April 1989 $5.00 £2.00

STUDIO SOUND

AND BROADCAST ENGINEERING

UK HOUSE PUBLICATION

MICROPHONES

For a 16 or 24 track studio owner, the future looks very good.

With MIDI systems and digital outboard, you can already achieve extremely sophisticated productions.

But it's very hard to find a recording console to match that standard, without spending a small fortune.

That's why we've developed the new Series 6000. An evolutionary design that demonstrates how far Soundcraft are thinking ahead.

Behind the classic layout is a revelation in performance and facilities.

For a start, it's equipped with enough buses and routing options to make adventurous production a pleasure, rather than a chore.

It's a full 16 or 24 bus console, plus six auxiliary sends per channel. Each of the tape returns has EQ, which with its 'split' format naturally means they'll double as extra inputs.

We've also provided each input with push-button routing, EQ by-pass and programmable electronic muting that gives you none of the clicks ordinary switches produce.

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But it's the 6000's sonic performance which really puts the competition in the shade.

Take our revolutionary input design: 2dB to 70dB gain without a pad, with nearly unmeasurable distortion, cross-talk and noise.

Our new grounding system yields superb hum immunity and a routing isolation of 110dB (1kHz), and our active panpot comes close to theoretical perfection, improving on our competitors' performance by a full 25dB.

So nothing will change your sound, except our acclaimed, four-band sweep EQ.

In a word, purity.

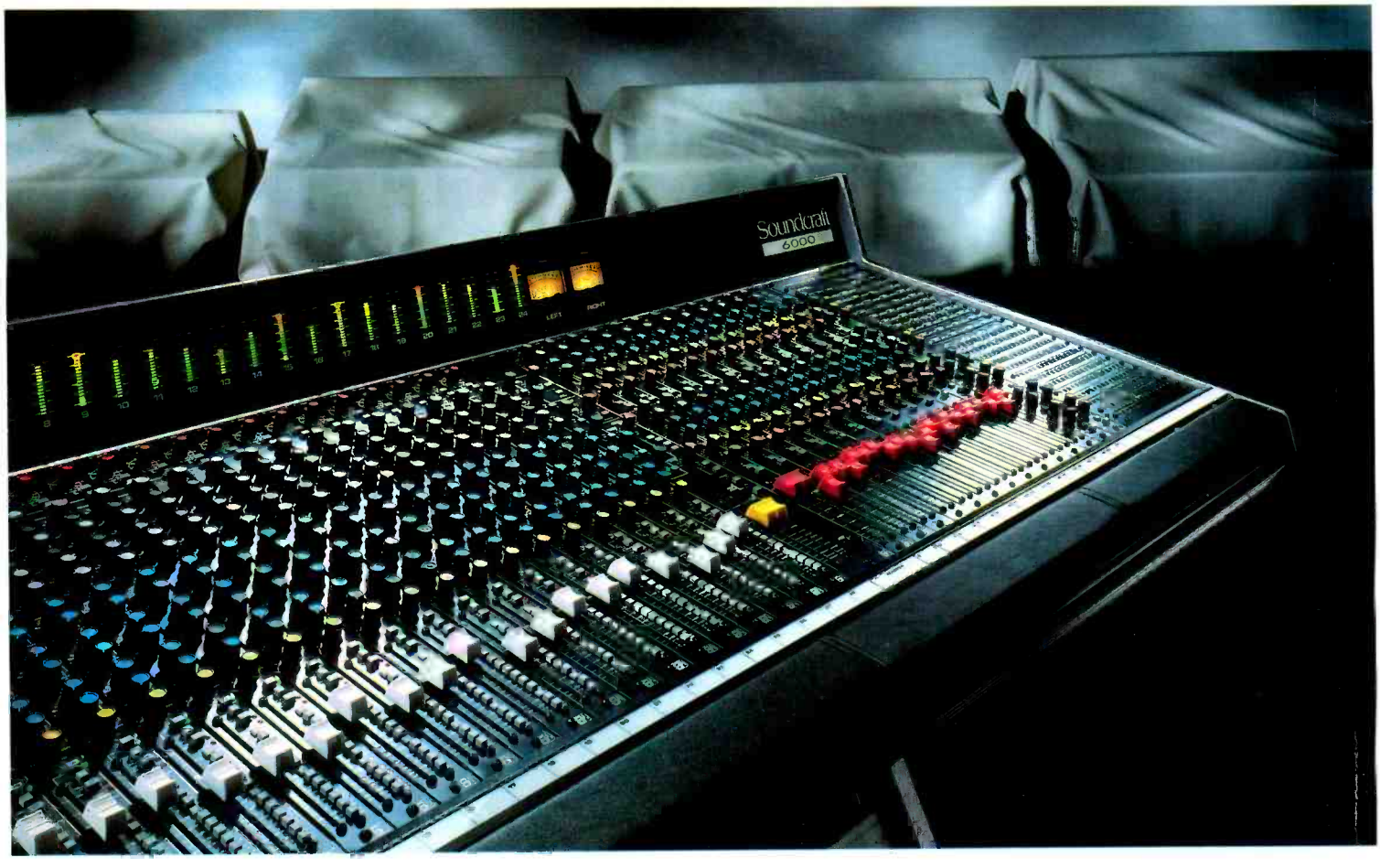
And with options including 16 to 44 channels, a stereo input module and built-in patchbay, you'll find it an affordable slice of progress. No matter what budget you're working to.

The Series 6000 is simply the most comprehensive production console in its class.

Call us today for full information, and the address of your nearest dealer.

Soundcraft
6000

If only more expensive desks performed as well.



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Beat mics in action

Is this the most cost-effective 24-track in the world?

We think so.

We also think that anyone contemplating entry-level 24-track should take this machine very seriously. After all, the only competition consists either of a pair of semi-pro recorders running in sync, or some dubious second-user dinosaur which will cost the same to maintain as it did to buy. A choice between compromised quality, or someone else's problem child.

Not much of a choice, is it?

Especially when you stop to consider that our alternative will cost you about the same, but will give you the mechanical integrity and audio purity you require - without compromises, synchronizers, or excuses.

The Studio Magnetics AR2400 - up to a quality, not down to a price.

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UK: 6,073. Overseas: 10,593.
(ABC audited)

Cover: Sanken *CU-44X* microphone. Photography by Tony Petch

Growing pains

It may be true that business is business and that in all forms of commerce there are winners and losers. It, however, does not make the news during the early part of this year any better. Several well known manufacturers are in trouble but I will leave the details to the industry news magazines as the situation may change drastically before you are able to read what I am writing.

I am particularly upset that these are medium sized companies and have products that are slightly different from the general market. I don't know what conclusions to draw from these connections other than times are not easy for the medium sized companies in our business. We are seeing large companies get bigger and a constant supply of small companies start up but we seem to see fewer able to make that transition through medium size. To us industry watchers, this does not look such a good sign.

There may, however, be no easy answer particularly when the industry we are all working in has severe fluctuations itself. I would like to wish all those affected by these business problems well with their difficulties on a business and personal level.

The gentle art of mic dropping

On a completely different topic—I would like to make a few comments about microphone reviews. We used to test microphones regularly for full specification measurements under the expert eye of the late Hugh Ford. Hugh used several different anechoic chambers in the UK for these measurements and he was particularly thorough. We were, however, running into problems with the very top end mics. Their performance characteristics were beginning to outstrip the specifications of the chambers we were using and the measurements reached the limit of what we could be precise about. In one case the measured mic response looked more like the deficiency list of the chamber than the full response. Most of the chambers that we have access to are not designed for such high specification audio measurement. The only chambers with adequate capability are in the hands of the microphone manufacturers themselves and the use of these—even if possible—would be fraught with commercial problems.

We are addressing this problem and it looks as though we may have found a solution but it will still be some months before we can proceed with full technical mic reviews.

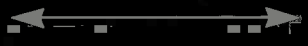
While on the subject of mics I would like to mention the most recent in a line of rather interesting microphone demonstrations. We understand that Al Kahn from Electro-Voice used to demonstrate the resilience of the E-V *664* by using it to hammer nails into a plank of wood—apparently it still worked afterwards. Adrian Weidmann from Bruel and Kjaer has demonstrated the resilience of the *4000* series condenser microphone to moisture problems by stirring a glass of mineral water with it and then shaking it out, and it worked.

Just before writing this, the UK distributors for Shure, HW International held a reception for the launch the new Beta *57* and *58* microphones. As a gesture they awarded serial no 1 of the *58* to the lead singer of The Who, Roger Daltry who has a way of his own with microphones. On accepting his gift Daltry said a few words of thanks, adding that the old *SM 58* had a reputation for toughness, he then said, "Let's check the Beta *58*," and promptly threw the microphone at the floor with considerable force, much to the surprise of the men from HW. But it worked and I think the audience was impressed.

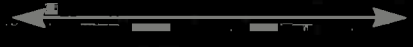
Several years ago we discussed a hypothetical test procedure for stage mics that involved a full specification test and then two drops from 6 ft on to a wooden floor followed by another full specification measurement; at the time we rejected this as perhaps being not practical. It is beginning not to seem so far off-the-wall.

Keith Spencer-Allen

–88dB @ 1kHz Crosstalk



1991mm
80 inputs



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TAKE A CLOSE LOOK AT A SOUNDTRACS IL SERIES PRODUCTION CONSOLE AND YOU'LL BEGIN TO UNDERSTAND WHY IT HAS ACHIEVED SUCH ACCLAIM AMONGST COMMERCIAL RECORDING STUDIOS AROUND THE WORLD.

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BETTER STILL, LISTEN TO THE WAY IT SOUNDS. THIS 32 BUS CONSOLE OFFERS VERY LOW NOISE, MINIMAL CROSSTALK AND A DEGREE OF SONIC TRANSPARENCY THAT SETS NEW STANDARDS WITHIN ITS SECTOR.

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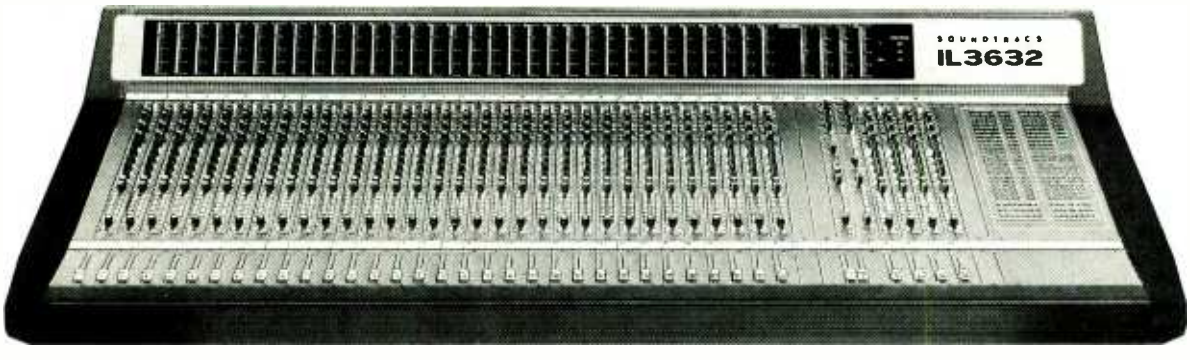

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For Hot Licks And A Great Mix Do It With The Stylyx

Stylyx 31 console with optional meter bridge.

Get the sounds down right with a new D&R STYLYX console. Nothing in its class is sweeter to the ear or easier on the eye than this hot new split format console.

STYLYX sets the tone: The slick meterbridge and smart grey-on-black chassis are sheer elegance, and a contemporary colour scheme allows quick identification of all controls.

An extremely compact design allows up to 40 inputs And beneath those good looks, features like smooth sounding 4 band EQ., super versatile aux section, true stereo input modules, and flexible dual channel subgroup modules make the STYLYX a perfect fit for broadcast production, video post production, as well as high quality sound reinforcement environments.

Eight and sixteen track recording studio's also benefit from STYLYX' digital quality specs, balanced inputs and outputs, custom configurations and one year warranty.

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"Neve Je t'aime!"

Polygone Studios has received a design award for their new purpose built studio complex. The studio was "Number One" in France for the number of hits recorded in 1987. "The biggest hit of the studio has been the Neve V series."

Jacques Bally Studio Owner.

"Neve V series Je t'aime!"

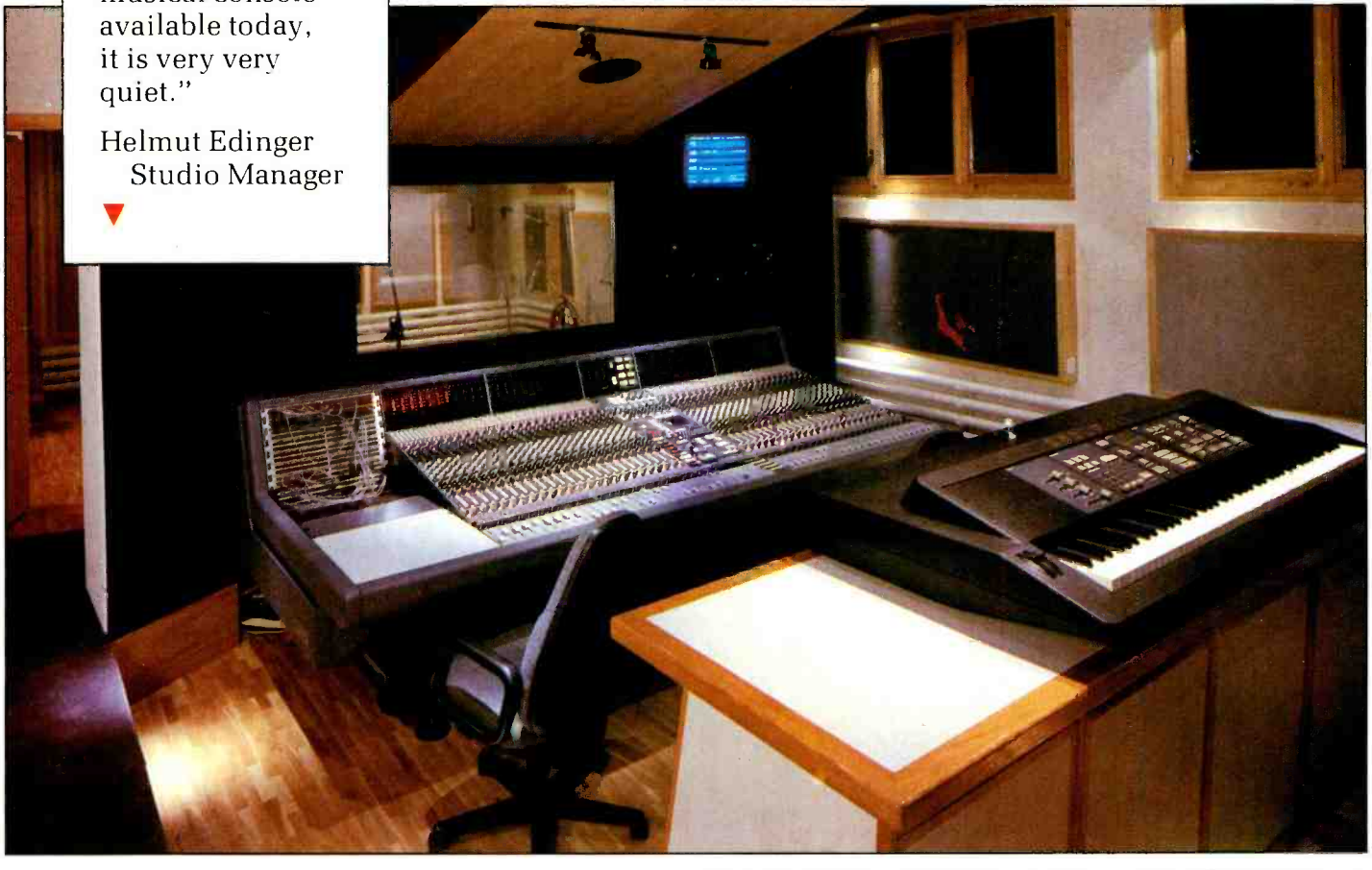
Jacques Hermer Chief Engineer.

POLYGONE STUDIOS – TOULOUSE – FRANCE

Blackwood Studios uses the Neve V series for music recording and for live broadcasts from the nearby music club.

"It is in our opinion the most musical console available today, it is very very quiet."

Helmut Edinger
Studio Manager



BLACKWOOD STUDIOS – BASEL – SWITZERLAND

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ASQ-10

MPC-60

Akai (UK) Ltd, Haslemere/Heathrow Estate, Parkway, Hounslow,
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YOU CAN'T BEAT THE SYSTEM

Because no other sequencing system offers so much musical power with so much versatility and ease of operation.

In the ASQ-10, Roger Linn and Akai have designed the ultimate sequencer at an incredibly low price. The massive 60,000 real note memory provides all the power you need. This means up to 99 sequences, each containing a maximum 99 MIDI tracks — which may be individually named. Up to 20 songs may be handled at a time, then stored in the ASQ-10's rapid disk drive.

A large LCD display provides instant access to every function and 'Help' pages offer simple, immediate assistance.

7 different sync modes are available, including SMPTE, MIDI time code and FSK. 2 MIDI Ins and 4 MIDI Outs allow detailed, flexible control over MIDI networks of any size. On the road (thanks to the sturdy metal case) or in the studio. At £999, the ASQ-10 is certainly one system you can't beat.

But it's not the only one.

The MPC-60 MIDI Production Centre has all the powerful features of the ASQ-10, but with the addition of a superb, dedicated sampling digital drum machine, complete with touch sensitive pads. The enhanced 12 bit format, with a 40kHz sampling rate and 18kHz bandwidth, produces results of a startling clarity and extremely low noise.

Then there's a built-in 32 channel programmable stereo drum mixer with echo send/return and LCD graphics of levels and panning — putting you firmly in control.

Sounds and sequences may be stored, using the onboard disk drive, and an optional memory expansion board will increase the sampling time from 13.1 seconds to a generous 26.2 seconds.

As a creative production tool, designed to go straight to the heart of any professional MIDI system at £2,299, the MPC-60 is in a class of its own.

You wouldn't compromise with your music. Why compromise with your equipment?

Now available with software version 2.0.

AKAI

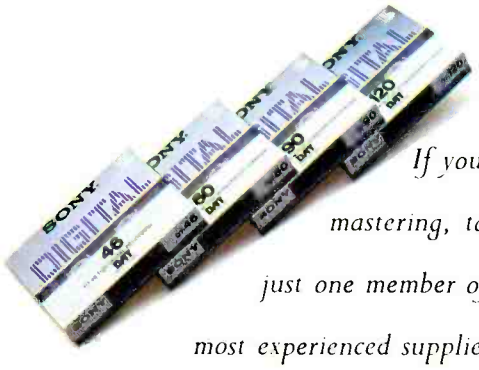
professional

Take a fresh look at the industry standard for DAT mastering.

Amongst audio professionals, the Sony DTC-1000ES is now widely recognised as the DAT standard. It's officially supplied by HHB – Sony's leading independent distributor. That means genuine service and spares support, as well as expert advice.

Second generation DAT hardware incorporates rationalised integrated circuitry and single A to D conversion. This may make DAT more accessible to consumers, but it's bad news for the audio professional. That's why we've talked to Sony and secured an extended production run for the DTC 1000ES.

Along with twin A-D conversion, all DTC 1000ES recorders from HHB are now specially adapted to record at 44.1kHz as well as 48 kHz. A modification that's impossible to implement in most second generation devices. For additional professional convenience, we've even designed an optional 19" rack tray.



If you're thinking about a secure future with highly-affordable DAT mastering, take a fresh look at the new DTC-1000ES package from HHB. It's just one member of a powerful family of DAT equipment available from the industry's most experienced supplier of digital recording hardware.

HHB HIRE & SALES, 73-75 SCRUBS LANE LONDON NW10 6QU PHONE 01-960 2144 FAX 01-960 1160 TELEX 923393.

Focusrite in liquidation

Focusrite the UK-based audio electronics company, have announced they have ceased trading and have been placed into voluntary liquidation. The company, set up three years ago by Rupert Neve, had been doing well with their ISA line of EQ and compression modules.

Last year the company expanded into custom console manufacture with the development of their *Forte* range of 48 and 64 bus desks. Focusrite have stated that it was the cost over-runs in R&D of the console range that led to the situation.

Although they had £1.5 million on the order books and a three month backlog in ISA orders, Focusrite's sales director, Kim Templeman-Holmes, stated that the console costings were wrong, a discovery too late to save the company.

• At the time of writing we understand that Fairlight Instruments are in financial difficulties and have cut back in several territories pending restructuring of the existing operation.

Tannoy and Audix combine

Audix, the broadcast and public address company, and Tannoy's Systems Division have combined to form a single operation. A new company is to be established—Tannoy-Audix Ltd.

The two-fold strategy of the new company is to strengthen the association of the Tannoy name with public address equipment, and to advance the Audix link with high quality broadcast systems. The electro-acoustic capabilities of Tannoy are seen to be complementary to the Audix expertise in the design and manufacture of audio electronics.

The new operation becomes the specialist systems company within TGI plc group, which includes Goodmans, Mordaunt-Short and Tannoy professional products. A greatly enlarged sales force will be based in both Saffron Walden and Glasgow, the original locations of Audix and the Tannoy Systems Division.

Exhibitions and conventions

April 28th to May 2nd NAB, Las Vegas, USA.
June 7th to 9th APRS 89, Olympia 2, London, UK. Contact: APRS Secretariat. Tel: 0923 772907.
June 17th to 22nd 16th International Television Symposium and Technical Exhibition, Montreux, Switzerland.
September 10th to 13th The Light & Sound Show '89. Olympia 2, London, UK. Contact: Clare O'Brien, O'Brien Associates Ltd, 10 Barley Mow Passage, Chiswick, London W4 4PH. Tel: 01-994 6477.
September 18th to 21st Media Visie 89, RAI International Exhibition Centre, Amsterdam, The Netherlands. Contact: RAI Euripaplein, 1078 GZ Amsterdam. Tel: (0) 20-549 12 12. Fax: (0) 20-461006.
October 3rd to 9th World Broadcasting Symposium Geneva, Switzerland.
October 19th to 22nd AES 87th Convention, New York, USA. Contact AES, USA. Tel: (212) 661-8528.
October 25th to 28th Broadcast 89, Frankfurt, West Germany.
November 28th to December 3rd Sound Expo/China '89, Shanghai Exhibition Centre, Shanghai, China.

1990

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

News from the AES

Our next lecture will be on Tuesday April 11th when David Meares of the BBC Research Department will talk on **Acoustic Scale Modelling**. "Despite the efforts of many individuals, acoustics remains an inexact science. The skill of the practitioner is as much in his/her choice of tools for a job as in the way they are ultimately used. This paper will look at one of the 'tools' in the acoustician's armoury, namely acoustic scale modelling, and the way it has been used by several workers in the field. It will cover its use both in the design of studios and in the improvement of industrial working environments."

Subjects to be covered later in the year will include Mixing Consoles, Design of Pipe Organs, Studio Acoustics and Analogue to Digital Converters. Details and dates will appear in due course and following the successful Sound with Pictures conference held in 1988, the UK section of the AES is pleased to announce that **Sound Reinforcement Engineering** is the title of a conference to be held at the IBA, Brompton Road, London on May 23rd and 24th 1989. Under the chairmanship of Peter Mapp, a comprehensive array of papers will be presented by leading industry figures covering all aspects of sound reinforcement technology.

Other future AES events to note are the **7th International Conference 'Digital Audio in Digital Times'** being held between May 14 to 17th 1989 in Toronto, Canada, the 4th Regional Convention being held in Tokyo between June 27 to 29th and the 87th Convention to be held in New York between October 19th to 22nd 1989.

