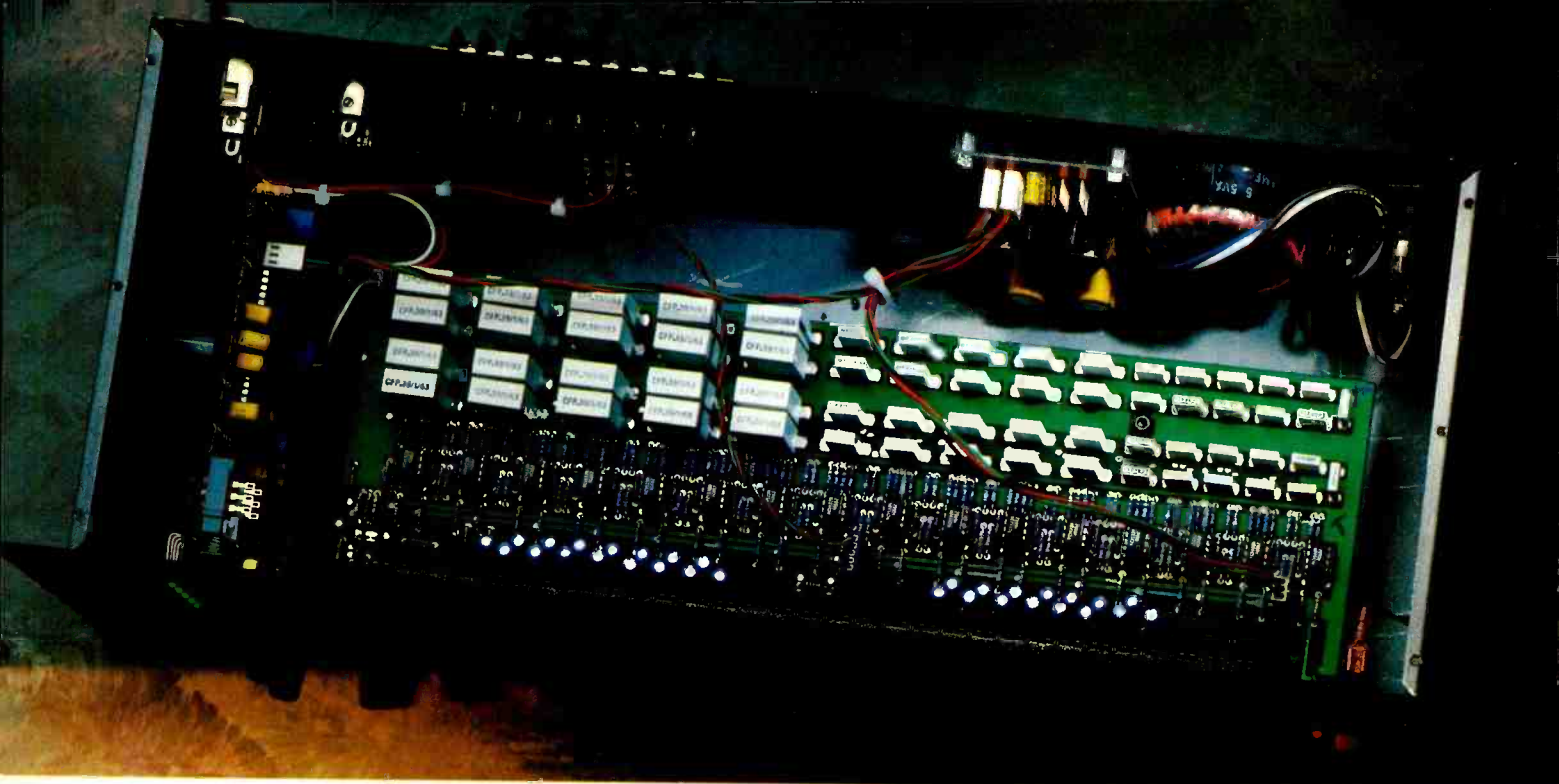
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REVIEW

A user assessment of the Valley International Model 415 Dynamic Sibilance Processor by Terry Nelson

As technology advances, all those little defects we used to be able to ignore become even more evident, and nowhere is this more true than in the area of de-essing. The problem is far from new and it is perhaps a good idea to remind ourselves of the problem of sibilance and of the disadvantages of many de-essers up until the present day.