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

In brief

• The live nightly broadcast *Radio Radio* is now produced from Molinare's audio complex in London's West End. The programme goes to 18 local radio stations throughout the UK. Molinare is also involved in the broadcast of *Rockline* and their video department currently transmits *Screensport*, *Lifestyle* and *Superchannel*.

• An **Ampex** Golden Reel Award Sound, Hollywood, has been given to LeVert (Sigma Sound Studios, Philadelphia/Great Tracks Recording/QCA Recording Studio/Encore Studios/Mad Hatter Recording Studios/Larrabee Sound and Amigo Studios) for their album the *Big Throwdown*.

• **Halma** have recently acquired **Vitavox**, manufacturer of folded horn loudspeaker systems, integrating it with Halma subsidiary Secomak Ltd at Honeypot Lane, Stanmore Middx, UK. Tel: 01-952 5566.

• Picnic Studios, Kent, have installed a **DDA** *AMR 24* console which is prewired to run Mitsubishi 32-track digital and Studer 24-track simultaneously. All studio cabling has been upgraded for improved sound recording and monitoring.

• Metalworks Studio, Canada, has opened its second recording facility featuring **SSL** *G* series console (the first in Canada) plus hard wired MIDI station and patchbay.

Address changes

• **Audio Systems Components** (ASC), the UK broadcast and professional audio dealer, have moved to 1 Comet House, Calleva Park, Aldermaston, Berks RG7 4QW. Tel: 07356 79565. Fax: 07356 71000.

• **Ariel**, US-based designers and manufacturers of digital signal processing hardware and software, have relocated. Their new address is a three storey mansion complete with secret staircases and hidden rooms. You'll find them now at 433 River Road, Highland Park, NJ 09804. Tel: (201) 249-2900. Fax: (201) 249-2123.

Maison Rouge Studios acquired by Scarlett Group

The Scarlett Group of companies have bought the Maison Rouge Studios in a deal representing an overall investment of £2 million. The investment is to include improvement of the space and acoustic response of the recording and mixing rooms, an overall updating and upgrading of equipment and the installation of a restaurant and bar.

The Scarlett Group currently includes Power Plant Music and Recording; Scarlett Recordings; Scarlett Management and Scarlett Publishing's Crusoe Music. The purchase of Maison Rouge takes the group to the number one position as the largest independently owned recording studio company in the UK.

In brief

- Production team **Heart & Soul** are selling their Neve equipped recording studio. More information from Alexander Foulcer on 01-521 1499.
- **FM Acoustics** recently acquired **Precision Cable Technology**, which will now operate under the FM Acoustics Ltd brand name, from Tiefenhofstr 17, CH-8820 Waedenswil, Switzerland. Tel: 1 780 6444. Fax: 1 780 0488.
- Following **Seltech**'s acquisition of **Sondor** of Switzerland, Seltech International has embraced the Sondor range of high precision sound followers for professional film and broadcast television.
- When blind blues guitarist Jeff Healey played the London Marquee, engineers Barry Farmer, Paul Riley and Mike Dignam recorded the gig without using a console. Working in a narrow corridor they used 14 **Focusrite** *ISA110* input signal amplifiers to take a direct feed from drums, vocals and bass on stage to the multitrack machine, whilst lead and backing vocals were fed via two *ISA130* dynamics processors.
- **BBE** has signed a licensing deal with **Aiwa** to incorporate their signal processing technology in Aiwa domestic audio products.
- PlayBox Theatre has completed a three month tour of China and Australia using the **ARX** audio system, including an OB TV live to air broadcast to an estimated audience of 90 million Chinese.
- UK suppliers Paul **Farrah** Sound have changed their name to **Farrahs**.

Highlights from NAMM

NAMM shows are fun. There are few serious events to go to, like papers and seminars, but there are plenty of parties, concerts, and press conferences with open bars. The show is huge: this year it filled all four rooms of the Anaheim Convention Center in California, and spilled over into the nearby Hilton and Marriott hotels. There's no way a normal human being can see everything in the three days available, and that's part of the fun too: rushing around trying to track down something you've heard rumours about, and trading secrets of the obscure and the curious with your fellows. The height of achievement is to find something no one else has spotted that you know will end up being very, very big.

Plenty of surprises

This year's show was full of interesting ideas from companies both large and small. For example, a New Jersey company called Micro-W were showing a little gadget called *MIDI Magic*, which allows a MIDI sequence to be stored in realtime on an audio tape recorder. It works, according to the inventor, by encoding the MIDI stream, telemetry-style, on to a 5 kHz audio signal. The company is also the distributor for QRS piano rolls and sees several markets for the device; playing back pre-recorded sequences, like piano rolls, on synthesisers (they already have a 250-song library available on audio cassettes); off-loading sequences from hardware and synth-based sequencers as an inexpensive alternative to RAM cartridges; and giving professional studios and (especially) performers alternative backup systems to their sometimes temperamental computers. The device sells for a mere $150. The only drawback is that it is slow: only 50 events per second can be encoded, and an LED lights up to tell you when you're sending data too fast. This means that really complex sequences and, more importantly, system-exclusive bulk dumps are beyond the device's capabilities. The company says, however, that a pro version, using a faster processor, may be available in about a year.

Aphex have taken off in an entirely new direction by bringing on board designer (and former Billy Joel and Kenny Rankin producer) Michael Stewart. Two of Stewart's products were being shown. The Studio Clock is a SMPTE-to-MIDI converter, with an internal tempo map that can be constructed from incoming MIDI notes, MIDI clocks, or audio triggers. The device can also generate MIDI clocks in realtime based on audio triggers, so that sequencers can follow live performers. The beat-detection algorithm of the device is sophisticated enough to pick a waveform with a fast rise time out of an entire mix. The Feel Factory, which was actually shown last year under the aegis of another company, allows eight 'faders' to be assigned to MIDI velocity, notes, or timings, so that individual rhythm tracks can be subtly changed while a sequence is playing to alter the 'groove'. It's a very effective device for bringing sequenced tracks to life.

Another company moving rapidly into new markets are Peavey. Once known primarily for guitar amps and roadworthy sound systems, Peavey is now making an astonishing variety of studio-oriented gear, including programmable equalisers, effects units, MIDI data processors, mixing consoles, multitrack cassette decks and even console automation systems. One of their newest devices is the *Multifex*, which comprises four 16 bit digital processors in 1U, which can be used on four different signals or combined into one channel, in any configuration. A new division, Audio Media Research (AMR), has been set up to develop even more high-end products, like the *Sync Controller*, a two-machine transport controller with memory for 99 program events, which will also convert SMPTE to MIDI clocks for slaving sequencers; and the *AEQ 2800* ⅓-octave EQ with MIDI control over program memories and individual bands.

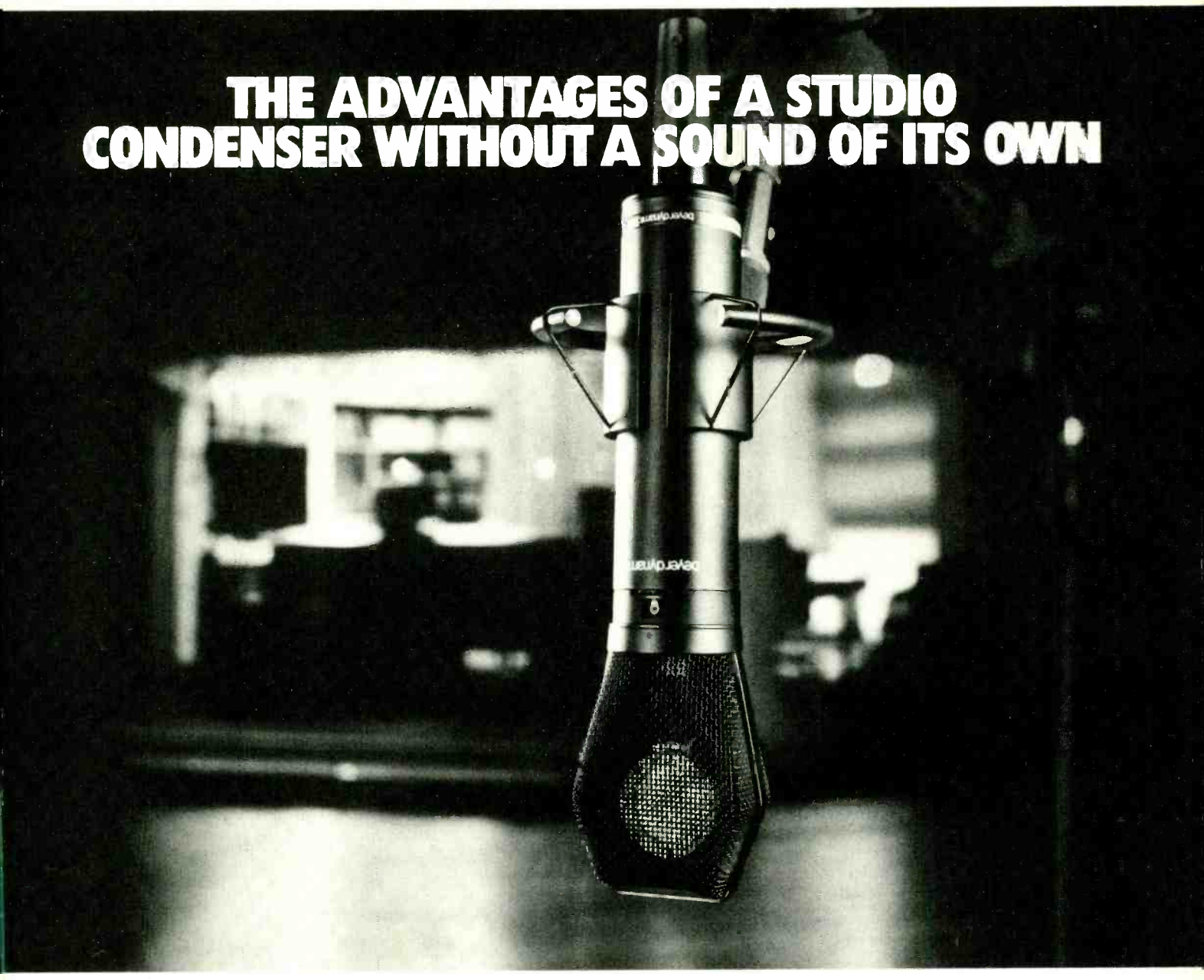
Yet another surprise was to be found at the Sansui booth. The *WS-X1* is a mini-recording studio with a 6-track cassette deck, a stereo deck and an 8-channel mixer in one tabletop unit. The multitrack deck has Dolby *C* and pitch control, and runs at 3¾ in/s. The mixer has a built-in digital reverb and several effects loops. Also on display were a rackmount version of the multitrack deck without the mixer and a sync box linking the two decks together.

Tascam and Fostex were showing the latest in sophisticated (but relatively inexpensive) audio/video/MIDI synchronisation gear (including the former's long-awaited *Midiizer*) and other companies like Toa and Peavey had multitrack cassette decks for the home recordist on display.

Adams-Smith had some improvements to their *Zeta-Three* synchroniser that should prove valuable. For one thing, a remote controller is now available that will handle up to four synchronisers, with 100-point autolocation and display either in realtime or in musical measures and beats. The remote adds a whole new front end to the system to make it much easier to use, including dual alphanumeric displays, a numeric keypad and user-programmable function keys. The synchroniser itself has been upgraded to include a learn mode, in which it constructs MIDI Tempo maps from a manual tap or audio triggers.

DAT machines were in evidence at a couple of booths, including Fostex, who were showing their SMPTE-compatible model *D-20*, and Casio, whose inexpensive *DA-2* portable will be available in the US in June. Several DAT distributors had booths, advertising the availability of multiple lines and promising customers English-language manuals and US warranties, although most of what they had to offer seemed to be models intended for the Japanese market. Even more interesting than the hardware, however, was a booth set up by 'Musicians for DAT', a ▷

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



For all of its virtues, the typical studio condenser imparts a definite character to any recording. These impositions are often considered inevitable technical imperfections: accepted, ignored or tolerated by audio engineers.

Characteristic anomalies of condenser performance such as exaggerated high end response or distortion have even been rationalized as compensation for the high frequency losses inherent in typical analog formats. Nowadays, however, they are increasingly viewed as unnecessary intrusions in critical analog and digital recording situations.

A Condenser For The Digital Era: The Difference is Nothing. *The increased dynamic range of digital recording is perfectly complemented by the self-effacing nature of the MC 740. The microphone is virtually inaudible. No coloration, no self-noise — no sonic footprint, not even a fingerprint. All five of its pickup patterns are equally uniform, identically transparent. We feel your prior experience with large diaphragm condensers will confirm this as a unique achievement.*

An Atypical Approach To Condenser Sound. *Beyer has never relied on conventional technical solutions. A manifestation of this kind of thinking, the MC 740 eliminates the icy, strident quality typical of most condensers to reproduce voices and instruments with warmth and intimacy. It's no coincidence that these are characteristics often ascribed to our ribbon microphones.*

The MC 740's freedom from exaggerated sibilance or graininess and its greatly reduced distortion are immediately apparent to critical listeners. European and American engineers have already commented on the startling accuracy of the 740, and the way it reveals the subtle differences between instruments and ambient environments.

Accuracy And Versatility Without Compromise. *Uniform (<2 dB: from actual machine specs, not just published specs) frequency response curves for all five polar patterns may seem a remarkable breakthrough. To Beyer, this is simply a design criterion for the microphone. Similarly, there is no contradiction in the fact that the 740 is exceptionally sensitive, yet also withstands extreme SPLs (up to 144 dB with the 10 dB attenuator in circuit).*

Hear What You Could Be Missing. *The MC 740's unconventional design offers a clear alternative. The best way to evaluate the difference the MC 740 can make is to work with it in your studio. To arrange a hands-on audition of this remarkable new audio instrument, contact your Beyer dealer or write us: beyerdynamic, Ltd., Unit 14, Cliffe Industrial Estate Lewes, Sussex BN86JL*

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Courses and seminars

April 11th Acoustic modelling. Contact: AES (British Section), tel: 06826 63725.
May 9th Pulling all the stops out. Contact: AES (British Section), tel: 06286 63725.
May 14th to 17th AES International Conference. 'Digital Audio—Audio in Digital times'. Contact: AES, 80 East Street, New York, NY 10186, USA. Tel: (212) 661-8528. Fax: (212) 682-0477.
May 23rd to 24th Sound reinforcement engineering conference. Contact AES (British Section), tel: 06286 63725.
June 13th Studio Acoustics. Contact: AES (British Section), tel: 06286 63725.
July 11th High resolution ADC. Contact: AES (British Section), tel: 06286 63725.
August 26th and 30th Soundscape. The University of East Anglia, Norwich, UK. Contact: Jane Thorp, UEA. Tel: 0603 592802.

Agencies

- **Cello** have appointed Aston Audio Ltd, Lightbrook House, 4 West Street, Alderley Edge, Cheshire SK9 7EG, UK, UK retailer for their audio products. Tel: 0625 582704.
- **Platinum** have announced UK distribution of their consoles through Stirling Audio.
- **Courtyard Electronics** have appointed FWO Bauch Ltd as UK distributor for their electronics equipment.
- The **Adams-Smith** Australian agency for their *System 2600* and *Zeta* MIDI synchronisers has been awarded to Syntec International Pty Ltd, 60 Gibbes Street, Chatswood NSW 2067. Tel: 02 406 4700. Fax: 02 406 6136.
- Loudspeaker manufacturer **McKenzie Acoustics** have appointed Inter Mercador, distributor for the West German territory. Inter Mercador, D-2800 Bremen 44, PO Box 448747, Zum Falsch 36, West Germany. Tel: 0421 489090. Fax: 0421 481635.

NAMM

group started by the Home Recording Rights Coalition, which is supported by most of the major consumer electronics companies. They were signing up showgoers to help counteract the efforts of the major record labels to quash consumer-level DATs in the US. A questionnaire they were handing out included the leading question: 'What would you like to tell the record companies?' Most responses were reported to be very brief—only two or three words.

Processing

The big guys you would expect at NAMM, like Yamaha and Roland, all had new processing gear on display, but some fascinating-looking products, at breathtakingly low prices, were being shown by smaller American companies.

ART, for example, were showing a broad range of units, capped by the startling *SGE* which, at $650, will generate nine simultaneous effects, including echoes, delays, reverb, EQ, stereo panning and imaging, two octaves of pitch transposition, overdrive, compression, and expansion. There's also an enhancer function referred to as a harmonic exciter (is that because the harmonics go out the window?). 200 MIDI-accessible memory locations are provided and up to four individual parameters can be controlled by MIDI in realtime.

DOD, through their DigiTech and Audio Logic divisions, were showing a wide variety of inexpensive effects, including a 320 ms high-quality single-channel delay for long-throw sound reinforcement systems, a 31-band realtime analyser, and an upgrade to the *DSP-128* effects processor that extends the bandwidth to 20 kHz, and allows up to four simultaneous effects.

Rane introduced a range of programmable graphic equalisers with MIDI memories and the ability to edit curves through MIDI system-exclusive. One interesting feature is that the amount of time it takes to go from one curve to another can be programmed by the user, thereby avoiding the 'snap' that sometimes occurs with instantaneous EQ changes. The three models all have 28 faders: one is a single-channel unit, with ⅓-octave centres; the second is stereo with ⅔-octave centres; and the third is a 4-channel unit, with seven single-octave bands on each channel. They also had a variety of half-rack modules designed to be used either vertically or horizontally oriented, which conform to the new HR standard. The modules include a mic/line mixer input channel, 2- and 4-channel limiters, a combination compressor/limiter/expander, a 3-band parametric equaliser, and a 15-band graphic EQ.

Sampling and synthesis

Using computers for direct sound synthesis and for hard-disk recording is becoming more commonplace, as the distinctions between synthesis, sampling, recording and post-production continue to blur.

A major player in software development in this area is Blank Software, who were showing an upgraded version of their well-respected *Alchemy* program for the *Macintosh*. *Alchemy 2.0* provides independent control of pitch and duration of samples, so that a 33 s spot can be trimmed to 30 s without 'munchkinising' the announcer's voice, or a trombone sample can be tuned to match the rest of the band without affecting its envelope. In addition, provision is made when crossfading samples to automatically detect and correct pitch differences between them.

The program will work with almost any sampler on the market (it excels at translating samples from one sample to another, over MIDI- or SCSI-based network), as well as with the Sound Accelerator card for the *Macintosh SE* or *II* made by Digidesigns. The original version of the program will remain available as *Alchemy Apprentice*, at a lowered price. For composers of 'industrial' music, Blank were offering a library of digitally-recorded sounds created by, in, on and around an automobile. The collection, known as 'Anatomy of an Automobile', is hundreds of megabytes large, and is available on CD-ROM or removable hard-disk cartridges, in Apple's Audio-IFF format. 'The car is your drum,' says the press release. 'The hubcap collection alone contains enough sounds to build the strangest Gamelan ever created.'

And speaking of CD-ROM, Optical Media International (OMI), makers of the first CD-ROM for samplers, were showing two new instrument and sound effects disks, as well as a rackmountable CD player expressly designed for effects and samples (although it will play standard CDs as well). The *ProCDP* comes with a remote control, and SCSI and RS-422 interfaces, for direct loading into various samplers, are available as options.

Hybrid Arts, whose *ADAP* sampling system for the Atari *ST* continues to improve, announced that they are now making its rackmountable SCSI hard-disk drives available separately from the system. Although they are designed to work well with *ADAP*, the drives are not limited to *ADAP* users and can be helpful to any *ST* owner. In fact, they are even available for the *Macintosh*. Sizes range from 65 to 660 Mbytes, with access times from 26 to 18 ms. The company is promising that tape-streamer backup systems and WORM drives are on the way.

A new company, Spectral Synthesis, were showing a digital sound processing board for the IBM *PC*. The *SynthCard* can handle digital processing at sample rates up to 312.5 kHz, using Texas Instruments 320C25 DSP chips. It communicates with the outside world—MIDI, SCSI, RS-232, or SMPTE timecode—using a controller card called the *FlyBy*. A/D and D/A conversion is also handled externally, using the company's own hardware, or others. They were also showing a rackmountable *AT*-compatible 12 MHz 80286 computer with slots for up to seven *SynthCards*, known as the *SynthEngine*, and a user-configurable external control surface, known as the *DashBoard*. Although the company hopes for software support from a number of third-party developers, they were also showing their own 'AudioCAD' programs, which include digital recording and playback, sound design and processing, and MIDI-based sequencing.

Two-for-one computers

Computers have taken over many of the chores of music production, from sound generation to track editing, to mixing automation, but one of their limitations has been that they can basically only do one of these things at a time. At this NAMM show, however, it was obvious that that situation is about to change dramatically.

In the 'Why didn't we think of this before?' category, Opcode Systems were showing a Desk Accessory patch librarian for the *Macintosh* that can be used simultaneously with their new sequencing program, *Vision*.

TOTAL CONTROL

JBL Control 5

If you are looking for a versatile compact loudspeaker, a little control might be in order. Specifically, the JBL Control 1. It's the smallest system in the famous JBL Control Series. The Control 1 combines the well known JBL sound with a unique approach to enclosure construction. Molded from dense polypropylene structural foam, the enclosure is both nonresonant and very durable.

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

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

By now you should be getting the picture: the JBL Control 1 and Control 5 put you in control of all your sound decisions. Total control.

JBL

AUSTRIA: Hi Fi Stereo Center, Münchner Bundesstraße 42, 5013 Salzburg **BELGIUM:** Beltronics N.V. S.A., Rue de la Célidée straat 29, B-1080 Brussels **DENMARK:** AudioNord Danmark A/S, Vester Allé 7, 8000 Aarhus C. **UNITED KINGDOM:** Harman (Audio) UK Ltd., Unit B, Mill Street, Slough, Berks SL2 5DD **FINLAND:** Studiovox KY, Atomitie 5C, 00370 Helsinki **FRANCE:** Harman France S.A., Peripole 243, 33 avenue du Maréchal de Lattre de Tassigny, 94127 Fontenay s/Bois Cédex. **GREECE:** Lynic Hi Fi, 7 Stournara St., 10683 Athens **HOLLAND:** AEG Nederland N.V., Aletta, Jacobslaan 7, 1066 BP Amsterdam **ICELAND:** Steini Danielsson, Skulagata 61, PO Box 5066, 125 Reykjavik **ISRAEL:** Sikma Trade International Ltd., 19 Echad Haam St., 66541 Tel Aviv **ITALY:** Linear Italiana S.P.A., Via Arbe 50, 20125 Milano **NORWAY:** Erling Neby A/S, Ryenbergvn 70, Oslo 6. **PORTUGAL:** Valentim de Carvalho Ci SARL, Rua Nova do Almada, 95-99, 1200 Lisboa **SPAIN:** EAR PRO, Sant Gervasi de Cassoles, 17, 08022 Barcelona **SWEDEN:** Septon Electronic AB, Box 4048, S-421 04 Västra Frölunda **SWITZERLAND:** Musica AG, Rämistraße 42, 8024 Zurich **WEST GERMANY:** Harman Deutschland GmbH, Hünderstrasse 1, 7100 Heilbronn

NAMM

Details were sketchy but they plan to develop librarians for all the synthesisers now currently supported by their more conventional software.

Zero One Research, a new California company, managed to get a full-featured editing program for the Roland *MT-32* LA synthesis module running on a *Macintosh* simultaneously with a sequencer from another developer. They plan to support other LA models as well.

Steinberg had an even more interesting concept on display: MIDI Realtime Operating System, or M.ROS. This is a shell for running multiple simultaneous MIDI applications, and they were showing it operating with a sequencer, a patch editor and a mixing-automation system, on an Atari *ST*. They claim the system is completely portable and versions for IBM PCs and *Macintoshs* are ready, although no other software developers have yet decided to support it.

Apple Computer, who have been occupying very large booths for the last three NAMM shows, were showing their own multitasking system for the *Macintosh*, known as *MIDI Manager*, which will run in conjunction with *Multifinder*. The front end of the system consists of a graphic 'patchbay', in which timing signals, program inputs and outputs and even links to graphics programs, can be configured to respond internally or externally. They say the program will be included as part of Apple's *System* software and several third-party developers have already announced they will be supporting it.

Midi controllers and processors

Lake Butler Sound was showing a new item in their *MIDI Mitigator* line of accessories: the *CFC 4* multiple controller pedals. Each of the four pedals in the set can be programmed to transmit any MIDI message, with any of six response curves: linear, more sensitive at the heel position, more sensitive at the toe position, or switched (two values only), and either increasing with downward motion of the pedal or decreasing. Each pedal's message can be up to 48 bytes long, so that controller messages on all 16 MIDI channels simultaneously or some fairly complex system-exclusive commands can be sent. The unit has a MIDI input and will merge incoming signals with commands generated by the pedals.

Forte Music, the folks who have turned many a grand piano into a MIDI controller, have taken the concept of live MIDI control about as far as possible, with an upgraded version of their *Mentor* control processor. The unit contains four sliders and inputs for eight switch or potentiometer pedals, which can be assigned to any MIDI parameter including system-exclusive commands. Setups can be stored in the unit and recalled with MIDI program changes and can be off-loaded over MIDI system-exclusive. The newest version has six independent MIDI inputs and six outputs and any of the inputs can be mapped to any of eight processing buses, and then to any of the outputs. Signals can be split and merged and the unit can even handle multiple players, keeping functions for all of them completely separate.

The eight processing buses, called 'Data Paths', allow such functions as transposition; range splitting, filtering of even, odd, or individual keys; velocity scaling or inversion; sostenuto and latching; three types of mono response; random or circular note re-assignment; controller filtering, scaling, inversion, and mapping; and delay up to ten seconds. The unit also handles 'event mapping', in which a specific incoming event triggers a string of commands: for example, receipt of a particular MIDI note on one channel could send out a string of controller data on a different channel. Up to 16 such events can be on-line at one time.

And finally, one more manufacturer has jumped into the treacherous waters of wireless MIDI. An Atlanta company called Gambatte say their *MidiStar Pro* will operate essentially glitch-free—the error rate is claimed to be less than 1 bit in 38 thousand million, or about one error every 342 hours—over a distance of 400 ft (123 m). It can be operated without a licence (in the US, anyway) using 50 mW of output power in an unspecified frequency range and requires only one antenna on the transmitter and one on the receiver. The company are a little close-mouthed about the technique used to ensure data integrity and will only say that it is a 'high-powered technology called Spread Spectrum', which uses nine carrier frequencies simultaneously. It seems to work—the demonstrator was able to walk all over the floor of the convention, around other people's synthesisers and computers, playing a portable keyboard, while the synth module at the receiving end never missed a note.

Harold D Osborne

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MUSIC LAB RECORDING NEWS

Telephone 01-388 5392 for latest information and prices

Joining the Neotek Elite

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

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

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

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

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

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

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

HEAVYWEIGHT CONTENDER FROM TASCAM

Forget the portastudio - the Tascam ATR-80 is a truly professional 24-track recorder

Tascam have long been known for their expertise in producing low-cost, high quality tape recorders and mixers. Now, the company's ATR-80 machine is making a big impact on the professional 24-track market With full-function remote and autolocator options, and a full 14" reel capacity, this is a recorder that any studio can be proud of.

Music Lab are London's only authorized ATR-80 suppliers. If you are looking for a new high-quality 24-track recorder - call us to arrange an immediate trial.

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Music Lab are now offering free delivery on complete cartons of Ampex tape to their London account customers - any time, seven days a week. Non-account customers can also take advantage of the service for a nominal £6 delivery charge. Just telephone Music Lab on 01-388 5392 (days) or 01-387 9356 (nights and weekends) and quote your credit card number.

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Sony APR-24 analogue multitrack

Sony have announced a completely new analogue multitrack designated the *APR-24*. This is a 24-track machine cosmetically closer to DASH multitrack styling and based around a 16-bit microprocessor, which integrates transport, audio and synchronisation functions. The transport uses a 4 inch deep-webbed casting for rigidity and the tape path has been designed for improved handling with a high wind speed of 475 in/s.

The audio electronics are based upon the *5000* series mastering machines and offer microprocessor-assisted alignment with the ability to store three preset values for each tape speed. The metering section has a dual level of operation—as a standard bargraph-type meter or in an alignment-type mode with a display resolution of ¼ dB. The *APR-24* has both serial and parallel remote control ports with synchronisation features for all the timecode formats. The machine is provided with a remote control unit allowing full operation including the use of a jog shuttle wheel.

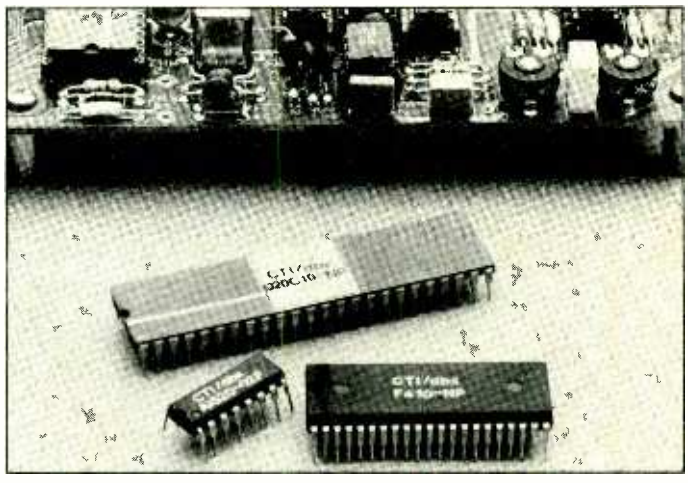
• Other new Sony products

Aside from the analogue multitrack, Sony had a large number of other new products on show in final production form at the AES Convention, Los Angeles. Featured was the *PCM-3348* 48-track digital multitrack already covered in the November issue. The other digital multitrack shown in production form was the *PCM-3324A*, the new model of the 24-track DASH machine with all the improvements covered last year. There were also new models for the *5000* range of 2-track machines. The *APR-5003V* is a development of the standard *5003* with a port to allow serial control so that it may be fully controlled from a video editor as well as having centre-track timecode facilities.

The *MXP-3000* series of consoles has been expanded and is now available in a 56-input channel frame size. There have also been several ergonomic changes such as the hard disk automation terminal having been placed in the centre section with the tape machine remotes. Expanded audio features include stereo echo returns and improved cueing facilities.

UK: Sony Broadcast & Communications, Jays Close, Viables, Basingstoke, Hants RG22 4SB. Tel: 0256 55011. Fax: 0256 474585.

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



CTI/dbx A/D chip set

CTI Research have announced that it is providing samples of the CTI/dbx *F410/D20C10/A1520* chip set intended for use as an 18/19/20 bit analogue to digital converter. These can be provided with an evaluation board. The CTI/dbx converter uses noise shaped oversampling at 6 MHz and flash 4 bit conversion. A 2-stage digital filter/decimator is used to reduce the sampling rate to 48 kHz, increase resolution to 20 bits and remove high frequency noise. The designers say that an unusual digital filter structure is used to reduce the computation rate to a practical level and that this patented technique is the first to allow practical audio-speed A/D conversion up to 20 bit level. Quoted specifications include greater than 105 dB S/N ratio, less than 0.005% THD at maximum input, 0.01% THD (untrimmed) at −20 dB and −40 dB input and 0.000000076% differential linearity. Synchronous operation of multiple converters is provided.

By changes in the clock speed the standard sampling rates of 48, 44.1 and 32 kHz can be accommodated with variable sampling rates of up to ±20% able to be handled with little or no degradation in performance. The resolution of 19 or 20 bits are attainable with the addition of a small number of components giving an S/N ratio of up to 114 dB.

CTI Research, 71 Chapel Street, Newton, MA 02195, USA. Tel: (617) 964-3210.

UK: Scenic Sounds Equipment Ltd, Unit 2, 10 William Road, London NW1 3EN. Tel: 01-387 1262.

Renkus-Heinz sound reinforcement

Renkus-Heinz have introduced a selection of new products: the *RH23* and *X31* processors for 'Smart' systems, and the *Coax 60* and *90* mid and high frequency horn systems. The new line of processors includes the 2-channel *Dyna Gard* unit for use with passive 2-way systems and employs a switchable Butterworth ⅓-order crossover for subwoofer outputs.

The *Coax* series horns complement the *SUB 152* subwoofer system and have a frequency response of 250 Hz to 17 kHz. The *Coax 60* and *Coax 90* are constant directivity horn assemblies (60° and 90° respectively) consisting of a 2 inch driver/HF horn mounted coaxially in the mouth of a midrange horn/driver, the mounting position is determined for negligible interference at the crossover frequency. The overall enclosure is trapezoid and common dimensions allow easy stacking and arraying. The processors ensure correct time/phase alignment.

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

NP portable mixer

NP Elektroakustik have released the latest version of the *NP* portable location mixer. Based on designs developed for Danish radio, the *NP* is 'digital ready' and features four mic/line input channels each with oscillator and phantom select switch, input gain control, equaliser section with bass and treble shelving and sweep midrange controls, variable highpass filter, pan, phase reverse, PFL and EQ in/out switches. The four channels are summed internally to two outputs and these can be routed through a peak limiter in stereo or left channel only. The *NP* portable features comprehensive communications and monitoring facilities together with bargraph output meters (ppm) and phase meter.

M/S circuitry allows one or two M/S microphones to be used without external matrixing and several mixers can be cascaded for additional input channels. The construction is fully modular in a lightweight metal alloy case and is built for rugged use. Power is supplied by an internal battery pack (up to 30 hours) or an external source.

NP Elektroakustik AS, Industrivej 3A, Stilling, DK-8660 Skanderborg, Denmark. Tel: 6 57 15 11. Fax: 6 57 21 63.

Tannoy small reference monitor

Tannoy have introduced the *TP1* small reference monitor. It is a 2-way design in a cabinet 15 inches tall and is constructed around heavy vertical and horizontal bracing. The mid/bass drive unit is a 6½ inch size with a new roll surround material that Tannoy say ensures linearity and robustness. The HF unit uses Tannoy's Differential Material Technology (DMT) with duralumin diaphragms and skirt with a separate polyamide-based suspension, which apparently gives the piston rigidity of titanium but without the high frequency break-up. The coil is ferrofluid cooled and the driver uses the familiar asymmetrical phase plate.

The crossover is of a hard-wired construction and when integrated with the drivers, Tannoy claim a matching of within ±0.5 dB between units over their specified range. The magnetic field around the cabinet has also been controlled and is less than 1 mille Tesla at any point outside the cabinet, so it doesn't affect video monitors.

The monitor is finished in black with an anthracite baffle and grey drive units.

Tannoy Ltd, The Bilton Centre, Coronation Road, Cressex Industrial Estate, High Wycombe, Bucks HP12 3SB, UK. Tel: 0494 450606. Fax: 0236 28230.

North America: Tannoy North America Inc, 300 Gage Avenue, Unit 1, Kitchener, Ontario, Canada N2M 2C8. Tel: (519) 745-1158. Fax: (519) 745-2364.

Klipsch KP-600 loudspeaker

Klipsch have introduced the *KP-600* loudspeaker system for sound reinforcement. This consists of three identical enclosures for handling low bass, bass, mid and high frequencies.

The subwoofer and bass cabinets are dedicated assemblies; the former is a ported cabinet with two 18 inch (46 cm) drivers and the latter horn-loaded with two 15 inch (38 cm) drivers feeding into either side of a common horn.

The mid/high enclosures can be fitted out as required with mid-bass and midrange/tweeter modules, the standard configuration being one module each per cabinet. The modules are interchangeable and can be rotated through 90° to suit arraying requirements.

The mid/bass module consists of a 10 inch (25 cm) driver coupled to a 60° horn with the midrange/tweeter module housing midrange and high frequency 60° horns. Each horn is coupled to two drivers.

Recommended with the *KP-600* is the *KP-600-EC* electronic crossover/processor, which provides flexible crossover and filter functions with 24 dB/octave slopes.

The cabinets for the *600* series are trapezoidal and moulded from a lightweight, high strength composite material. The enclosures are available in the *A*-version, which includes internal metal reinforcing straps for flying, and the *B*-version for fixed installation stacked systems. A full range of flying hardware is also available and the cabinet dimensions allow for efficient packing in typical 90 inch (220 cm) and 96 inch (235 cm) truck beds.

Other recent releases from Klipsch include the *KSM-1/KSM-2* stage monitors, which feature high sensitivity in the midrange in order to overcome masking levels from the main sound reinforcement system. Both enclosures feature a 15 inch (38 cm) bass driver and Klipsch horn/driver assembly together with identical frequency response characteristics, the difference between the two cabinets being the physical size and configuration of the bass driver and horn.

Klipsch & Associates Inc, PO Box 688, Hope, AR 71801, USA. Tel: (501) 777-6751. Fax: (501) 777-6753.

Studer A827 multitrack

Studer have introduced a new analogue multitrack based around the *A820* transport technology but at a lower cost. The *A827* offers 14 inch reel capacity, three tape speeds with integrated varispeed, phase compensated audio electronics NAB/CCIR/AES equalisation switchable, microprocessor-control of the transport and audio electronics with automatic alignment data recall offering two alignments per speed, switchable Dolby *HX PRO*, parallel and serial RS232/422 control ports. There is also an option for an internal synchroniser/resolver. The machine is supplied with a remote control offering control of most machine functions.

Studer International AG, Althardstrasse 150, CH-8105, Regensdorf, Switzerland. Tel: 1 840 29 60. Fax: 1 840 47 37.

UK: FWO Bauch Ltd, 49 Theobald Street, Borehamwood, Herts WD6 4RZ. Tel: 01-953 0091. Fax: 01-207 5970.

USA: Studer Revox America Inc, 1425 Elm Hill Pike, Nashville, TN 37210. Tel: (615) 254-5651. Fax: (615) 256-7619.

Linstead G3 signal generator

Masterswitch Ltd have introduced a simple battery-powered audio signal generator from Linstead. The *G3* offers sinusoidal, square and triangular wave outputs. The manufacturers claim a pure sinewave performance with a maximum distortion of less than 0.04% over 20 Hz to 20 kHz. It has switched and continuously variable attenuators with a maximum output of 6 V p-p from a 50 Ω source. Weight is 400 g with batteries.

Masterswitch Ltd, 8 Dorset Road, London N15 5AJ, UK. Tel: 01-802 1423.

Larson LarTec ADR/Foley system

Larson Technology have introduced the *LarTec* ADR/Foley system, which has been developed in collaboration with Sound Workshop and Ketcham Engineering.

The system comprises a Sound Workshop ADR/Foley console, LarTec Systems hardware and software packages and a Ketcham Engineering *MC-211* motion controller. It integrates console control, machine control and database management and offers SMPTE timecode or film footage modes, computer control of patching, channel record status, track assignments, monitoring and automated playback.

The console features six mic/line input channels, L/R and mono record buses, L/R monitor buses, L/R stage monitor buses, two headphone outputs and 24-track monitoring. The left and right output buses can be routed to the multitrack as required and the returns assigned to L-C-R speakers. The monitor section can also be used for automated mixdown.

The *MC-211* provides machine control with a master SMPTE timecode generator and direct drive outputs for magnetic film recorders. The SMPTE/EBU output can be used with an external VTR/ATR chase synchroniser system and an optional VSI interface for synchroniser offset control is also available. All looping functions are fully programmable by the user.

The LarTec hardware/software package is IBM-based and is controlled via a 60-key console-mounted keypad.

Larson Technology Inc, 4109 W Burbank Blvd, Burbank, CA 91505, USA. Tel: (818) 845-4100. Fax: (818) 845-2414.
Sound Workshop Inc, 79 Express St, Plainview, NY 11803, USA. Tel: (516) 932-6570. Fax: (516) 932-6573.

In brief

● **MicroAudio** have added the MIDI *Pod 1.1* to their programmable equaliser range. The unit is a ⅓-octave equaliser with 28 bands over ISO frequencies with ±12 dB of boost or cut and can be programmed either by a MIDI controller or by front panel controls (with a 3-digit security code function to lock out unauthorised tampering). The *Pod* has 64 memory locations that can be accessed via MIDI commands or by a step-through footswitch.
MicroAudio, 4438 SW Hewett, Portland, OR 97221, USA. Tel: (503) 292-8896.

● **Neumann** have introduced the *KM100* system of small condenser microphones comprising four capsules (omni, two types of cardioid, supercardioid), a preamplifier body, remote power supplies (battery and mains) and a wide selection of cables, stands, clamps and other accessories. The wide range of accessories enables many microphone configurations.
Georg Neumann GmbH, Berlin, West Germany. Tel: 30 259 930. Fax: 30 259 93108.
UK: FWO Bauch Ltd, Borehamwood, Herts. Tel: 01-953 0091. Fax: 01-207 5970.
USA: Gotham Audio Corp, 1790 Broadway, New York, NY 10019-1412. Tel: (212) 765-3410.

● The **Sennheiser** *MKH50P48* studio condenser microphone is similar to the *MKH40* but has a supercardioid pickup characteristic. A switchable highpass filter (−4 dB at 50 Hz) compensates for the proximity effect when used close to sound sources and high side rejection combines with a smooth off-axis response for use in critical situations. Frequency response is 40 Hz to 20 kHz (±2 dB maximum deviation) for 134 dB maximum SPL (142 dB with attenuator).

The *HD25* dynamic headphone is designed for multi-purpose use. Features include rugged, lightweight construction, high sensitivity (105 dB/mW), frequency response of 30 Hz to 16 kHz and extremely high external noise attenuation. Nominal impedance is 70 Ω.

The *HD250* linear headphone uses neodymium magnet structures. Claimed characteristics include high external noise rejection (>40 dB) and transparent reproduction over the frequency response of 10 Hz to 25 kHz. Impedance is 600 Ω.
Sennheiser Electronic KG, Wedemark, West Germany. Tel: 5130 5830.
UK: Hayden Laboratories Ltd, Chalfont St Peter, Bucks. Tel: 0753 888447. Fax: 0753 880109.
USA: Sennheiser Electronic Corp, Old Lyme, CT 06371. Tel: (203) 434-9190. Fax: (203) 434-1759.

TC Electronic additions

TC have introduced two new digital delay lines (*TC 1380/TC 1280*), the *TC 8201* AES/EBU digital audio interface test generator/analyser, the *TC 1128X* satellite for the *TC 1128* and new software for the *TC 2290* digital effects unit.

The delay lines feature the same specifications as the *TC 2290* but with improved analogue circuitry. The *1380* is single-channel with three outputs while the *1280* is stereo-in/stereo-out. Standard delay time is 2 s in 5 μs increments with expansion possible up to 20 s. The ability to be adjusted in 5 μs steps makes the delay lines especially useful for aligning drivers in sound reinforcement arrays and in satellite broadcast applications. The units feature a readout display in time and m/ft and incorporate a lock-out function to guard against unauthorised tampering.

The *TC 8201* AES/EBU digital audio interface test generator and analyser is aimed at facilitating the interconnection of digital signals and supports both the AES/EBU professional and Philips/Sony consumer formats.

The *8201* is basically an independent generator and analyser, the generator being programmable. Sampling rates are the standard 32 kHz/44.1 kHz/48 kHz, adjustable 28 to 53 kHz. The unit will generate and analyse all types of waveform and digital audio data and also includes an RS-232 interface for connection to a PC or ASCII terminal. The instrument is housed in a 1U rack chassis with the AES/EBU input/through/output connectors (*XLR*) located on the rear panel and the consumer RCA phono connectors on the front panel, together with BNC connectors for External Frame input, Clock outputs, and Trigger input and output. There is also an alphanumeric Preset display with nudge buttons.

The *TC 1128X* satellite version of the *1128* programmable graphic equaliser is for use with an external computer, which provides all the programming and master control functions. In addition to the standard *1128* equaliser features, the satellite/computer combination provides such added facilities as ⅓-octave analysis, visual editing, automatic room equalisation and feedback suppression, SMPTE timecode reading and generation and MIDI functions.

The new software for the *TC 2290* will retrofit to existing units and will be standard on all new equipment. Functions include the doubling of sample times, fast trigger and memory (up to 1 min), a hold function and new modulation effects.
TC Electronic, Grimhoejvej 3, DK-8220 Brabrand, Denmark. Tel: 626 2800. Fax: 626 2928.
UK: TC UK, 24 Church Street, Oswestry SY11 2SP. Tel: 0691 658550.

Wheatstone distribution camp

The Wheatstone Corporation have announced an 8-channel stereo distribution amplifier, *SDA-82*. It may be used as a single-input/16-output or stereo-input/eight stereo-output configuration. Each output is individually actively-balanced and capable of delivering +26 dBm with all outputs and inputs having individual sockets. The unit has 16 independent output level controls with LED signal presence indication on all ins and outs. On the practical side, provision is made on the front panel for marking the source and destinations. Wheatstone claim a technical performance of typical THD of 0.002% and a dynamic range of 115 dB.
Wheatstone Corporation, 6720 VIP Parkway, Syracuse, NY 13211, USA. Tel: (315) 455-7740. Fax: (315) 454-8104.

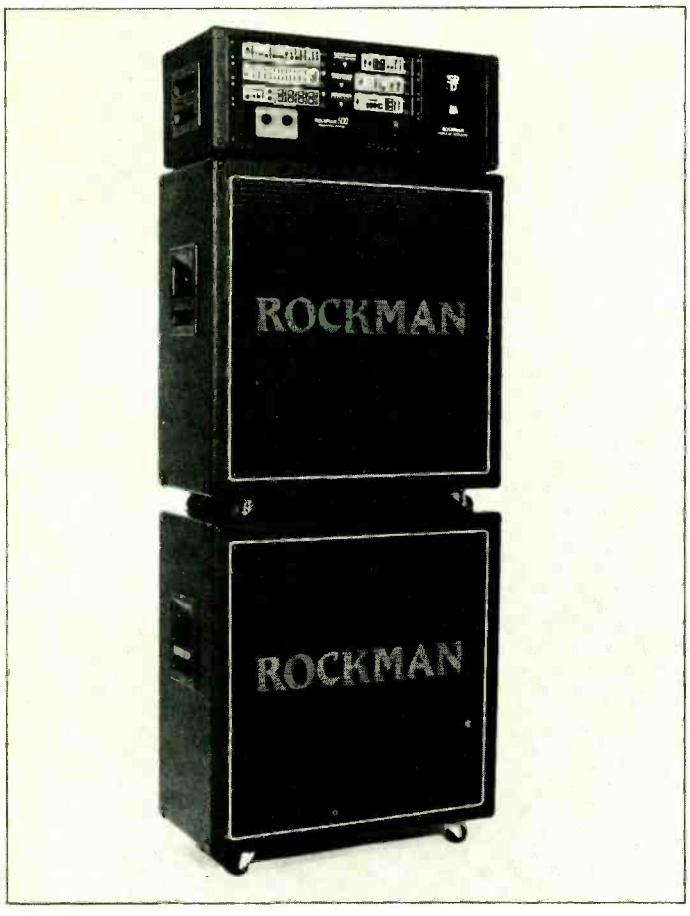
In brief

● **Wireworks** have added a series of modules in a rackmount frame to complement their audio and audio/video cabling systems. The rack housing can be fitted with a variety of modules such as 1:1/1:3/1:4 splitters, DI boxes, etc, in order to meet specific working requirements on-site. **Wireworks Corp, 380 Hillside Avenue, Hillside, NJ 07205, USA. Tel: (201) 686-7400. Fax: (201) 686-0483.**

Rockman modular amplifier

Completing the *Rockmodule* range from Sholz Research and Development is the new *Rockman Modular Amplifier*. Within the amp head, alongside a 500 W stereo power amp, can be fitted one of four configurations of *Rockmodules*. MIDI control is provided by the new MIDI *Octopus Effects Switcher* module, and the whole thing is fed through Sholz's own *Rockman* speaker cabinets. The modular design should allow for updating and expanding the system in line with future developments.