Sibilance is a physical fact of life and not something that even superlative microphone technique can overcome. The 'ess' sound is a fricative, ie it is produced by forcing breath through a narrow aperture in the vocal tract that causes audible friction, or frication. Another term for sibilance could be 'whistling' as it is almost sinusoidal in nature, thus producing high frequency peaks.

De-essers have tended to come in all shapes and sizes, the simplest being high frequency-conscious limiters that just punched down the overall level in the presence of sibilance. This was acceptable for the spoken word and almost unusable for vocals as it took out holes in programme material. Another common form of de-esser lowers the high frequency level above a preset point but while reducing sibilance this also reduces everything else round it and colours the sound. The most successful form of de-essing has been selective limiting, where an equaliser is placed in the side chain of a limiter so that limiting only occurs across a narrow frequency band. Audio+Design produced one of these units for a time, the *E-560*, but usually it meant taking a limiter and patching in an external equaliser (assuming you had access to the side chain).

The solution offered by Valley International takes advantage of the 'mighty micro' and provides an elegant answer to the problem.

The unit tested, the *415*, is a 1U dual-channel unit meant for standalone use. Valley

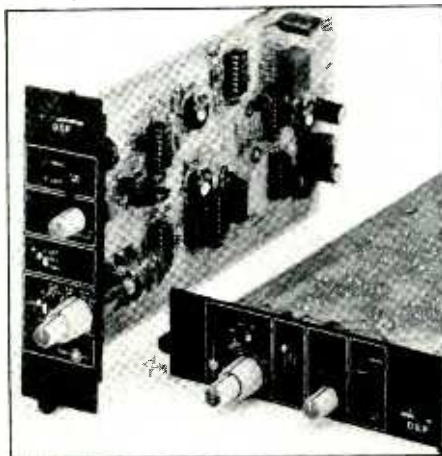
International also produce a module version, the *815*, for use in their powered rack assemblies.

The *415* is provided with an IEC mains socket for the power lead and the audio connections are made on high quality barrier strip. (I suppose it does save on XLR connectors.) All inputs/outputs are electronically balanced and the *415* interfaced to a Studer 962 console without any fuss and untoward noises.

The controls for the *415* dynamic sibilance processor have been kept very simple, each channel comprising a sensitivity control, a bandpass filter variable from 4 to 16 kHz with variable Q (dual concentric control), a 3-position toggle switch and two status LEDs that indicate minimum and maximum processing. A Link switch enables the unit to be operated as two independent channels or in stereo.

Operation

The *415* makes use of the fact that sibilance is almost pure tone. The frequency band where



sibilance occurs is constantly analysed for complexity and if a signal is found to have a sinusoidal nature, this part of the frequency spectrum is inverted and summed with the programme signal, thus cancelling out the unwanted sibilance without changing the character of the programme material.

I was able to use the *415* for two weeks in a sound reinforcement/recording situation where the programme material ranged from speech to vocals to instruments such as trumpet and saxophone. In all cases the *415* was used on insert in the channels to be processed.

The 3-position switch provides three modes of operation: Out, where the *415* is in bypass; Tune, which enables the frequency band where sibilance is occurring to be monitored; DSP, which is the operational mode.

The status LEDs illuminate when sibilance is present, the green (or Min) LED acting as a threshold indicator and the red (or Max) LED indicating heavy de-essing. This means that the unit can be adjusted in live situations quite easily where the Tune function cannot be used.