Sholz Research and Development Inc, 1560 Trapelo Road, Waltham, MA 02154, USA. Tel: (617) 890-5211.
UK: Dixies Music, 2 Stocks Walk, Almondsbury, Huddersfield, Yorks. Tel: 0484 512601.



Sound Genesis: sound samples for the EIII

A new collection of sound samples for the *EIII*, called *Protege*, has just been announced by Sound Genesis. Eleven stringed, wind and percussion instruments are currently offered, and there are plans to extend the range to include more than 50 instruments. A pedigree certificate is issued with all Sound Genesis samples that documents the original source of every sound and licences the owner to use these sounds without fear of copyright infringement.

Sound Genesis also offer the Master Sampler Collection for the Fairlight *Series III*, as well as *Scorekeeper*, a *Macintosh* database application designed to cater for the needs of audio production professionals in tracking sound libraries.

Sound Genesis Corp, 7807 Creekridge Center, Minneapolis, MN 55435, USA.

Ensoniq ESQ1 expansion units

The wave expansion unit comes in the form of a ROM cartridge, which adds 32 new waveforms to provide extremely refined samples from which the synthesiser can generate new sounds. These waveforms were developed on a new 16 bit sampling system, which made it possible to sample natural sounds in 16 bit quality and transfer them to the *ESQ1* format. New software has also been developed to edit these samples so that it is now possible to filter out annoying high frequency sub-harmonics (fizz), filter digitally, and expand and compand signals without loss of quality.

The RAM expansion unit comes in the form of a retrofit PCB, which not only expands internal memory to eight banks and 320 memory locations but also provides an intelligent control unit with its own microprocessor. This processes MIDI commands, automatically selects suitable waveforms, and monitors the keys of the *ESQ1*.

Ensoniq Corp, 155 Great Valley Parkway, Malvern, PA 19355. Tel: (215) 647-3930.
UK: Executive Audio, 159 Park Road, Kingston-upon-Thames, Surrey KT2 6BX. Tel: 01-541 0180. Fax: 01-549 2858.
Ensoniq Europe bv, Domplein 1, 3512 JC Utrecht, The Netherlands. Tel: 30-314 225.

Yamaha PLS1 MIDI Programmable Line Selector

This is a 32 in/8 out line selector with a MIDI interface that allows users to select input signal combinations quickly and easily. Each of the eight channels is equipped with a selector that lets you choose from four different inputs. The inputs to the unit are unbalanced phone jacks, and there are four switchable inputs to each of the eight channels. The eight outputs are also via unbalanced phone jacks.

Up to 99 different selection patterns can be stored in memory for instantaneous recall. During operation, MIDI program change commands can be sent directly to the PLS1 to switch to any of the stored selection patterns. LED indicators on the front panel clearly show the current selection pattern.

Intended for use with either the *DMP7* or the *DMP7D* Digital Mixing Processors, this unit drastically simplifies the connection process for multiple signal inputs.

Yamaha Corp, PO Box 1, Hamamatsu, Japan.
UK: Yamaha-Kemble Music (UK) Ltd, Mount Avenue, Bletchley, Milton Keynes MK1 1JU. Tel: 0908 71771.
USA: Yamaha International Corp, PO Box 6600, Buena Park, CA 90620. Tel: (714) 522-9105.

Armadillo Systems 8-bit samplers for the Archimedes computer

Armadillo Systems of Leicester have just announced the release of two new 8-bit sound samplers for the Archimedes computer. The *A448B* is a stereo version of their original mono sampler, and the *A448M* additionally features MIDI. Both products come with updated and improved window-based software. A 16 bit Sound Sampler with MIDI is due for release this year. This features CD quality, 16 bit stereo sampling, 44.1 kHz sample rate, and four times over sampling on playback, to produce professional quality results.

Armadillo Systems Ltd, 17 Glaston Road, Uppingham, Leics LE1 9PX, UK.

SONY

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Dear Reader

Re: New analogue multi-track

Sony are proud to announce the introduction of a new 24 track analogue audio tape recorder as a replacement for the JH-24, which over the years has become something of an industry standard.

The new machine, the APR-24, is eminently suitable for recording studios and audio/video post production. It has been designed to meet the widest range of audio recording requirements, in particular the fast and accurate synchronisation of audio with video.

Featuring comprehensive microprocessor control of both transport and audio electronics, along with versatile remote control facilities for ease of use, the APR-24 represents a major step forward in the world of cost effective analogue recording.

The APR-24 has an internal synchroniser, which being part of the machine's software, gives substantial advantages in terms of cost, space and ease of interconnection for external machine control. It also features a built-in all format timecode generator, giving versatile tape striping without the need for a separate timecode generator. In addition a multi-function metering system is included plus triggered edit synchronisation as an alternative to controlling drop-ins from an external synchroniser or studio computer.

State-of-the-art audio circuits and components ensure superb sound quality and microprocessor assisted alignment provides the user with accurate and repeatable control over machine line-up.

All these features, coupled with Sony's unrivalled reputation for quality and reliability, mean that the APR-24 is the solution to your audio problems. Don't delay - Contact your nearest Sony centre to find out more. You'll not be disappointed.

Sincerely

SONY

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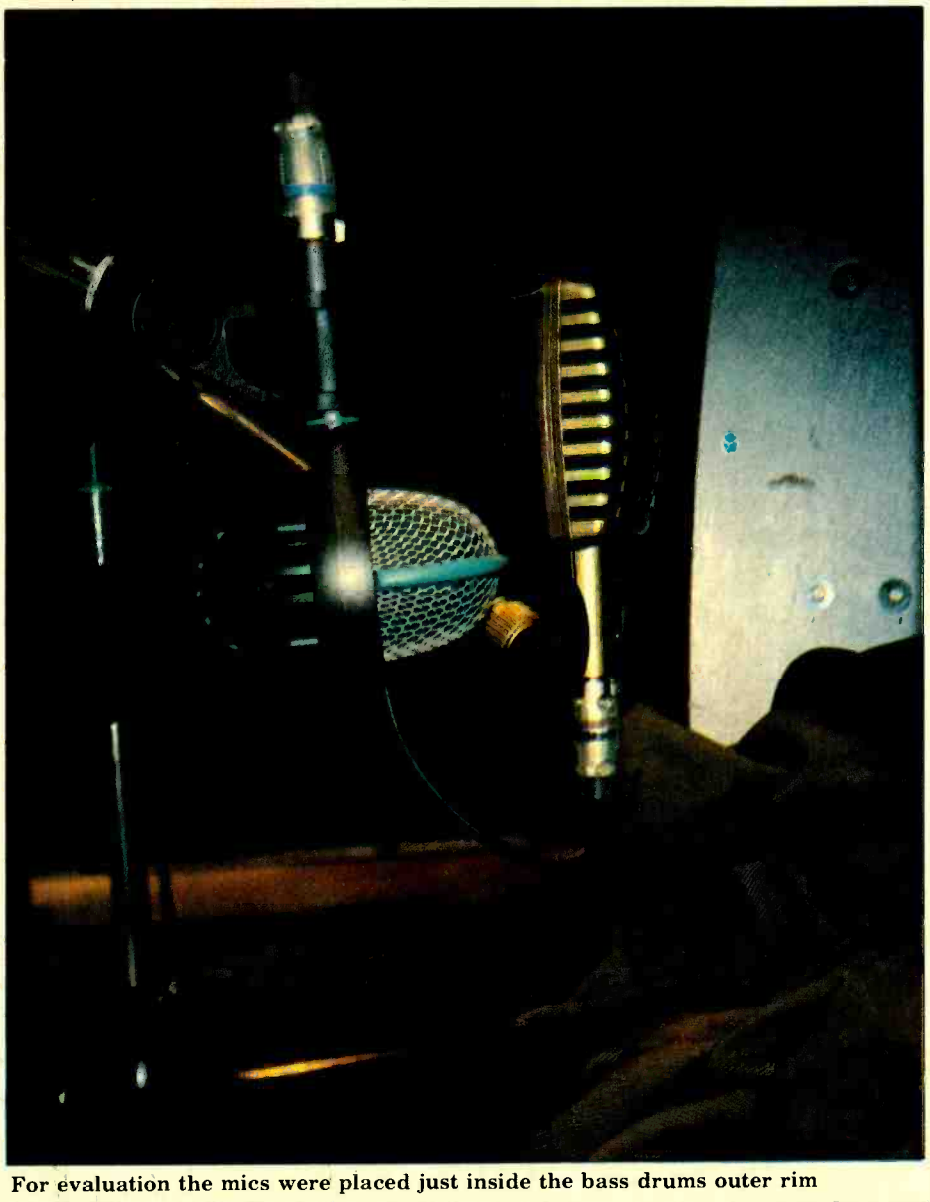
Zurich 7333311 Eastern Europe – Vienna 554606 Middle East – Geneva 936350 Africa – UK 0256 55011 Headquarters – Basingstoke, UK 0256 55011

BEAT MICS

Three UK-based producers compare microphone preferences for bass drums. Each visited the others studios and Patrick Stapley was there to report back

AKG and Beyer have each 'recently' produced dynamic mics designed for bass instruments emitting high sound pressure levels—in particular bass drum. The AKG *D112* is cardioid and has a frequency range of 20 Hz to 17 kHz with a lift at around 4 kHz and 100 Hz, the Beyer *M380* is fig-of-eight with a range of 15 Hz to 20 kHz and has a much flatter response. Both mics are sturdily constructed: the *D112* having a die-cast aluminium housing finished in dark grey metallic enamel, and the *M380* a die-cast zinc housing finished in antique brushed bronze. Special care has been taken to eliminate mechanical and wind noise, with a rubber shock mount and dual windscreen in the case of the AKG, and a suspended system with a single screen for the Beyer. In addition each mic is hum compensated.

The *D112* is 150 mm (5.9 inches) high, 70 mm (2.8 inches) wide, and 115 mm (4.5 inches) deep; it must be one of the most unusual designs to appear from a microphone manufacturer in recent years, and its egg-shaped, sci-fi appearance wouldn't look out of place on a Spielberg set! In comparison the *M380*, 106 mm (6.3 inches) high, 66 mm (2.6 inches) wide, and 57 mm (2.2 inches) deep, looks rather old fashioned and bulky. Both mics weigh roughly the same, the AKG being slightly heavier at 380 g.



For evaluation the mics were placed just inside the bass drums outer rim

It's been a long time since a manufacturer has developed a mic specifically suited to bass drum, and engineers have tended, in the past, to stick to a few well-tried mics that they know will produce results. Over the years the fashion in bass drum sounds has changed enormously, from the 'felt but not heard', to the 'heartbeat', to the 'disco click', to the 'power punch' sound of today. Whether or not different mics have played a large part in these changes is debatable but certainly different tuning and damping techniques, along with new approaches to EQ and processing have been major factors.

To evaluate the mics and make some comparisons, we thought it would be interesting to enrol the help of three well-respected producer/engineers, all skilled in the rapidly diminishing art of recording a drum kit. It was important that the tests should be carried out in familiar surroundings where acoustics, equipment and speakers were all well-known to the listeners; so rather than picking a single studio, which may have harboured some unknown quantities, we visited Alan Parsons at his studio, The Grange, in the Kent countryside, Haydn Bendall at Abbey Road studios which is his base, and Jon Kelly at Swanyard studios in North London, where he had been working for some weeks.

Session drummer Pete May provided a choice of bass drums: a 14 inch deep, 22 inch diameter Gretch, and a 16 inch deep, 22 inch diameter Yamaha *9000 RP*. Both drums were fitted with Remo *Black Dot* heads and had the front heads removed. The skins were tuned to a medium tension, and the pedal used in each case was a Drum Workshops *5000* fitted with a wooden beater. Each of our producers cast a critical ear over the two drums, adjusting damping to suit taste, but in the end each chose the Gretch, which appeared to have more attack and less boom than the Yamaha. Once the decision had been made, the rest of the kit was set up to enable the mics to be checked against spill levels.

The three studios all had wooden floors, and on each occasion the identical kit was set up on a square of carpet in a central position. The size of rooms differed, from the large ambient space of Studio Two at Abbey Road, to the smaller more intimate rooms at Swanyard and The Grange. At Abbey Road the mixer was an SSL and standard EQ was used, at Swanyard the mixer was also an SSL but with *G* series EQ, and at Parson's studio it was an Amek *Angela*. The large/small monitoring was as follows: Abbey Road B&W *801* and B&W *DM1200*; Swanyard Quested and Yamaha *NS10*; The Grange Quested and Acoustic Research *AR 18*.

We also introduced an AKG *D12* for reference, as it's a mic that has been synonymous with bass drum recording for decades, and would certainly be one that our evaluators would be familiar with. In addition we invited them to add a mic of their own for comparison but—apart from Bendall who put out a Neumann *FET 47*, which is the mic he generally uses on bass drum—the others were happy with the *D12*.

The mics were positioned by each producer, and initially they all placed them in a line just inside the outer rim. An observation made by Bendall while setting up the mics, was that the clip on the Beyer was prone to disengage during adjustment. Console mic gain was then adjusted to give equal levels and no EQ was added. This ▷

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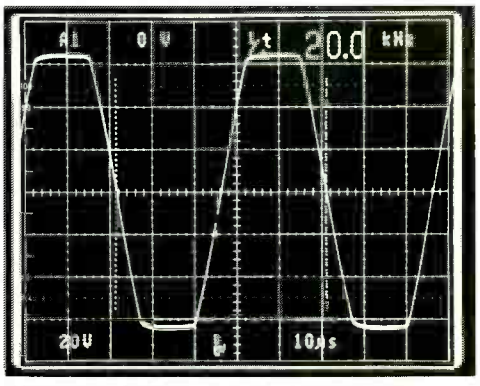

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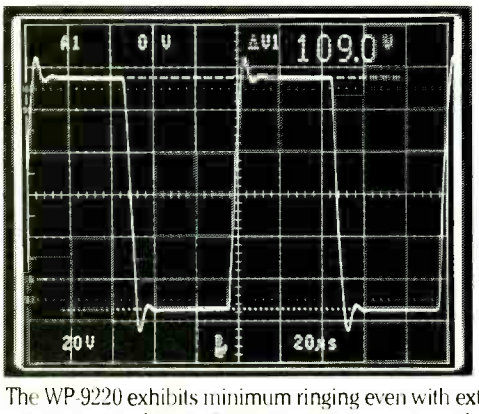

The WP-9220 exhibits minimum ringing even with extremely reactive loads. (8Ω, 1µF; 10 kHz square wave input.)

300-318 Bath Road, Slough, Berks SL1 6JB
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RAMSA
Pro-Sound By **Panasonic**

◁ was the starting point for comments, and at this stage all three seemed to concur—the *D112* produced a good solid sound with accentuated attack, the *M380* seemed 'woolly' in comparison with no attack but had an extended bass response. and the *D12* gave a boxy, hollow sound lacking in low end. It was also noticed that the Beyer had a much higher output than both AKGs and Parsons estimated it to be around 6 dB louder, which he pointed out was close to the output one might expect from a condenser.

Next, everyone tried swapping positions to see if there were any fundamental changes but all remained consistent apart from the *D12*, which seemed to give better results in a central position. They also experimented with the distance of the mics from the skin and again the overall characteristic remained constant, although there were obvious changes in perspective and, as everyone noticed, an increase in bass response as the mics got closer. Kelly felt the Beyer produced an overloaded sound when moved in very close; he also thought it sounded more distant in relation to the other mics, which could be connected with the fact that it is fig-of-eight.

Having placed the mics in a position they were happy with, which in each case was very similar—approximately a foot away from the skin with the diaphragm angled in towards the beater—the three went about EQ'ing and this is where opinions started to differ. Parsons and Kelly basically agreed that the *D112* produced a good punchy sound that required little EQ to cut through a track; they found the *M380* needed radical treatment to produce a modern sounding bass drum, and Parsons in particular was anti-excessive equalisation: "I can hear that it has a good bass response but that's not necessarily what one wants in a bass drum mic. Bass drum recording these days is little to do with bass, its all down to attack and umph. I dare say that the Beyer is the most accurate of the three but it doesn't work for me on bass drum. I can imagine it being a good mic to use on things that don't have a lot of high frequency content and are quiet, like a double bass for example, or conversely it could be good on very bright brass rather like the Celes *4038* which is also fig-of-eight."

Bendall on the other hand was quite happy to heavily EQ the *M380*: "It's not always the mic that sounds best flat that gives the best results when EQ'd, and although the Beyer needs more work to get a sound than the *D112*, the result is much more solid."

In fact it took a good deal of work: +9 at 10 k, +10 at 4.5 k, −12 at 200 Hz, +6 at 80 Hz, and SSL compression.

"Compression doesn't do much for the other mics but a little helps make the Beyer sound tighter."

Interestingly enough, Kelly took a similar approach with the EQ: "To clean it up I've taken out 15 dB at 200 Hz but the problem is getting any click out of it and I'm having to add masses of top. The *D112* on the other hand is much more controllable in the high end which suits me as I tend to take away more in the low end than I add to the top, and I'm having to do very little to get a good sound out of it. Having said that though there is something in the quality of the bottom end of the Beyer that I miss when I switch back to the *D112*. The Beyer is more the kind of mic I might choose if I were recording an orchestral bass drum or the bass drum in a 3-piece jazz band but for 'rock and roll' I'd go with the *D112*."

Comparative tests were performed to check the spill coming from the rest of the kit. The most obvious thing that everyone noticed, was that predictably the Beyer produced a duller pick-up than the AKGs. Bendall felt that the spill on the Beyer was more in perspective than the 'open' sound on the other mics and therefore blended in better with the kit; this possibly ties in with Kelly's impression that the Beyer produced a more distant sound. Parsons was interested to see how much signal the Beyer picked up from the sides, and was impressed by its degree of cancellation. All agreed that the spill levels from both mics were quite tolerable.

As far as the *D12*'s performance was concerned there was a unanimous feeling of disappointment and Parsons, who had favoured it as a bass drum mic in the past, replaced it a few days later with a *D112*. Kelly described the *D12* as sounding very hollow almost as though it had a highpass filter across it. The *FET 47*, which Bendall put out, didn't fare much better and on this occasion he ended up giving it the thumbs down, much preferring the sound of the *M380*.

Conclusions

So what does one conclude from all this? I think what becomes immediately apparent is how different tastes and methods of working end in contrasting opinions and results, and having heard the final three individual preferences, I must say that in each case I agreed with the choice. There is a string of continuity running through the three evaluations but in the end it's down to personal style, and in this respect both mics must be considered as valid as the other, although intrinsically there are marked differences. Another variable is, of course, the source itself, and if an alternative bass drum had been used we might have ended up with a different response in both senses of the word. Bearing these points in mind, I leave it to the reader to reach his own conclusions and to decide which mic might best suit his technique.□

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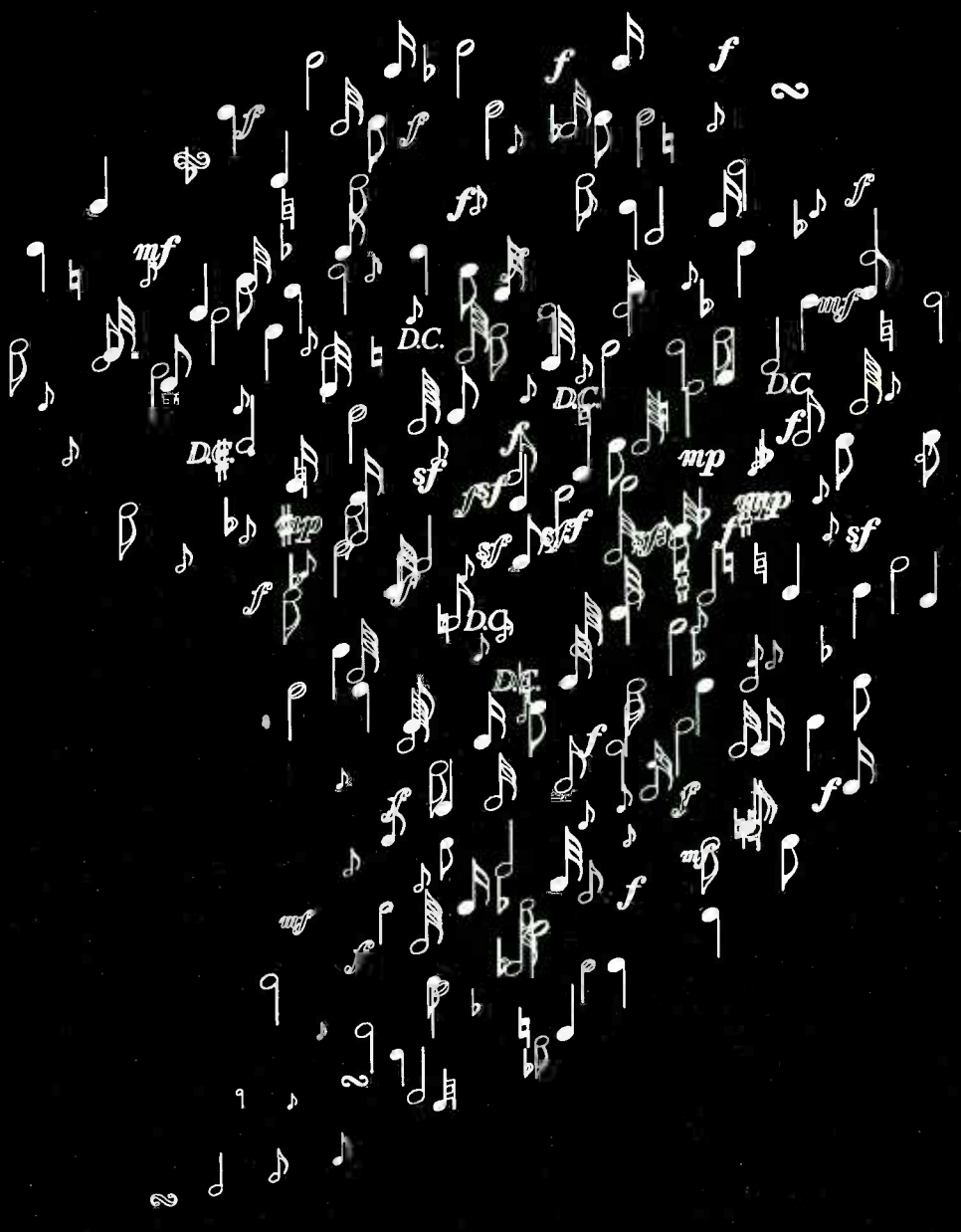

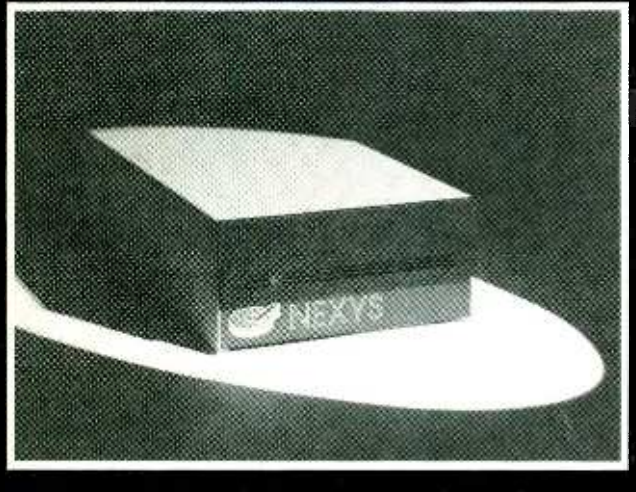

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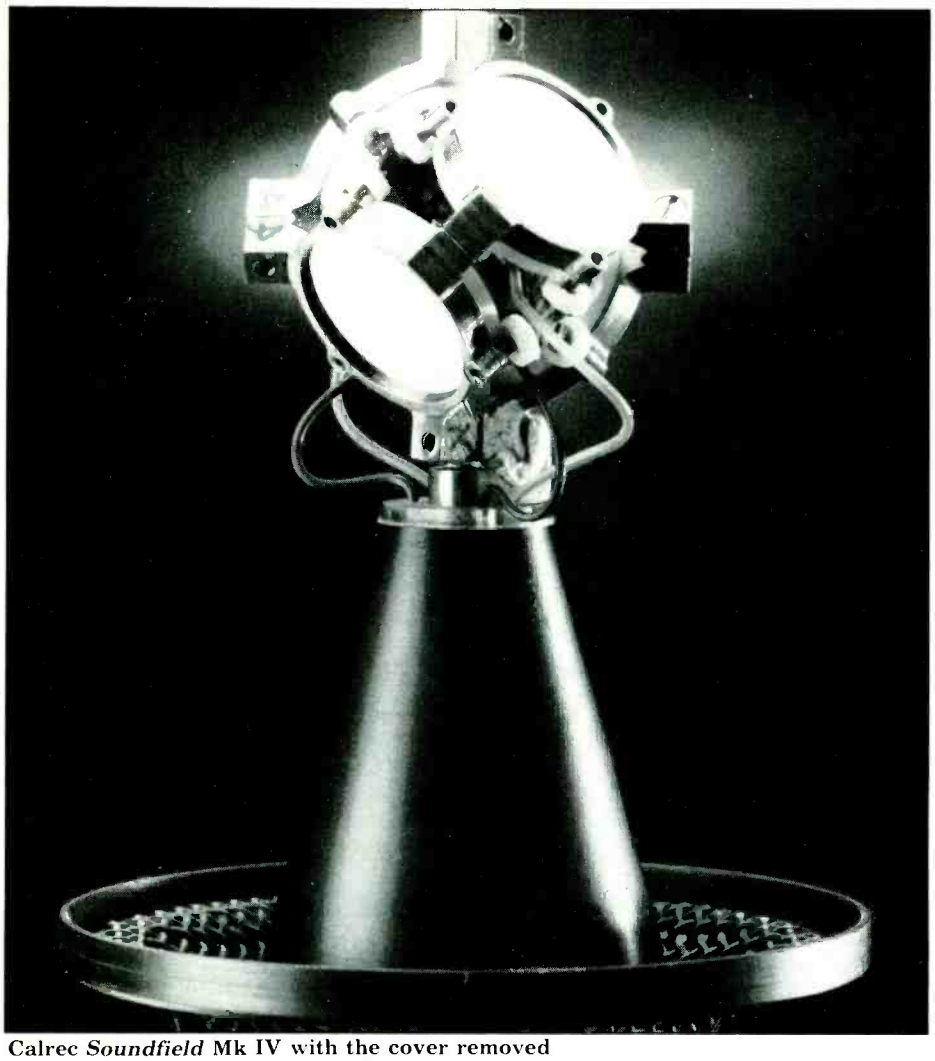

Calrec *Soundfield* Mk IV with the cover removed

SOUNDINGS ON SOUNDFIELD

David Hastilow questions two users of the Calrec *Soundfield* microphone on their production methods

The Calrec *Soundfield* microphone was first introduced in the late '70s and since then has evolved through successive generations to the current *Mk IV* series. Each generation has achieved better noise and transduction figures, and user-friendliness to the point where it is now hailed by Mike Stock, of the Stock, Aitken and Waterman production ensemble, as the 'Rolls-Royce' of microphones.

Their enthusiasm is further endorsed by the fact that they use the system only as a straightforward microphone and not in its total capacity as a further control over ambience, desirable or otherwise.

"The reason we prefer to use it is because we want, on tape, the total frequency spectrum of the voice we're recording, without colouration or that sort of 'veiling', which seems to be a characteristic of all of the other mics we've tried.

"We route the mic output to just one mono track, safe in the knowledge that we have on tape the best possible starting point for any after treatment, which is a totally unindoctrinated signal."

Other users feel safer having the mic output across a number of tracks and this enables a considerable post-production capability, adaptable to a wide number of applications, not only in the recording of orchestral music, where the *Soundfield* mic is truly at home, but in the television studio, and the effects department of the Royal Opera House.

First though, John Fredericks, engineer at Wool Hall Studios who is currently working on a project with Paul McCartney, will give us a brief summary of the system. (Non-technically minded readers may wish to dig out a couple of sound recording and old school maths text books!)

"Basically, you have a tetrahedron of capsules within the microphone, from which, if you do some seriously involved maths, you can derive a variety of polarities. For instance, if you 'sum' all the capsules you arrive at the mathematical equivalent of a point source omni, a point destination omni. And in that respect you've got the best omni you can have, because it's sampled at a point source, rather than over a diaphragm.

"The key to it all is that the tetrahedron approximates to a sphere, also, by various electronic matrixing you can derive any pattern of microphone that you'd care to choose, and obviously, by very simple adding and subtracting of electrical constants you can effectively move the position of the microphone and where it picks up from. You're not forever pointing a pair down or moving it back slightly, which obviously gives a change of perspective but you get the change of 'picture' in the front and you change what's behind whereas you don't so much if you keep the microphone in the same place, you just change the emphasis from front to back.

"In the *Soundfield* control area you have pan and tilt, that is, you can turn the mic laterally or tilt it vertically and also change the dominance, ie the front to back ratio. So it is fairly flexible in what you can achieve electronically without having to get out of your seat!"

This latter point is not only the essence of the *Soundfield* mic in post-production but it is very versatile in those situations where it would otherwise be impossible to make any changes to a normal pair of microphones.

Fredericks continues: "You might be mixing out-riggers, you might be mixing a choir pair, or working in those situations where you won't get a second chance at changing the position of the mic. With the Calrec, you can take a pre-*Soundfield* output and then send it back through *Soundfield* control later. You'd be putting w,x,y, and z signals across four tracks and thus you'd be able, to apply the electronic matrixing all over again.

"You can get away with omni and x and y if you're willing to limit your scope and, as far as I know, once you've committed the system to stereo it can't be retraced."

Playing around with the off-tape signal has been likened to copying photographic slides with a zoom slide copier. The electronic matrixing enables the whole perspective of a performance to be changed, from the 'listening' position.

This feature has also found considerable application in the origination of off-stage effects in the theatre.

Eric Presley, at the Royal Opera House: "Many of our shows were written in the 19th century, with very large casts and often set in the open air—and performed there too. Quite often, either due to the way the set has been built or just the production criteria concerning the movement of performers, and the audiences ability to see them, we are actually unable to accommodate everyone actively involved, on the stage.

"Consequently, a choir or group of musicians, or

a screaming frantic mob, for instance, will have to be mic'd up in another part of the building and then that output signal routed to the front of house speakers.

"However, it is extremely important, to the show as a whole, that that separate performance be in the right ambient context. Otherwise, it would simply destroy the whole illusion if an action which is supposed to be happening outside sounded as if it were coming from within a large, ambient room. In fact, it was the way the *Soundfield* mic was first marketed that put me off buying one for a number of years because the last thing we want to record here is the sound-field. Rather the opposite in fact.

"So, having the perspective control means that we may juggle around with the signal to suit virtually any production requirements.

"Rehearsals for us are often three runs at something in realtime with no stopping and no going back. So the ability to be able to change the emphasis, or the 'position' of the mic is marvellous."

Coping with the demands of the 19th century are one thing but meeting the exacting demands of 20th century producers is the lot of most engineers now. As home hi-fi reproduction nears that of the recording studio, and studio automation leaves the engineers hands to do very little, the smallest nuance of production criteria will begin to take on a greater degree of importance. At least we no longer have to suffer the unbearable agony of hearing our recorded masterpieces being gradually eroded by the grating combination of dust and stylus.

Nowhere is production technique more noticeable than in the recording of the 'fronters' themselves, the singers. Just a slight variation in the quality of someone's voice can be a deciding factor as far as the record buying public are concerned and personal stereo technology has brought the singer and listener less than half a cubic centimetre of 'auricle' space, apart.

Though technology has yet to evolve to the point where a sound-field may be brought up on a screen and then altered with a light pen or mouse. The very fact that microphone movement may be electronically matrixed, a fact which in itself was once thought to be impossible, places the idea of 'computerised phase' manipulation definitely in the 'probable'.

Little wonder though, that for those inmates who are accustomed to manipulating sound signals with Fairlights and the like, should now look to the Calrec ambisonic microphone for that extra degree of control within the 'stereo' landscape of the sound picture.

The *Soundfield* mic is an invaluable tool in those applications where it would be impossible to either move the mic or replace it. Such as at a live performance, or when one has a vocal on tape and the singer has flown back home across the great water.

Some engineers are, however, reluctant to devote four tracks to one vocal but are pleased at being able to achieve a more than acceptable vocal sound across two, or even on one track. The primary criterion here is that without moving faders or twiddling with the EQ knobs the strength, clarity and perspective of the vocal may be varied from the engineering position. This allows a greater degree of concentration on what one is actually listening to, rather than whether an acoustic screen is six inches too close to the singer or whether anything major might be achieved if one went and moved the mic a couple of centimetres. This is the real value of the *Soundfield* mic.□

A scene from *Les Misérables*

TRANSATLANTIC MUSICAL STAGING

Autograph Sound Recording has worked on *Les Misérables* and *Chess*, tasting both success and defeat. Caroline Moss reports

One of the biggest differences between opening a show on Broadway and repeating the experience in the West End of London is that on Broadway the show stands or falls on the opinions of a select group of New York theatre critics. If the critics enjoy the show and write favourably about it, the show is almost guaranteed a good run. If, on the other hand, there are bad reviews, it can sometimes be just a matter of hours before the signs are being taken down from the theatre where the ill-fated show has come to the end of its short run. Sound designer Andrew Bruce of Autograph Sound Recording experienced both sides of the coin at close hand in just over a year, during which time he also set up an American subsidiary of his company.

When he arrived in New York in 1986 to work on the transfer production of *Les Misérables*, which had already been a huge success in London, he found himself being treated like visiting royalty. Bruce had worked on *Les Misérables* since its first production in Paris in 1981 when it had disappeared without trace after running for a season. Four years later it re-emerged in a totally different form when Cameron Mackintosh bought the rights to stage it in London. At the time Bruce didn't give much for the chances of the new London production thinking the British public would not react well to the musical's title and epic story line. Sure enough, the initial reviews were bad and at the traditional breakfast following the opening night, when the producer director and key people involved in the production gathered to read what the critics had to say, Bruce was told that "the mood around the table was deepest black."

Fortunately, this being London and not New York, the Royal Shakespeare Company's subscription system acted as a buffer, meaning that *Les Misérables*' run at the Barbican theatre was virtually sold out in advance and it became such a huge success with the theatre-going public that it transferred to the West End, from there becoming an international commodity. Which brings the story back to Bruce arriving in New York to work for the first time on Broadway. It was immediately obvious that the reputation of *Les Misérables* had not only preceded it but that it was hyped to the point where in some ways it could never reasonably fulfil its expectations. Bruce had seen this happen in London in 1976 when *A Chorus Line* came over from Broadway but the subsequent change in direction of musicals across the Atlantic meant that the terminology, 'The British Invasion' had sprung up in New York, and that all involved in this invasion were afforded an elevated status on Broadway.

Bruce needed to find an engineer for the New York production of *Les Misérables* in whose hands he could quite happily leave the show to run and after much searching, Tony Meola emerged as the obvious choice.

Meola was a former operator who had decided some years previously to stop mixing shows and work as a freelance sound designer. He was initially very reluctant to regress to being an operator again but Bruce was determined to persuade him, realising that Meola thought and worked in a very similar way to himself.

In August 1986 he eventually agreed to do it and came to London to prepare for the show, educating Bruce in the ways of working on Broadway and the different terminology used in the American theatre. One of the first things that Bruce learned was that the sound hire companies worked in a totally different way. He was used to a hire company, such as his own, that designs, puts together and installs complete systems into the theatre. In the US, hire companies do just what their name implies—as they are prevented by the unions from being involved to the same extent they merely hire equipment. Which meant that when he prepared his list he had to be somewhat more accurate about his requirements, making sure he'd thought out every last nut and bolt in advance. Then when the equipment arrived at the theatre it was installed by a local crew, all of whom had differing ways of putting equipment together.

Bruce: "It is obvious to say but like any designer, I feel most comfortable when I'm working with equipment that I'm used to. Consequently when working abroad, I always start by sending a detailed specification of the equipment I use in London.

"However, I know before I go and visit a potential hire company that the first questions will be 'Will you accept a TAC *Scorpion* or Yamaha *PM3000* instead of Cadac *E* type? How about Vega radio mics instead of Micron? Have you ever thought of using Turbosound loudspeakers instead of Meyer?'

"If it is a first class production with direct involvement by the original producer then the answer is no—for the simple reason that I believe that I'm there to repeat the sound for the show as closely to the original as possible and not to spend valuable time learning about the advantages and limitations of other types of equipment.

"What I am sure of is that those choices have been made for very clear reasons.

"On the subject of mixing desks we had come to the conclusion in 1983 that none of the live sound consoles available were up to the standards required by theatre and trade shows so we asked Cadac to build a console to our specification. It incorporated balanced busing throughout, expandable frames, dual independent power supplies and many other smaller features. Since then, we've updated the design three times.

"The same argument applies to the radio microphones and loudspeakers.

"I clearly remember the time when we started dealing with overseas sound designers in the mid '70s. We felt that ultimately it would be better to provide what was asked for if at all possible because then there could be no recriminations later and the designer couldn't ever say '...well if I'd had what I had asked for...'"

Les Misérables opened to ecstatic reviews and after the show had settled in on Broadway, Meola helped to form two national touring companies so that it could be seen throughout the United States. As Bruce and Meola worked more and more together, at this stage mostly by transatlantic telephone calls, it became obvious ▷

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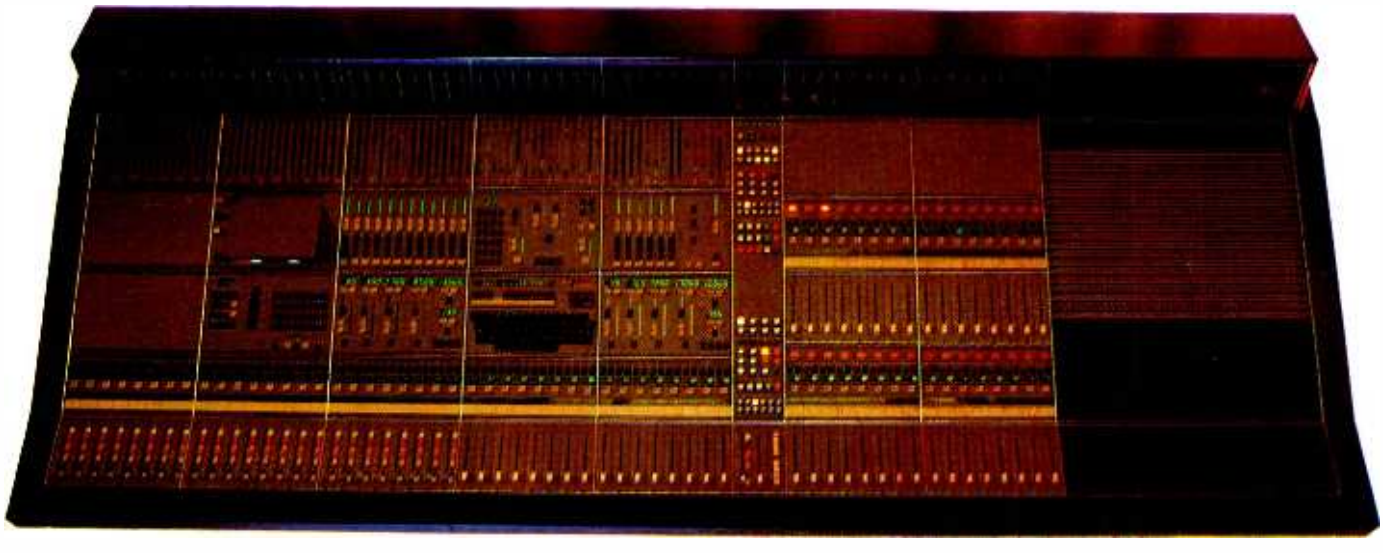

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The Cadac console used for *Chess*

◁ that they should formalise their working arrangement and set up a branch of Autograph in New York.

Bruce: "Our intention was to help make things very smooth for transfers of the *Les Misérables* type, because I don't believe for a minute that the tide will continue to flow from East to West as it has been doing for the last few years. It'll switch back. Broadway and the West End tend to be roughly 180 degrees out of phase, and it struck us both that working for the same company 3,000 miles apart could mean that by increasing the co-operation and access to information on both sides of the Atlantic we would work more harmoniously and efficiently, which would benefit both ourselves and the producing managements." So at the beginning of 1988 Autograph Sound Inc was formed.

The first show the new company worked on was the transfer of *Chess* to New York. This time Meola was to work as Bruce's associate sound designer but to all other intents they approached the job in the same way as *Les Misérables*, thinking to repeat its success.

Meola: "To tell you the truth, *Chess* from the beginning was fated. It was on again, it was off again, it was on again. Just before the New Year it was announced that *Chess* was not going to happen in the States. Then a few days later Andrew got a call from David Hersey the lighting designer, not even the producers, to say that *Chess* was back on."

Another thing they weren't told about until rehearsals started was whether or not the show would be the same as the London production. In the event it was completely different, being much more of a straight play with musical interludes than its fully sung counterpart in London. Not only did they have to design the show with no script but a hire company still hadn't been decided on. Eventually A1 Audio, based in Hollywood, won the contract. They had worked on *Starlight Express* on Broadway but most of their experience lay with rock and roll and big Las Vegas acts. It was with some trepidation that Bruce embarked on the detailed planning with a company based 3,000 miles away, as far from the venue as he was in the opposite direction.

When Bruce and Meola finally sat down with director Trevor Nunn halfway through rehearsals and six weeks before the opening date, to be told about sound effects, he added another six pages of effects to the three pages they had compiled from the preliminary version of the script. There were potentially 100 sound effects to be prepared, compared to just six or seven used in the London production.

Bruce: "Because it was a new show, Trevor had decided to approach it in a completely different way, and in his own words, he wanted to treat the whole thing as though it were a film. To that end, every scene had a filmic ambience track running throughout, so that if you were on the third floor of the Hilton in Bangkok you would have one type of Bangkok street sound, if you were on the 34th floor it took on a different character."

Many of the effects were predictably dropped after they had been tried out, for instance the sound of a Thai television set coming from an adjacent hotel room, painstakingly recorded, was cut as soon as it was played.

Meola: "In a film you can afford to have sound ambience running through one particular scene, because the editing and camera shots can direct your focus, you can zoom in on a close-up and it doesn't matter what's going on in the background, the ear can be pretty selective. But on a stage with a wide viewing area, with a sound going on in the background and two people downstage right carrying on a dialogue, it becomes infinitely more difficult to concentrate."

Bruce: "And it must be said that Trevor, having tried it once, which was all he wanted to do, came round to thinking that yes, it was too distracting but it gave us an awful lot of unexpected work in the studio."

Much of this work was carried out by Mark Menard, recently taken on by Meola as the second member of Autograph Sound Inc, who ran back and forth from studio to theatre on an hourly basis to deliver completed effects and get an update on what had changed in the meantime.

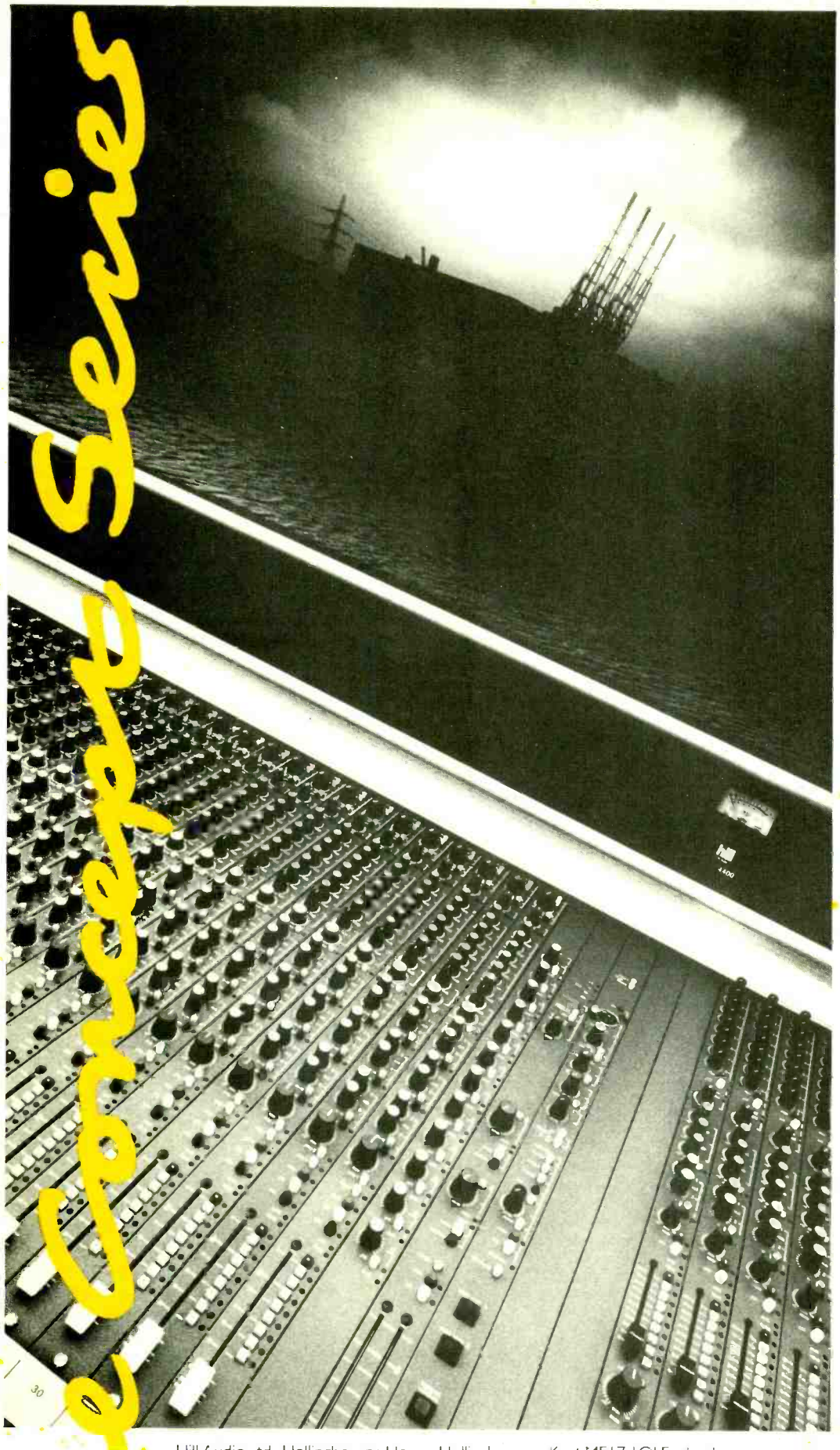
When *Chess* finally opened on April 28th 1988, it was mercilessly slated by the critics, who found fault with the production right across the board, with the exception of performances given by those in the leading roles. Six million dollars had been put up in promissory notes from booking agents, who play a big part in the success of Broadway shows by reserving blocks of seats for theatre parties travelling from all over the States. Overnight the whole amount simply disappeared into thin air. The show ran for just six weeks.