For quick setup the Sensitivity control can be set to about 10 o'clock and the Frequency control swept through the frequency range to find the area of maximum sibilance. The Q should be kept fairly wide at this point. The LEDs having indicated the correct frequency, the Q can be narrowed accordingly and any final adjustments to the Sensitivity control made. The latter should be adjusted so that the red LED flashes on heavy sibilance without staying on permanently.

Performance evaluation

While it is doubtful whether any de-esser will ever be perfect, the Valley International *415* dynamic sibilance processor certainly comes fairly close. In evaluating things such as reduction in sibilance, the ear becomes acutely conscious of the phenomenon and it is really only when one does a quick A/B on programme that you realise how good the unit really is.

Positive points are that there is no change in signal level or in the character of the programme material—even with very 'essy' speakers. Setup was found to be very easy and when I was able to use the Tune function, it was possible to home in on the troublesome frequencies and really fine tune things.

The DSP also proved itself very useful in taking 'spittiness' out of saxophone signals, where the player will insist on shoving the microphone right into the bell of the instrument. In fact, where normally the sound would have been pretty nasty to say the least, the *415* let it be nice and raunchy whilst removing the sibilant mud. The same also applied to trumpet and trombone signals and it soon became apparent that the unit is very much a good general purpose tool for removing excessive high frequency energy without altering the overall sound character.

Summary

The Valley International *415* shows itself to be a very useful device. It is easy and fast to use and the fact that its mode of operation leaves the programme content uncoloured means that it will find uses in overall programme processing, such as mastering, on-air feeds, etc, as well as in treating individual signals. □

Manufacturer's specifications

Input: balanced 100 k Ω , unbalanced 50 k Ω ; max input level @ 1 kHz, +24 dB; input CMRR @ 50 Hz to 20 kHz, >60 dB.

Output: source impedance <40 Ω balanced, <20 Ω unbalanced; nominal output level -10 to +8 dB; maximum output level +24 dBm (600 Ω) balanced, +18 dBm (600 Ω) unbalanced; static THD @ 1 kHz, 0 dB in, unity gain; <0.01%; static IMD, 0 dB in, unity gain; <0.01%; output noise and

hum 20 Hz to 20 kHz with 600 Ω source at unity gain; -90 dB.

Power requirements: 90-130/190-250 VAC, 50/60 Hz, 12 VA max.
Valley International Inc, PO Box 40306, 2817 Erica Place, Nashville, TN 37204-3111, USA.
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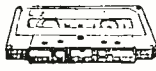
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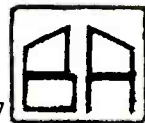
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Its performance and features are equalled only by the Studer A820 (take a look at the comparison chart below).

COMPARISON CHART	SATURN	A820	MX80	JH24
PROCESSOR CONTROL OF AUDIO	YES	YES	NO	NO
AUTOMATIC ALIGNMENT	YES	YES	NO	NO
ALIGNMENT AND METERING FROM STANDARD REMOTE	YES	NO	NO	NO
SPEEDS/EQS	3/3	3/2	2/2	2/2
PROCESSOR CONTROL OF TRANSPORT	YES	YES	YES	NO
OPEN LOOP TENSION CONTROL	YES	NO	NO	NO
REWIND TIME (2400 FT)	56 S	(56 S)*	80 S	85 S
FULL FUNCTION LOCATOR WITH PROGRAMMABLE FUNCTION KEYS	YES	NO	NO	NO
14" REEL CAPACITY	YES	YES	NO	YES
W & F (30 ips)	<0.03%	0.03%	0.04%	0.03%
S/N (500 nWb/m, 20Hz-20kHz, 30 ips REC/REP)	66dB	-	61dB	64dB
VARISPEED RANGE (30 ips)	+100, -50%	-	150%	120%

* MEASURED AT EXHIBITION, NOT PUBLISHED

Yet its price is little more than an Otari MX-80, a machine it outperforms in virtually every respect.

With such a significant saving, a Dolby SR system becomes a realistic proposition you can actually buy a Saturn with SR for less than an A-820 without.

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