Bruce: "Until the day it closed, *Chess* was doing very respectable business. In spite of the reviews, the show definitely did appeal to the native theatre-going New York public who took the risk and wanted to see for themselves. It is interesting to observe a side effect of the theatre party phenomenon on a smash hit transfer from abroad. Block bookings by agents can fill the show on paper for years in advance. While this provides welcome security for the producers with full houses and an assured future, these audiences are notoriously unresponsive. Accordingly, many a hit show has suffered an ambivalent reception during its first six months as a consequence of its rave reviews. At the same time it can be very demoralising for the cast and frustrating for those who, unwilling to subscribe to a group booking scheme, can't get a ticket until 12 months has elapsed and a replacement cast has been installed."

After recovering from the *Chess* experience, Meola went on to work on the sound systems for national touring companies of both *Driving Miss Daisy* and *Anything Goes*. Touring companies travel the United States staying a minimum of two weeks in each city, bringing the show to people who would otherwise not be able to see it. At the same time he worked with a third touring company of *Les Misérables*, this time a 'bus and truck' version where the company arrive in a city in the morning and are ready for a matinée performance the same afternoon. On top of this he was preparing for a Canadian tour of *Les Misérables*, set to open in Toronto on March 15th, 1989. Tours such as these obviously need constant co-ordination, a task that has now been simplified with the creation of Autograph Inc.

Meanwhile, in London, Andrew Bruce is working on a new musical called *Miss Saigon* by the writers of *Les Misérables*. Due to open in the West End later in the year, it is a modern version of the Madame Butterfly story set in Vietnam at the end of the war.

There are no plans for Autograph Sound Inc to step up its operations by hiring out equipment in the States. To begin with, employing staff is much more complicated than in Britain as only union labour can be employed if the company wants to work on Broadway. Secondly, neither Bruce nor Meola feel that there is the need or room for another American rental company. Both parties feel that the company should concentrate on providing design services. They have entered into a firm two-year commitment in order to give Autograph in New York time to develop, partly supported by the parent company. And as plans are already in the pipeline for the Broadway hit *Anything Goes* to transfer to the West End next summer, it looks as if the London-New York tide may be set to change.□



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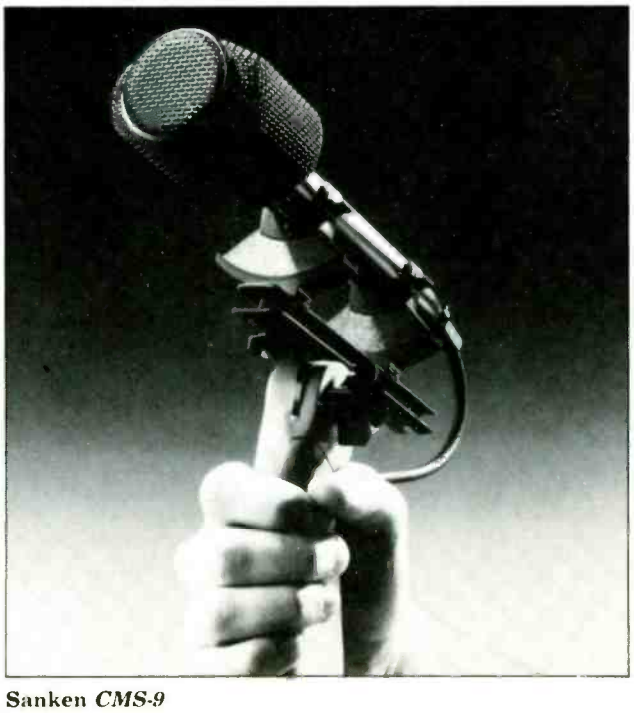
MICROPHONES

A list of the new microphones introduced in the last 12 months compiled from information available to us at the time of writing

AKG: *C525S* hypercardioid condenser for stage use with phantom or battery powering. *C426B* large diaphragm stereo condenser with fully variable polar pattern and MS/LR operation. *PPC1000* slip-on polar pattern converter for the *C1000S* that changes cardioid to hypercardioid. *MPA* micro mic phantom adaptor allowing all microMics to be phantom powered from 9-52 V. *D905/D955* dynamic mics. *D905* cardioid and *D955* hypercardioid. Both rugged designs for hard stage use.
Bruel & Kjaer: *4011* pre-polarised cardioid.
Beyer Dynamic: *SHM10* gooseneck condenser mic. *Tour Group* series range of mics for live use with reinforced grilles and matt black finish. Includes versions of established mics such as *M88*, *M380* and *M300*. *MCE86* lightweight pre-polarised gun mic.
Fostex: *M22RP* MS stereo with 'printed ribbon' elements now available in the UK.
Neumann: *KM100* variable pattern miniature condenser mic system. *RSM190i* stereo transformerless short shotgun with built-in MS/LR matrix.
Milab: *D-37* robust dynamic with solid brass body and soft capsule suspension. *BM-75* condenser design with switchable pads for stage applications.
Pearl: *CC30* cardioid transformerless with rectangular double membrane capsule for studio applications.
Sanken: *CU-44X* transformerless dual-capsule version of the *CU-41* condenser microphone. *CMS-9* portable stereo cardioid mic available in MS and LR formats. *CMS-7S* new version of *CMS-7*.
Shure: *Beta 57/58* supercardioid dynamic microphones developed from *SM57/58*. *55SH II* redesign of classic *55* series *UNIDYNE II* microphones. *SM99* supercardioid miniature gooseneck condenser.

Addresses

AGK, Akustiche u Kino-Gerate GmbH, Brunhildengasse 1, Wien A-1150, Austria. Tel: 222 956517.
UK: AKG Acoustics Ltd, Vienna Court, Catteshall Wharf, Cateshall Lane, Godalming GU7 1JG. Tel: 04868 25702.
USA: AKG Acoustics Inc, 77 Selleck Street, Stamford, CT 06902. Tel: (203) 348-2121.
Beyer Dynamic Electrotechnishe Fabrik, Theresienstrasse 8, Postfach 1320, Heilbronn, D-7100 West Germany. Tel: 71 316170.
UK: Beyer Dynamic UK Ltd, Unit 14, Cliffe Industrial Estate, Lewes BN8 6JL. Tel: 0273 479411.
USA: Beyer Dynamic (USA) Inc, 5-50 Burns Avenue, Hicksville, NY 11801. Tel: (516) 935-8000.
Bruel & Kjaer A/S, Naerum, DK-2850, Denmark. Tel: 2 800500.
UK: Bruel & Kjaer (UK) Ltd, Harrow Weald Lodge, 92 Uxbridge Road, Harrow HA3 6BZ. Tel:



Sanken *CMS-9*

01-954 2366.
USA: Bruel & Kjaer Instruments Inc, 185 Forest Street, Marlborough, MA 01752. Tel: (617) 481-7000.

Fostex Corporation, 560-3, Miyazawacho, Akishima, Tokyo, Japan. Tel: 0425 45 6111.
UK: Harman (Audio) UK, Mill Street, Slough. Berks. Tel: 0753 76911.
USA: Fostex Corporation of America, 15431 Blackburn Avenue, Norwalk, CA 90650. Tel: (213) 921-1112.

Milab (International) AB), PO Box 510, Spinngatan 3, S-260 50 Billesholm, Sweden. Tel: 42 730 70.
UK: Klark-Teknik Research, Walter Nash Road, Klark Industrial Park, Kidderminster, Worcs DY11 7HJ. Tel: 0562 741515.
USA: Klark-Teknik Electronics Inc, 30B Banfi Plaza North, Farmingdale, NY 11735. Tel: (516) 249-3660.

Neumann (Georg Neumann GmbH), Charlottenstrasse 3, Berlin 61, D-1000, West Germany. Tel: 30 251 4091.
UK: FWO Bauch Ltd, 49 Theobald Road, Borehamwood, Herts WD6 4RZ. Tel: 01-953 0091.
USA: Gotham Audio Corporation, Eighth Floor, 1790 Broadway, New York, NY 10019. Tel: (212) 765-3410.

Pearl Microphones, Box 98, S-26501, Astorp, Sweden. Tel: 042 588 10.
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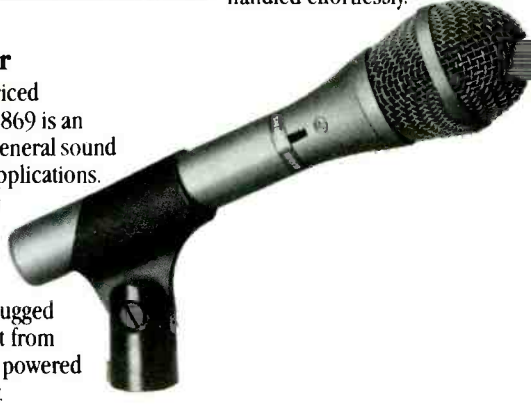

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Studio Three Control Room

LIVINGSTON

Janet Angus visits this complex in North London, which has recently been renovated and two new studios added

London is not renowned for its vastly spacious studios. In spite of its importance in the recording world, the capital city imposes severe constraints on studio owners and designers in terms of available space, not least because of the sheer finance involved. The most obstructive problem, however, is the fact that most London studios have been constructed within existing buildings and unless you are lucky enough to find yourself a nice church or similar building, you have to come to terms with the fact that spaciousness is not going to be one of your prime selling points.

Livingston's situation is therefore quite unusual. They, too, have grown up with constricted recording areas in the past and so their two latest studio facilities have been doubly exciting. Their answer to the problem has been to move into an industrial unit where, almost literally, the sky was their limit. The result is two magnificently large recording facilities with several recording areas apiece and a chance to do something a little different from a design point of view.

Not only have these two studios brought about a completely new Livingston—in terms of facilities, clients and renown—but it also saw the beginning of the studio design partnership KFA: Kinsey Fitzgerald Associates. As a founder member of the studio, Kinsey had already built the original two rooms round the corner in Brook Road, remoulding them over the years as fashion dictated. The acquisition of the factory units in nearby Guillemot Place presented him with the opportunity to put his ideas to the test in the sort of large space many designers would give their eye teeth for.

This was the beginning of KFA as a separate company, as Kinsey joined forces with Fitzgerald, the buildings expert of the team. Their first project, Studio Three was carried out on a very strict budget as Livingston took a giant stride into the top of the studio tree and away from the original rooms, which had acquired a more or less cult following. Constructed in 1980 and '82 in a former church hall, they are described these days as being 'cosy', although they are every bit as big and roomy as many of the facilities in the city centre. As they are situated in North London, Livingston had to work hard for its market but they nevertheless count among their followers many name producers and musicians, both old and new.

Big decisions were taken like finally buying an SSL console for Studio One. Nowadays of course they have three but at the time it was another of those giant strides up the studio status ladder. The studios at the two locations, although separated only by a few yards are almost worlds apart and yet they complement each other remarkably well. As studio manager and partner Jerry Boys says people never use the rooms you intend them to use; they will come to mix in the recording rooms, and record in the mix rooms; they come and lay tracks in Studio Two when you have built Studio Three for that purpose. All you can do is offer as wide a variety of recording areas and equipment as possible to appeal to as many customers as possible and let them get on with it.

The formula is certainly appearing to work as Livingston goes ▷

Studio Three Drum Room

◁ from strength to strength. Some would imagine they have reached the top of that ladder but as far as the partners are concerned there are a great number of things that can be achieved before then; new avenues to explore and others to widen.

The 'built on a budget' Studio Three, looks anything but that. Boys has come to learn that the part of a recording studio that loads the building costs is the finishes. Studio Three was built in 1986 on a shoestring. Studio Four was finished in May 1987 and involved considerably more expense, a great deal of which went into trims and other visual niceties arrived at through consultation with interior designers EGA (Elwick Grover Aicken Partnership) of Brighton.

In spite of Nick Kinsey's previous involvement in Livingston design, Boys was nervous during the Studio Three build and behaved much the way most studio managers behave during a build. When it came to the fourth facility, however, apart from choosing colours and basic concepts, he managed to more or less leave them to get on with it, no doubt much to everybody's relief! The two facilities are very similar in concept. Both have several recording areas offering a variety of options and opportunities, and both have spacious control rooms.

The layout in Studio Three is thought to be slightly more ergonomically conducive to playing as a band (yes some people still record real instruments) as the areas are grouped closer together (Studio Four's are spread out in a long line). There is a very large drum room, which overlooks the courtyard and thus features natural daylight. Quite a large proportion of the wall area is mirror finished, the remainder being covered simply by plasterboard. The floor covering is oak parquet tiles, the ceiling being tongued and grooved softwood. Red battens brighten the room up visually.

Studio Four

Adjoining the drum room is a less live area, the walls of which are finished in roofing slate—very cost effective as well as acoustically appropriate. The paving stones that cover the floor are the same.

Boys recalls just how tight the budget was at this stage: "We hadn't proved to the bank that we could build this sort of studio and make it work financially."

In spite of budgetary considerations the room is in fact very attractive and comfortable. The same blue/grey fabric and red batten trim theme is carried through into this room which again features natural light. The trapped ceiling is covered over with blue/grey fabric.

The third recording area houses a Yamaha grand piano and has a carpeted floor. Acoustically transparent fabric covers the absorbent walls. And on into the fourth area, which is referred to variously as 'the silly bangy room' and 'that crazy live area'. Everything you are supposed not to do has been done in here: plastered parallel walls and ceiling, which is in turn parallel with the concrete floor. Very silly it is too but surprisingly useful as an echo chamber or sampling despite its 'over the topness', which Boys describes with a delighted grin on his face.

After the success of Studio Three, KFA went into the Studio Four project with renewed confidence and the advantage of budgets that allowed a little more creative input. Armed with an agreed basic concept of desired functions and colour scheme they proceeded to construct another four varied acoustic rooms to complement a very similar control room. The control room layout is the result of a lot of discussion about how people move around inside control rooms and how they work. Where to put the patio doors into the recording areas—to one side rather than between the monitors; should there be enough room for people to walk behind the engineer, is it in fact desirable? Deciding that people would try to walk round the engineer whether you wanted them to or not, adequate space was left for this to not interfere in any way. The producer's table behind the engineer was much more of a new thing at the time of the Studio Three build, its success borne witness to by the fact that most studios now feature this method of storing outboard equipment. It also provides ample room for hire gear and keyboards without getting in anyone's way.

One thing different between the two control rooms is the positioning of the Eastlake-type monitor tweeters. In Studio Three this is in the middle of the monitor wall, not angled down but facing directly at the engineer and those seated at the back of the room. What it did not take into account, however, was the effect of lots of gear piled on top of the producer's table, which simply gets in the way. So in Control Room Four, the tweeters are more traditionally mounted at the top of the monitor column, angled down to the listening position.

The Studio Four colour scheme comprises light greys with green and ash trim. In the recording areas much use has been made of wood in almost tree-like shapes, which make the rooms interesting while not actually serving any structural or acoustical purpose. The drum room is the livest area once again featuring a combination of plaster and glass wall finishes with perspex on the ceiling between the wooden slats. The flooring is ash and some of the wall surfaces are made to look more interesting with optical illusions such as painting the fabric covering the plaster walls to look like slate—very confusing.

The central recording area is slightly live for brass and percussion and finished in a combination of ash, mirrors and glass plus wall areas covered in panelling with fabric between the ash battens, mimicking the battening on the mirrored walls.

There is a dead area, although the description is not used in the 1960s sense. The floor is carpeted, which is the main difference acoustically between this and the previous area. The final recording room is a vocal booth, which by use of two mirrored walls and two glass doored walls produces 'a bit of a ping'.

Each studio has its own private area—a lounge adjoining each control room. "We thought a lot about providing a private area," reflects Boys. "We don't want this studio complex to feel too big, like being at the BBC, which can easily happen. The private area seems to be popular."

Studio Four was conceived more as a mixing facility than Studio Three, in spite of its large recording area, and is therefore equipped with a slightly different outboard complement. Mixing consoles are both 48-channel Solid State Logic *SL 4046 E* series with *Total Recall*. Multitracks are Otari *MTR90* 24-track, with Mitsubishi 32-track digital available to either room. Otari *MTR12* ½ and ¼ inch 24-tracks are complemented by Sony *F1* and Aiwa cassette decks.

Outboard in Studio Three comprises Lexicon *480L*, Yamaha *REV1* and *SPX90*, AMS *RMX-16*, Ibanez *SDR 1000+* and EMT valve plate reverbs; AMS *DMX 15-80S*, Roland *SDE3000* and ▷

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Studio Four's outboard complement comprises Lexicon *480L*, AMS *RMX-16*, two Yamaha *SPX90-II*, Klark-Teknik *DN 780*, EMT valve plate and Roland *DEP5* reverbs; AMS *DMX 15-80*s, two Lexicon *PCM41*, Korg *SDD3000* and Ibanez *DN150* delays; two UREI *1176*s; two Neve, two dbx *160*s and a BSS *DPR 402* compressors; Massenburg, four Amek, two EAR (valve), two Neve (vintage) and two Klark-Teknik *DN27* graphic equalisers; and finally a Roland *SFR 325* flanger, two dbx de-essers, a *Rockmodule* rack and Aphex C.

The monitors in all four Livingston studios are Eastlake *TM3*-style with White EQ, powered by HH and Quad amplifiers. Nearfield monitors are Yamaha *NS10*s and Auratones.

"Most of our clients seem to like our monitoring," says Boys, "I can't see any reason for changing. To tell you the truth I don't think anybody bothers about the big monitors these days much anyway, they prefer to listen on the small ones."

Round the corner in Brook Road another step into the dark was taking place. Livingston engineers were busily putting the finishing touches to the new Mitsubishi *Westar* console in Studio Two.

"Upgrading is a constant thing," said Boys. "Things get wrecked very quickly in a recording studio when it is being used 18 hours a day seven days a week. Every four to five years you need to revamp. The console in Studio Two, after 4½ years, was beginning to get old. We chose *Westar* because we wanted a change from our Amek and the only other available consoles in that market of £50,000 to £60,000 were the *Westar* and DDA boards. The Amek *2520* was just a little over our budget. I felt that the *Westar* sounds superior and has the better EQ. It is good looking—it is built like a real mixer with expensive pots and connectors and patchbays. I am hoping that in a few years time it will still be going strong for longer before needing replacing. It is not as good as an SSL but I don't know another console that is. Obviously we don't know what people are going to make of the *Westar* but I didn't like the DDA EQ."

Maintenance engineers were painstakingly removing all the echo send panpots and replacing them with black ones for ease of identification.

Control Room Two has been reworked, with the addition of a separate machine room pinched from a spare corner of the studio area. Out has gone a lot of the original timber wall finishes to be replaced with blue fabric, and the former machine recess has had its roof raised to accommodate keyboard set-ups and their players. Moving the machines out has released a lot of floor space and made the room feel surprisingly bigger. A mini producer's table has been incorporated to store the outboard equipment behind the engineer. The floor under the console is now finished in ash instead of carpet and apart from the additional space and ambience the overall result is a more modern looking room. Its associated recording areas have not been changed, neither have the rooms in Studio One.

These rooms are fairly typical of their age and remain surprisingly popular. They both have Otari tape machines, Studio Two is digital ready, and both have a thorough outboard equipment complement.

Livingston has expanded enormously in the last two years. Why?

"Studios One and Two fill a specific niche in the market. My attitude is that each studio should address a different market sector. The rooms we have seem to complement each other quite well. We went for the new studios because at the time we felt that we could run more studios, and they are quite different."

Additional facilities serving all four studios include a large restaurant and relaxation area where breakfast and snacks are provided throughout the day followed by an evening meal at 7pm. This is located in the newer of the two buildings although Brook Road has retained the original kitchen and cooking facilities for do it yourselfers. "You have to provide more these days," explains Mary Boys, the other half of this husband and wife management team.

Another recent addition has been dedicated 24-track copying with two *MTR90* multitrack machines. All 2 inch formats can be catered for, SSL floppy disks may be copied as well as digital multitracks if sufficient notice is given. Associated paperwork is also duplicated. "It's a service we can offer," says Boys, "and we don't have to compete because no-one else is doing it. With this sort of facility you can do the copying with care and at short notice instead of having to do it in the studio downtime. People are not worried about paying for that kind of service. It is the sort of thing you spend more time organising and arranging than actually doing. If suddenly three other facilities sprung up in London offering copying I wouldn't bother—there isn't that much work about so we would simply get out. We are, however, looking at a number of ideas for the future: management of engineers and producers; putting an *AudioFile* out on the road; maybe going into video post-production in a couple of years; implementing Atari with Steinberg software in all the rooms."

The fact is that the elusive top of the tree can always be beyond your reach if you pick a tall enough one to climb.□

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Studio Four Control Room

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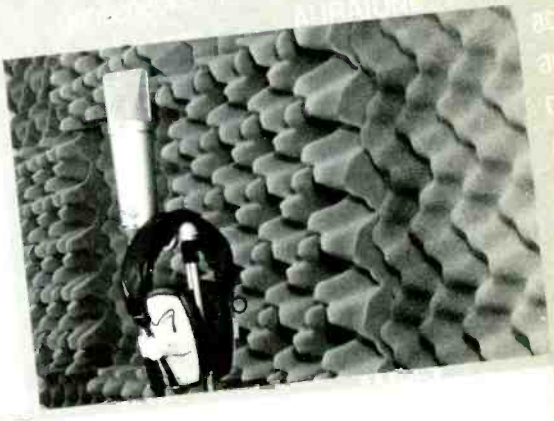

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STORING DATA

Continuing our 'back to basics' insight into computer technology, Francis Rumsey explains data storage principles

So far in this short series the Winchester disk has been considered specifically as an audio storage medium, and for the exchange of data between devices. It is perhaps time to look at the more general principles of storing data, which apply equally to computer data and to digital audio.

Pigeon-holing data

Data is handled in groups of binary digits, called bytes. A byte is eight binary digits and it is still a very common division of a data string, although many systems will work with data words of 16 and 32 bits. MIDI messages, for example consist of 8 bit data words. Most data is only useful to us if it stays around for a while, unless it is part of a temporary calculation, so it is necessary to find places to keep it. The exact type of storage location depends on how often the data is needed, how quickly it is needed, how secure it has to be and how much of it there is.

Storage devices can be envisaged as a set of pigeon-holes, each with a location that can be identified by a label or a set of co-ordinates. Each pigeon-hole holds a certain number of bits, say one byte. The co-ordinate of the pigeon-hole is known as the 'address'. Most memory devices can be thought of in this way, although they differ as to how the pigeon-holes are implemented.

Uses for storage

Any audio product that uses microprocessor control has to run a software program or programs. This program is just a list of binary numbers executed in a pre-determined sequence, or in a sequence altered by events occurring in the course of program execution. These binary numbers forming the commands and data for the microprocessor, are stored in memory pigeon-holes and the pigeon-holes are asked in turn to present their contents to the microprocessor. The microprocessor then interprets each command, acts on it, then asks for another. This process is repeated many thousands or even millions of times a second.

The data that forms the program usually resides either in temporary or permanent solid-state memory within the system, such that it can be accessed quickly and easily. Such data is very unlikely to be changed on a regular basis, as it forms the basis of operation of the equipment, so it should be reasonably secure and should be safe when the power is turned off.

Other more temporary data, such as that produced by the rest of the system during the execution of the system software (data from instruments in a MIDI system stored in a sequencer, for example), would need to remain in memory at least as long as required by the user, perhaps until the power was turned off. For more permanent storage it might be removed to a floppy or hard disk.

Visual displays require a considerable amount of memory on which to map the arrays of dots that make up the displayed information. Each dot will be represented by a one or a zero, depending on whether it is black or white, while colour will be even more complicated. This memory can usually be temporary as it is changing all the time, and will usually be lost when the power is turned off.

Digital audio and video is a different kettle of fish altogether, as the amount of data produced is enormous and would easily outgrow the amount of storage space in the average desktop computer within seconds. Nonetheless, solid state memory is used in large quantities in MIDI samplers and electronic musical instruments such as the Fairlight. The information is stored to disk as a more permanent home with larger capacity. Other disk-based recording systems will use memory simply as a temporary buffer to store audio samples as they come on and off the storage medium (see *Studio Sound* October 1988).

Memory size and addressing

We are basically considering two types of memory here: solid state devices made out of silicon with lots of legs on them, and mass storage devices such as floppy, optical and hard disks.

A silicon memory device will be able to store a pre-determined number of bits or bytes of data, decided by the number of pigeon-holes available in the structure. This might range from a few hundred bytes to perhaps a million, and this is growing all the time as manufacturing methods get cleverer. It is normal to refer to large numbers of bytes in terms of kilobytes (1024 bytes), and megabytes (1024 kbytes), the number 1024 being 2^{10}, so we hear of such things as 64k of memory, or 1Meg of memory. It is worth remembering that only a few years ago the pioneering Sinclair *ZX-80* computer was supplied with 1k of memory as standard. Nobody would give less than half a megabyte a second glance these days, which just goes to prove the old adage that the application expands to fill the amount of memory available.

Each pigeon-hole in a memory chip must be able to be addressed individually, so it will be connected to what is known as an 'address bus', which is a collection of wires (or tracks on a printed circuit board) whose voltage states correspond to a pattern of noughts and ones representing the address in question. A low voltage may represent a one and a high voltage a zero. It follows that enough pieces of wire are needed to make up a binary number corresponding to the highest address in memory.

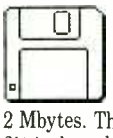
If you think back to your binary maths, you may remember that four binary digits allow you to represent decimal numbers up to 16 (2^4), eight bits represents up to 256_{10} (2^8), and thus 10 bits will take you up to 1024_{10}, which is 1k. So a 10 ▷

Data storage devices

Solid state: RAM (Random Access memory) is used primarily for temporary storage of data and will generally lose it when power is removed. Fast access times and easy modification of data are key features and RAM may be written to as many times as necessary.

ROM (Read-Only Memory) is used for storage of data that will not be changed regularly, such as system software. It does not lose data when power is removed, so is a safer long term store with fast access to information that will not be changed. It may be programmed once only. Different types of ROM include EPROM, EEROM and EAROM, which allow varying degrees of re-programmability. Storage capacities are small compared with the mass storage devices below.

Hard disk: is used primarily for more permanent storage of data in read/write form. Reasonably fast access times of the order of tens of milliseconds make them more useful than floppy disks for fast access to large volumes of data from around 20 Mbytes to over 1000 Mbytes. They have the disadvantage that they are not removable and thus tend to be archived to tape.



Floppy disk: is used primarily for convenient removable storage of small to medium volumes of data from around 360 kbytes to 2 Mbytes. The most common physical sizes are 3½ inch and 5¼ inch. Their disadvantage is the slow access time.

Optical disk: the large storage capacity of optical disks makes them suitable for large databases. The CD-ROM can hold up to 600 Mbytes of data. Access times are reasonable and are getting faster. The WORM disk can be written to once by the user, and then read many times. The CD-ROM is a read-only disk, which must be specially mastered. Magneto-optical disks, which may be erased and rewritten many times, are being developed.

Tape: is used mainly for archival of large amounts of data. Tape storage can be very secure but has very slow access. Many systems now use digital cassettes such as 8 mm and DAT for archival purposes.

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bit address bus is needed to address 1k of memory. Taking this further, a 16 bit address bus would be able to address 2^{16} bytes of memory (64k). Many common microprocessors use 16 bit address buses, thus this is the amount of memory that they could address if used in a simple fashion. There are various clever ways of getting round the problem of addressing more memory than this with a 16 bit address bus but we won't go into those here.

Disk storage devices may hold amounts of data, depending on their format and the quality of the storage medium. It is common for floppy disks to hold up to 2 Mbytes of data in their latest forms, although the most common formats are the 3½ inch double-density micro floppy, which holds around 800k, and the 5¼ inch ordinary floppy, which usually holds around 360k. Hard disks, as discussed previously, can hold much more than this, starting at around 20 Mbyte, and rising to over 1000 Mbyte. Optical disks are in the ascendant at the moment, and a CD-ROM, for example, can store 600 Mbyte on one disk.

Types of memory

A primary distinction must be made, between memory that is 'read only' and memory that is 'read-write'. Read-Only Memory (ROM) as its name suggests, is non-volatile: that is it can only be inspected, not changed. It is a good way to store information that will not be altered, such as system software. Read-write memory can be changed many times, and its most common solid state form is known as RAM, for Random-Access Memory.

ROM takes many different forms, depending on the degree of un-alterableness. True ROM can only be programmed once and is usually done by the manufacturer of the product in which it resides. Fusible links are blown internally using a higher than normal voltage on the pins. Once this has been done, that's it, and the information is held for all time. The only way to change it is by replacing the ROM. Many manufacturers prefer to use EPROM, Erasable Programmable ROM, which is programmed much as before by using a higher than normal voltage on the pins, but which can be erased by exposing a small window in the package to ultra-violet light for around 15 min. In normal use this type of ROM acts as a read-only device, and it can only be re-programmed after erasure in a special PROM 'blower'. This erase/re-write cycle can usually occur many hundred times, as long as the legs don't come off the chip due to the repeated removal and re-insertion.

Further towards alterability are the EEROM and EAROM, the Electrically Erasable ROM and the Electrically Alterable ROM, both of which may be changed by writing to specific addresses with a higher than normal voltage. This would not normally be used for writing information on a regular basis but where occasional changes were anticipated. These two could perhaps be considered as 'read-mostly' memory.

EPROM is used by audio manufacturers for storing system control software, as it can be changed relatively easily by re-programming the PROM, so software updates for many systems are provided in the form of replacement PROMS. This can be difficult to administer, and PROMS have a limited life-span, so other manufacturers may distribute software upgrades on floppy disks to be inserted in a drive located on the device. The data from this disk is then loaded into a reserved area of temporary RAM when the system is powered up, and would normally be lost at power down. The disadvantage of this is the need to load system software from a disk every time you turn the system on, and some systems use 'battery-backed RAM', which maintains the internal data in RAM even when the power is turned off. This is OK until the battery goes flat. One novel approach is to provide software updates in the form of barcodes, which can be distributed in the post cheaply and read by a light pen into the system's memory. This can work for relatively small amounts of data.

Floppy disks are read-write memory, as are Winchester or hard disks. They can often hold a lot more data than solid state memory but they tend to be slower in transferring it to and from the microprocessor, thus data that is used regularly and needs fast access is usually stored in ROM or RAM. It can be kept on disk for longer-term storage where speed is not the important factor, and transferred into RAM at the appropriate time.

Tape storage is even slower and is the opposite extreme to fast RAM: it is very permanent and very slow to access. Data is often backed up on tape from hard disks as even longer-term storage, as the tape can store a lot of information and is usually quite non-volatile.

Optical drives come in both read-only form and in write-once form. The CD-ROM is a compact disc holding computer data, which has to be laser mastered to store the information in the first place, after which it can only be read. The WORM drive is a Write-Once-Read-Many times disk drive which can be written to once, and thereafter only read. Most optical drives have a slower access time than hard disks, but they are good stores for semi-permanent data and have a very high capacity. Magneto-optical disks are just around the corner, which have high capacity, are erasable, and also have fast access time.

It is clear that the type of storage device used is a trade-off between all the aspects mentioned at the start: speed, capacity, size and permanence. Certain combinations of these parameters will be appropriate in each situation.

Reading from and writing to memory

In the case of solid state memory such as RAM, reading from the memory is a matter of setting the desired combination of ones and noughts on the address bus, and setting a read/write line to the read state. It may also be necessary to 'enable' the particular device in which the piece of data is stored by setting an enable line true. The data from that location will then be placed on the data bus to be handled by whichever device is reading the data bus at that time. In order to write to a location in memory, the correct address should again be placed on the address bus by the microprocessor or other controller, and the read/write line set to the write state, again enabling the device. Any data present on the data bus will then be written to memory, usually on either the rising or falling edge of the read/write or enable pulses.

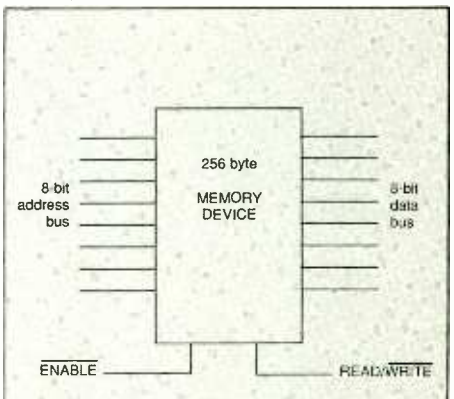
Reading from and writing to disks is similar, except that the address of the relevant sector on the disk is determined by the disk controller, based on a catalogue of the information stored on the disk called a directory. The directory says where every file is stored, even if it is broken up into lots of small pieces. The rest of the system does not usually need to know exactly where everything is on the disk.

Some practical examples

A MIDI sequencer is a storage device for information about notes pressed and controls changed in a musical system. Sequencers are often desktop computers running software packages loaded from disk into RAM. Two popular computers used for this purpose have 1 Mbyte of RAM and this is usually more than enough to store the musical outpourings of a keyboard player, even in a long song with lots of instruments. A MIDI note-on message consists of three bytes, so you can work out how many notes could be stored in 1 Mbyte. Nonetheless, large numbers of pitch and modulation wheel changes, and the incorporation of MIDI timecode mean that a lot more data is produced, which quickly soaks up memory. Also console automation systems using MIDI will produce much more data than a keyboard. For this reason, many sequencers have 'input filters', which are implemented in software to get rid of data that is not required before it is stored in RAM to save space.

A MIDI sampler may have 1 Mbyte of RAM and this will store a small number of seconds of high quality audio, which can then be off-loaded to disks. The RAM is required for speed of access but it is expensive to have too much, so the facility is often provided to reduce factors such as the sampling rate to reduce the amount of data produced in a given time, thus saving on memory again.

As computer applications become more prolific in the audio world it will be important to be able to run more than one lot of software in memory at the same time, the so-called 'multi-tasking' environment. This immediately puts a greater strain on memory requirements as the different applications must all reside in memory concurrently, and this surely has not a little to do with the current worldwide shortage of memory chips.□



A typical solid-state memory device: An 8 bit address bus allows the addressing of 256 bytes of storage. An 8 bit data bus allows 8 bit words to be transferred to and from memory. Larger memory can be built up by adding more devices of this sort and arranging logic such that certain ranges of address enable certain chips. The state of the read/write line determines the effective 'direction' of data flow.

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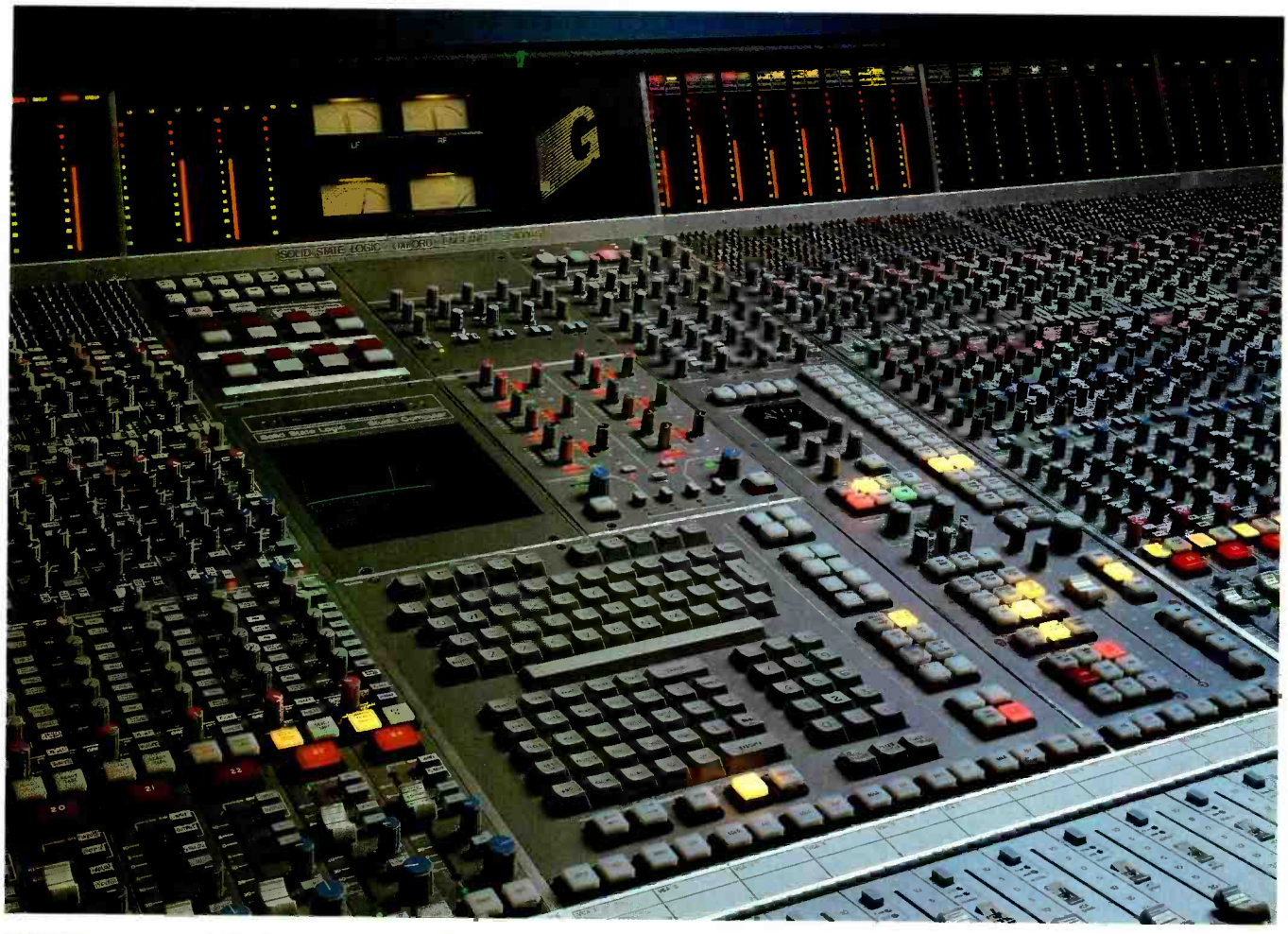

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Alfred Klaassen's Soundcraft *TS12* with *FAME* in operation

ALFRED KLAASSEN'S STUDIOS

Patrick Stapley visits a studio in The Netherlands which specialises in advertising jingles

Alfred Klaassen is no newcomer to the studio world having worked in various facilities in Germany and England as well as his native Holland. He was a staff engineer for some years at Artisound Studios in Amsterdam, working with bands like Golden Earring, Red White and Blue, and Groupo Sportivo. Ten years ago he decided to take the plunge and set up a studio of his own but rather than investing in a fully blown music facility, he saw an opening in advertising. Klaassen already had experience of this kind of work but, perhaps more importantly, he had some good contacts.

The advertising fraternity is internationally renowned for its reluctance to travel, even short distances, to a studio, and this attitude made a site in the centre of Amsterdam preferably within walking distance of the big agencies, essential. It was not easy but eventually, after a long search, an old metal worker's shop turned up in a small street just off the river Amstel; over the next six months the grimy, dingy premises were transformed into a neat and airy studio.

The facility quickly attracted interest and before long bookings were coming in regularly. Business has steadily increased over the years and Klaassen confidently believes that he can now generate enough work to run a second studio. However, it's not something he is about to undertake, having recently invested a lot of money in an extensive rebuilding and re-equipping programme.

The studio consists of a largish carpeted control room, 6×5 m (20×16 ft), with two connecting voiceover booths at the far end. The back of the control room retains the original windows, which are normally curtained off but can provide the client with that increasingly popular option, daylight. The central area is taken up with the console and custom made furniture, which houses tape machines and outboard equipment; the overall arrangement forms three sides of a square around the engineer. The acoustic treatment is pretty standard with *Rockwool* acting as the main ingredient, being sandwiched between plasterboard, compression board and *Slotak*. Behind the console the suspended ceiling gives way to a bass trap and at the back of the room there is an unconventional but extremely effective absorber in the form of approximately 5,000 library LPs organised into three rows of shelving.

"Because of the rebuilding work, all the records were taken out of the control room. I then had the chance to hear the sound without them and I very quickly decided to put them back!"

Apart from the studio there is a small modern reception area with adjoining kitchenette and WC, plus an editing/cassette copying room and an upstairs office.

The facility is run more or less single-handedly by Klaassen, although his receptionist, Cariola, helps with editing and copying. The kind of work Klaassen does makes it essential for him to operate fast, and often under considerable pressure; on the day the studio visit was originally arranged he received a last minute booking for an ad that had to be completed for broadcast that same evening. This frenetic way of working could easily jeopardise quality, and it's something he is very aware of.

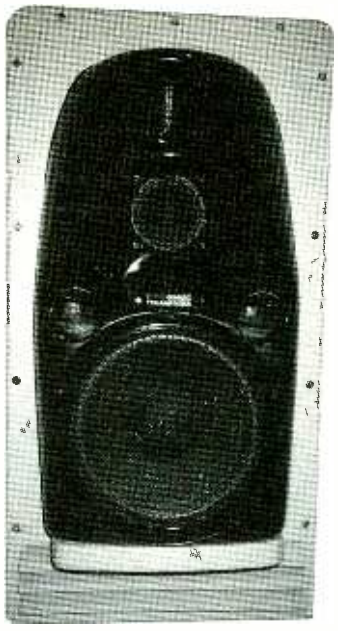
"It is important for me to be as efficient as I can but also I must give my clients the very best quality. This of course comes from experience but it also depends a lot on the equipment I buy, which must be correct for the job, and reliable."

This is reflected in his latest acquisition, a Soundcraft *TS12* console with *FAME* automation.

"I had a Soundcraft desk before and liked it but my main reason for buying the *TS12* was for the *FAME* system, which makes my job much easier. Not only is it controlling faders and cuts but also the on/off switching for EQ and auxiliaries. I also like the VDU display, which is maybe a bit small, but it shows exactly how the automation is working, so I always know what is happening; it's much better than having LEDs by the side of faders."

Klaassen's was one of the first studios to acquire the *TS12/FAME* package and he has become somewhat of an expert on the system, feeding a lot of user information back to Soundcraft. Watching him work, it is obvious that the system has helped to raise standards, as he meticulously and dexterously goes through a mix, cutting channels in and out to avoid extra noise.

Most ads are recorded on 16-track but if necessary there is an ▷



To compensate for the heat generated by the Genelec monitors, special ventilation chimneys were built into the back of each enclosure

◁ 8-track machine that can be synchronised to provide 24 tracks. Both machines are Tascam, 1 inch and ½ inch respectively, and are fitted with dbx. Mastering is normally to a Studer *A810* with Dolby *A* but there is a *5630* U-matic, which can be used in conjunction with a Sony *PCM 701*. Also available are two Studer *B67*s with Dolby *A*, which are used for flying-in effects, among other things.

As mentioned Klaassen has some library records at his disposal but he also has a large selection of CDs, which have almost exclusively taken over from the LPs. These are split 70/30 between library music and effects, and are played on a Technics *SLP 1200*. In the event of not having a suitable sound effect he frequently constructs one of his own, and had recently been up to his neck in old planks of wood and buckets of water, trying to create a shipwreck for a client.

An interesting addition to the outboard rack, is the Telephone Hybrid unit which is more commonly associated with radio phone-in programmes. Here it is hooked up to the studio's phone system to provide an authentic sounding telephone voice, and it has even allowed sessions to be conducted with the voiceover artist sitting comfortably at home! Other outboard includes a Roland *SDE 200* delay line, Lexicon *200* digital reverb, *910 Harmonizer*, *Aural Exciter B-type*, two UREI *1176* limiters and a stereo UREI limiter. Limiting the overall programme is done as a matter of course, due to the strict level requirements of both radio and television: if the peak level exceeds 6 dB above 320 nWb/m, the tape will be rejected. To help keep a close eye on levels a pair of RTW peak hold bargraphs constantly measure the stereo output.

Monitoring is switchable with three alternatives: Genelec *1022A*, Rogers *3/5A*, and Sony *Trinitron* speaker. The Genelecs were chosen as part of the general upgrading and replaced Tannoys. Choice of monitors was based on the way the speakers reproduce the human voice.

"I listened to seven different sets of speakers before choosing the Genelecs; they were the only ones that sounded right with a whole range of voices. They also matched the sound of the Rogers, which I use most of the time."

The Genelecs are recommended for use as free-standing monitors but Klaassen preferred the 'more solid' sound of them semi-enclosed. This caused a problem, as the speakers are active and generate a lot of heat. To overcome this, a ventilation chimney was built into the back of each enclosure, funnelling out into the upstairs office rather like the vents on the deck of a ship.

The *Trinitron* speaker is an important reference, as the stereo ad will be heard by over 70% of the Dutch audience in poor quality mono. There are two *Trinitron* 22 inch monitors mounted on wall brackets in front of the mixer, and they also provide visual monitoring for the recording area by swivelling round to face the glass. This arrangement, apart from being very neat, keeps mics and VDUs separate.

Most of the sessions at Klaassen's tend to feature small numbers of people: a few voiceover artists, a keyboard player, the occasional saxophonist, etc, but every now and then the studio gets packed out with school kids.

"It's typical Dutch—I did one job with children and everyone says 'he's great with kids', so now I get all that kind of work. Once a year I do a single with a local school and the place is full of school girls. I find it hard to breathe sometimes!"

Klaassen's job often encompasses the role of producer and it is quite common for an agency to outline their requirements, leaving him the organisational responsibilities of composers, musicians, voices, etc. One composer he works with regularly is Toon Vieÿra, who also owns a studio and, conveniently, a 16-track Tascam.

"It works very well—Toon will spend some days recording the music at his studio, he then brings the tape here and we mix it to digital. The mix is then re-recorded back to the 16-track so we can add voices and effects."

The success of Alfred Klaassen's studio is indisputable and the numerous awards spotted around the walls act as a constant reminder. Important international ads for Coca-Cola, Philips and Heineken have all recently been recorded here, and the future looks set to become even busier with the next door premises currently being converted into a sound to picture editing suite, along with a larger kitchen and a lounge. This new area is scheduled to open by the summer and should hopefully prompt Klaassen to employ an extra pair of hands.□

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AUDIO PRODUCTION AT MTI

Terry Nelson reports from Television City in New York

Audio production for film and video, whether it be live or post, tends to conjure up images of large plush control rooms and expensive installations. Though this kind of facility most certainly exists, there is also a considerable amount of work being done in studios with less pretension to glamour but a solid commitment to hard work.

Typical of this kind of studio in New York is the audio department of MTI at Television City.

MTI (Modern Telecommunications Inc) is one of the largest television production houses in New York with a large television shooting stage (90×75×30 ft high), studio and audio facilities.

Television City is situated in the old RKO Pathe Building on Manhattan's Upper East Side and inherits a lot of tradition as well as a lot of space allowing the facility to offer all stages of production under one roof.

Studio One is the largest broadcast stage and is used for both television and film productions as well as live broadcasts and at the time of my visit was laid out for a new sitcom TV series and featured a complete house as a set. Cameras were four Ikegami *312*s with an additional mobile camera with Steadicam.

Audio for the studio floor consists of 96 microphone lines grouped into four boxes of 24 each, together with foldback and communications lines. Microphone techniques are a mixture of radio and large booms, with Tram and Cetec Vegas being used for the former and Sennheiser *MKH 416* and Neumann rifle microphones for the latter.

Chief of Audio Services is Jeff Pincus. He explained some of the problems facing him in this kind of situation.

"Essentially the dialogue is live as the show is being shot in front of a studio audience and overdubbing mistakes can cause problems with getting the same ambience.

"Sound is still very much the poor relation in that you have to get it right without bothering the camera and lighting people and the last thing that set designers think about is that you are going to be using microphones.

"Where the set is open at the front you have the possibility of using a rifle mic on a high boom and this will usually mean a more natural ambience—especially for long shots. However, you also need the security of a radio microphone and by recording the two this does give a certain amount of flexibility for the final production stages.

"Specific problems arise when the set is closed in. For instance, the set here is a complete house with one wall missing, which means that resonances are not too much of a problem. However, at the back of the set there is an entrance with a hallway and that is, to all intents and purposes, closed in with some very noticeable colouration to the sound. You can always use some of this to your advantage—'oh, that sounds like a hallway'—but at the same time you have to be careful of dramatic changes that will distract the audience.

"The other thing is that you have to sort out these problems yourself beforehand by walking around the set with microphones and getting the feel of it. They will always stop to adjust lighting or camera angles but the soundman can make himself very unpopular if he wants to do it again!"

Communications between the audio control room and the studio floor are very important as there is no direct visual contact and it often has to be discreet. Though there are standard hard wire comms, there is also a wireless intercom system, which provides greater mobility for the sound crew on the studio floor.

The control room is very modest by recording studio standards and almost harks back to the square box of the '60s with acoustic tiles on the ceiling and moquette on the walls.

"This is what I call my cubby-hole," smiled Jeff, "but it works."

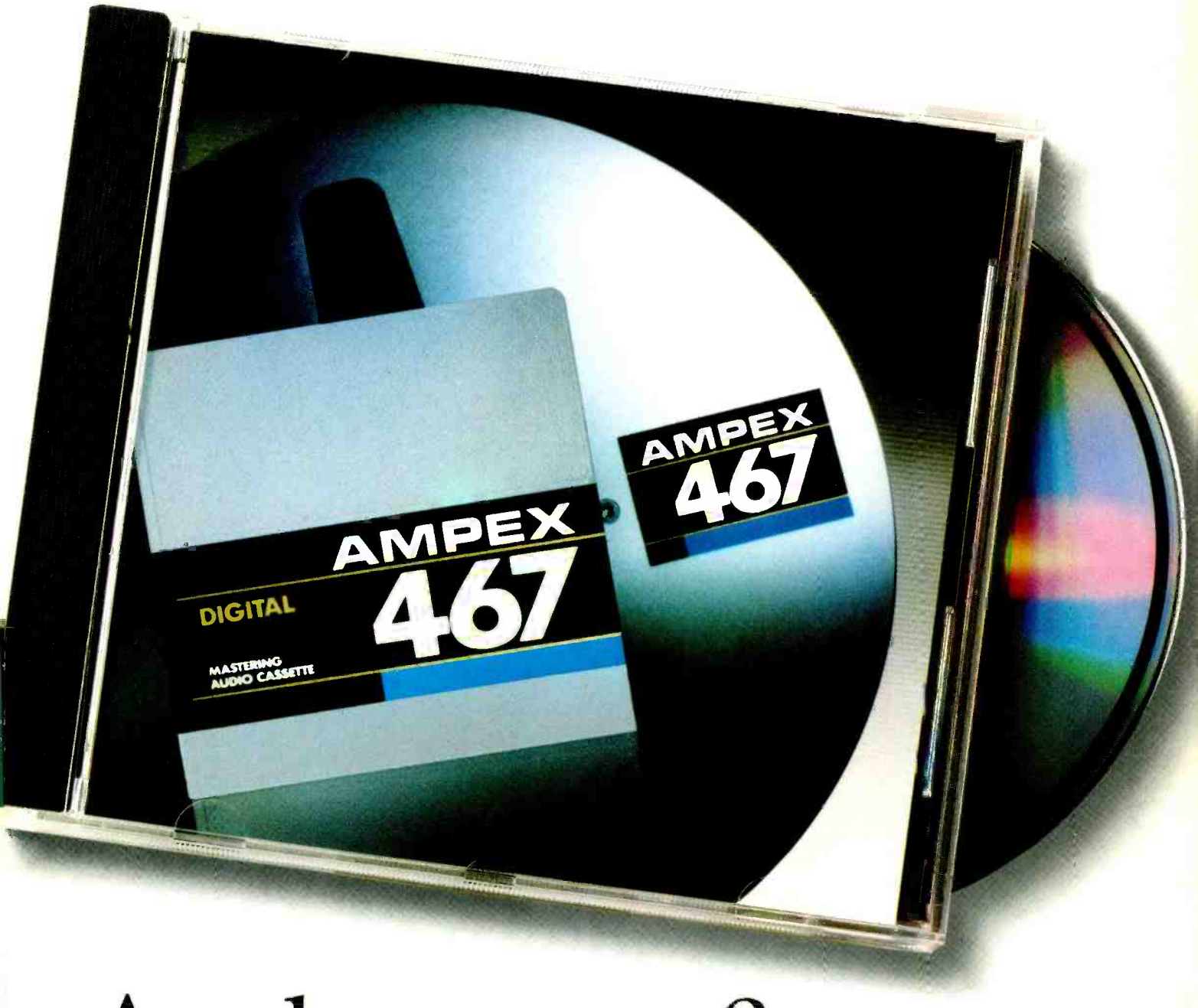
The Harrison *TV-3* console is equipped with 16 input channels, eight stereo groups plus main programme outputs, two monitor modules and a custom communications module.

Specially designed for stereo audio production for television, the *TV-3* features 24-track routing and send, 3-band sweep (or parametric) EQ and separate high and lowpass filters, four auxiliary sends, routing to eight stereo audio subgroups and nine VCA groups with free grouping. Each audio subgroup can then be routed to any combination of four stereo programme sends and four mono sends. The programme feeds can either be fixed level or have programme masters (usually P1 and P2). A comprehensive monitor module completes the system.

Bargraph metering is fitted as standard and may be configured as required. MTI's console has 51 meters in order to see what is going on where.

Monitoring at MTI consists of a pair of flown UREI *811* speakers aimed to converge at the engineer's head, an Auratone "for full-fi television sound" and a large video monitor for the programme plus four small camera monitors.

People used to the more (sometimes) uncluttered space of music recording studios would probably be surprised to see a ▷



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◁ large rack standing right next to the console housing an extensive patchbay, an RTS communications master station and some outboard gear.

"The problem is that it has to go somewhere where I can get at it in a hurry. I have covered the console side of the rack with Sonex and this seems to cure the serious reflection problems.

"Even though the work here is tracklaying most of the time, you don't want to give the engineers doing the post-production any time-wasting surprises and so far I haven't had any irate phone calls. I do also check from time to time that what goes out of here will sound pretty much the same elsewhere."

The outboard equipment was essentially confined to gain reduction and equalisation and included a UREI *LN 1178*, two *LA-4s*, two Teletronix *LA-2A* limiters, an Orban 3-channel de-esser and an Orban stereo parametric.

Recording is confined to an Otari *MTR-10* 4-track recorder.

"We do mainly dialogue so multitrack would be superfluous, though it is available as an option. However, we do have to lay down sound effects and for this I often use a Casio keyboard to trigger programs from a *Mac* computer in realtime."

Other equipment in use included a Tapco *C-12* for use as a submixer when required and Crown (Amcron) *DC-300A* and *D150* amplifiers for monitoring and foldback, etc.

The multiple feeds from the Harrison enable a wide variety of sends to be concocted at will.

"In broadcast it's often not the number of inputs that is important but the number of places that you can send the output signal at the same time."

Pincus's control room is next door to the video control room and this is equipped with a Utah Scientific routing switcher for the four floor cameras.

"We very often route each camera to its own track on the Otari in order to keep consistency between image and sound. We may also want to dedicate tracks to certain actors or actresses and when they change cameras this means they will also change tracks. The switcher means that we can keep a grip on what is going on and route the audio output from each camera as required."

At the time of my visit MTI were in the process of evaluating the *M II* video system from Panasonic and had five *AU-650* VTRs in the downstairs machine room alongside the five Ampex *VPR 2B* 1 inch machines. The *AU-650* features four audio channels, two with FM (ch 3/4) and two linear channels with Dolby *C*.

Synchronisation was provided by a BTX *Cypher* system.

"Everything is wired for stereo and the sends and returns are normalled to the VTRs from the control room. However, stereo equals two mono feeds as far as the distribution amplifiers are concerned.

"Being broadcast, all audio lines are balanced throughout the studio complex to avoid any hum and interference problems from stray fields.

"We are also fully equipped for satellite broadcasting and have two full-time transmit and one full-time receive audio/video telco lines to and from AT&T, together with two C-Band receive antennas. All lines for these appear both in the studios and videotape rooms."

Though it is a bit of a traditional joke in the audio industry that sound is the poor relation where film and television are concerned, it is clear that in most cases vision without sound would be a disaster. If you can't hear or understand what is being said then everything bar a well-filmed documentary will fall flat on its face. Though the audio production for a television stage might not seem like the most glamorous of jobs, it does provide its own unique set of challenges and Jeff Pincus seems to enjoy sorting them out.

"It would be nice to do a bit more of what recording studios do but I'm not complaining. Television is very much in a state of flux at the moment—especially with the advent of stereo TV. The video people are finally starting to realise that audiences want—and expect—good audio, which is what the commercial production houses latched on to some time ago. We often have the rather ludicrous situation where the audio for the commercials is noticeably better than that of the programmes, which is why audio is starting to become one of the latest buzzwords and is starting to get some better allocations in equipment budgets.

"I'd say we've got some exciting times ahead so check us out in a couple of years time."□

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ADV 412/1/E

Barry Fox

Comments on jazz concerts without amplification, jumping the taxi queues in Eastern bloc countries, sound-in-sync transmission, spotting random stereo broadcasts on TV and Copycode revival with respect to CDR and CD-E

Michael Webber went ahead with his plan to stage a jazz concert at the Purcell Room in London's South Bank Centre, without any amplification (see *Studio Sound*, December 1988). Groups of musicians, ranging in size from five to 10 recreated the music of King Oliver, Jelly-Roll Morton and Fats Waller. The only concession was a boom microphone at the piano for leader and pianist Keith Nichols to use for announcements and vocals.

The Purcell Room was sold out and there was a round of applause when Michael Webber went on stage to announce that there would be no amplification on any of the instruments. All went well, and a good time was had by all. Solo guitar and banjo and string bass were all clearly audible. The sound of the full ten-piece was almost too loud. This is probably the first time that many people in the audience had heard the genuine live sound of jazz, with the brass biting through without distortion and quiet passages free from low level hum and thyristor buzz.

Of course the technique can't be used for electric pop groups, and of course an acoustic band can't fill a large hall or open air arena. But acoustic groups playing in small halls with good acoustics, like those at the South Bank Centre, can manage without amplification and will probably sound far better if they do.

A nice rule of thumb came from the last Digital Information Exchange. Firms selling studio hardware into the Eastern bloc have found that the length of taxi queues works as a barometer of the local economy. The longer the queues, the healthier the economy.

And when travelling in the bloc countries, always carry a few spare musicassettes of Western pop music in your pocket. It's a sure way of persuading the taxi driver to take you first, and probably for free.

The BBC routinely distributes the mono sound for television between transmitters by sound-in-syncs. The analogue sound signal is converted into digital code and slotted into the gaps in the video waveform formed by the picture synchronisation pulses. Stereo sound-in-sync is a very tight squeeze if the data rate is a direct match with the broadcast Nicam rate of 728 kbit/s. Multi-level coding is needed, which makes the signal easily corrupted.

The BBC may convert down to 676 kbit/s for sound-in-sync distribution, because the lower rate is more robust. But the IBA still hopes to work with 728 kbit/s sound-in-sync, because down-converting with data compression to 676 kbit/s, and then up-converting to 728 kbit/s for Nicam transmission, introduces delays in the sound signal. These are in addition to the 6 ms delay created by the Nicam 728 transmission system. All these delays mount up over a long distribution path and put the sound and picture noticeably out of sync.

Here the BBC engineers may be able to take advantage of the BBC accountant's stall on Nicam. They will try to wait and see how the IBA copes with 728 links before deciding whether to order 676 or 728 equipment for the BBC links.

By neat coincidence the lecture on Nicam digital stereo given at the last Digital Information Exchange by Neil Gilchrist of BBC Research coincided with a deluge of announcements from TV set manufacturers. Now that Nicam chips are available, or due soon, from three sources (Toshiba, Texas Instruments and Mullard/Philips) and ITV has promised a stereo service in London and Yorkshire this autumn, the set makers quite literally dare not sell upmarket TVs without Nicam. They know that anyone who has spent around £500 on a TV set with two amps and two speakers, to reproduce stereo video tapes and video discs, will make a lot of nasty noise if they find that it is obsolete within a year of purchase because it won't receive Nicam off-air.

JVC has been selling a superb VHS Nicam VCR for over a year now and all the new Super-VHS VCRs (from JVC, Panasonic and Mitsubishi) have Nicam to help justify the £1,000 price tag.

Gilchrist steered well clear of BBC politics at DIE. But the message is clear. Inside the BBC there is mounting concern over the way ITV is taking the lead on stereo.

It was the BBC who developed the Nicam *728* system and Crystal Palace has been transmitting test Nicam stereo for more than two years. The Wogan show is regularly in stereo, so are many OBs. Anything simulcast with BBC Radio goes out in Nicam: *Top of the Pops*, string quartet recitals, orchestral concerts and grand operas. Over Christmas the BBC broadcast the feature films *Cotton Club* and *Back to the Future* in Nicam.

But it's all unannounced, which has made stereo-spotting a cult game.

The BBC still spouts the official Michael Checkland line that plans for a service will be reviewed in 1991, and that it is unfair to say that the BBC promised a service earlier. All we did, says the BBC, was release the technical specifications, work with manufacturers to perfect the system and broadcast test transmissions. Not surprisingly the chip makers took this as a green light. Hence the snowball of VCRs and TV sets.

If one thing in this world is certain, it is that the BBC will be forced to climb down and start publicising its Nicam transmissions as soon as ITV begins broadcasting. I can't wait to see how the BBC handles this.

And now, the main attraction. A return battle between the IFPI and EIAJ, leading the massed might of the record companies and electronics industry.

In October the IFPI woke from its post-Copycodal slumbers to declare war again. Its Board had "reacted vigorously to the reported development of CD-R (write once) and CD-E (erasable) compact disc systems...(which) represent an even greater potential threat to copyright owners than digital audio tape (DAT)".

Mass production of CD-R could begin as early as 1989, warned the IFPI, although the introduction of CD-E will require several years of further development.

"The price of a twin deck CD-R copier-player is estimated to be slightly higher than normal CD players," continued the IFPI, "CD-R blank discs are expected to cost a third of the price of pre-recorded CDs. The consequent economic loss to the industry would be incalculable."

What had prompted all this?

"We have discovered what this new technology can do," a spokeswoman told me, asking in passing who I was and what my interests were.

If you are going to be spokesperson it does pay to do a little reading now and then about the industry you are speaking for. Especially when you represent Nesuhi Ertegun who has accused the press of plotting to discredit a system called Copycode. But obviously the IFPI isn't too demanding in this respect.

The one thing the IFPI had read, because it was shoved under their noses, was an internal memorandum from the Philips Consumer Electronics Division in Eindhoven. The memo was written in October last year by Angelique Hoogakker, who worked as a lawyer for the IFPI before joining Philips as an assistant to consumer electronics boss Jan Timmer. Much of the wording used in the IFPI statement comes from the Philips memo. And the Philips memo followed smartly on from an announcement by Japanese chemical company Taiyo Yuden.

Taiyo launched its first audio tape product, under the odd brand name *That's*, in 1983. *That's DAT* tape followed.

Now there's to be *That's CD-R*, a CD that can be recorded on a special recorder but reproduced in any consumer CD player or standard CD-ROM drive.

"Since the recorded CD satisfies the (Philips/Sony) Red Book, which is the international standard for CDs," says Taiyo, "it can be directly reproduced without special accessories."

That's CD-R is a 'write-once' disc. It makes a recording which is then permanent. There is no erase option. So it's cheap.

The blank is pressed from polycarbonate, with a spiral groove moulded in the surface to guide a laser of around 7 to 9 mW for recording.

Small companies can use the system to make a few copies of a music CD or data CD-ROM, instead of mastering and pressing a short run.

Taiyo also says optimistically that "management of copyright is easy". A statement from Taiyo in pidgin English implies that copyright royalties could be built into the price of blank discs.

Because they can only be used once, the royalty is easily assessed. But this does not seem to have impressed Philips or the IFPI. Hence the declaration of war. Meanwhile Taiyo was saying that sample shipments were due in December 1988 with production during the first half of 1989.

This followed the announcement by Tandy of *Thor*, an erasable CD promised at $500 by the end of 1989.

Now that DAT is out of the frame as a domestic product, recordable disc looks viable. Standards don't matter. As long as a recording plays on a CD player, it does not matter how the recording was made. One-time recording is adequate. Most people don't re-use audio cassettes. With recordable CD they can make a compilation CD of favourite tracks, to store alongside the original CDs.

The Philips memo puts hard figures on the likely cost of a twin-deck CD-R recorder, between £80 and £100 more than a CD audio player,with blank discs £3 to £5.

It's really very sad.

If the IFPI had allowed DAT on to the market, the new format would have created a new opportunity for sales of pre-recorded music. DAT is the ideal medium for 'longform' audio, eg, unbroken operas and concerts, both rock and classical.

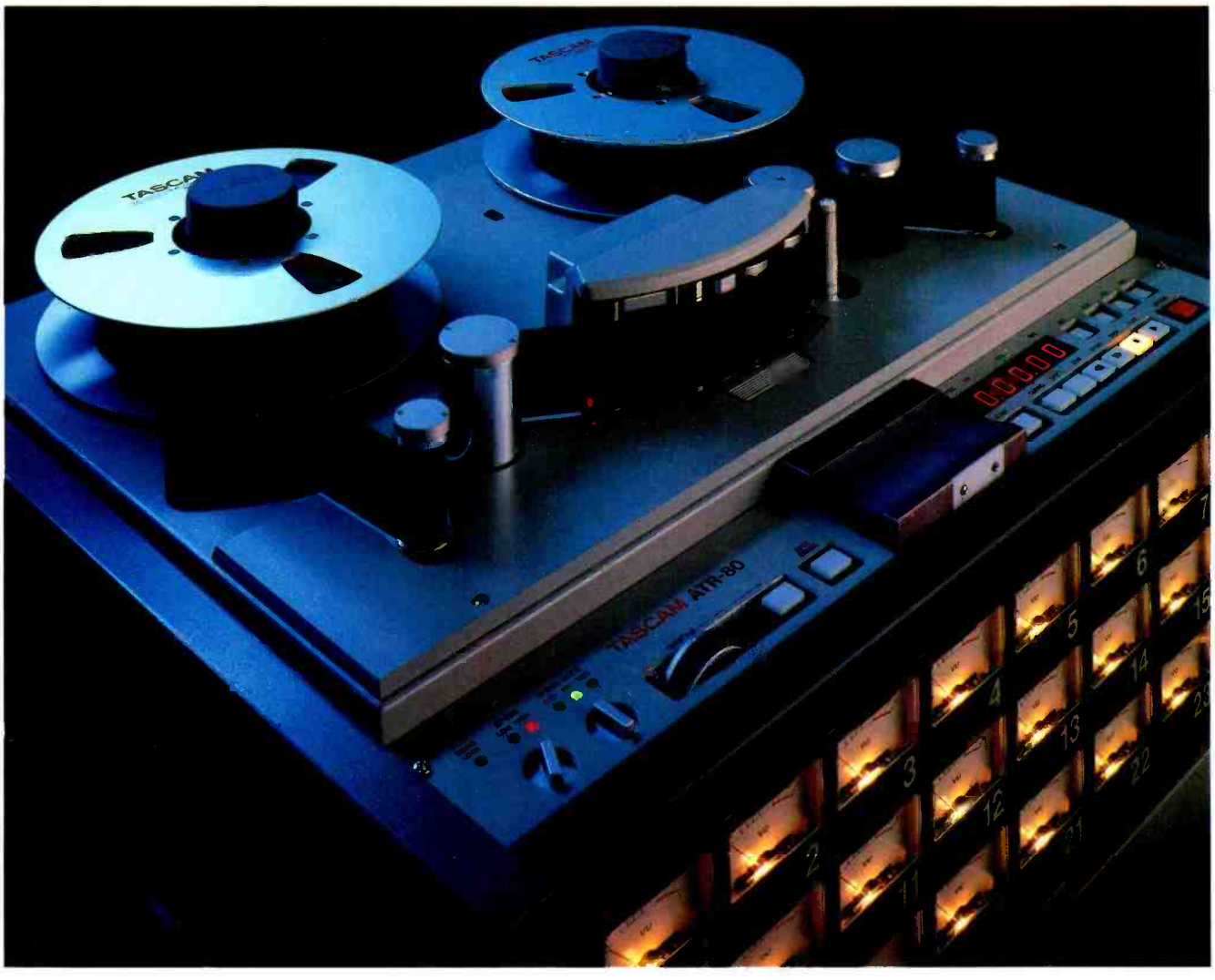
Never forget that the record industry only reluctantly embraced the Philips analogue audio cassette. But last year 75 million pre-recorded musicassettes sold in Britain, compared with 52.5 million LPs and 18.2 million CDs.

A CD compatible recordable disc exists for one purpose only, to record. There is no software opportunity. What a pity that IFPI and RIAA didn't think about this when they were busy trying to sell us Copycode and bury DAT.

There is a fascinating twist to this tale. The Hoogakker memo states categorically that Philips will not launch a recordable CD unless agreement is reached between the music and hardware industries over the copyright issues raised.

The memo goes on to admit that the negotiating position of the music industry is weaker on recordable CD than DAT, because the record industry's software is already available on the CD format.

Although Philips' pledge to stay out of the market for recordable CD may be morally sound, it may prove a commercial disaster. If recordable CD takes off, Philips will be left out in the cold—and perhaps even squeezed out of the consumer electronics business altogether.□



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Martin Polon

Our US columnist casts a slightly jaundiced eye on trade shows

"Miss Jones, please get your notebook. We are going to review my travel schedule for the first half of 1989. Let me see. I will fly through Chicago to Las Vegas on January 6th for the Consumer Electronics Show. Then on to Los Angeles on the 8th. The Independent Stations meeting. Yes, you are right. I should just stay West. Perhaps slip over to the NAB Winter Meeting in Scottsdale, Arizona on the 13th. Then back to LA for the Anaheim-based National Association of Music Merchants through the 22nd. Then on to Houston for the National Association of Television Program Executives on the 24th. One day there and then to Dallas to catch a flight for Cannes in France to catch the end of Midem and then on to the Musikmesse in Frankfurt through the beginning of February.

"Then in February, we must be at the INFOCOMM audio-visual show in Dallas on the 2nd, then a through flight to San Francisco for the SMPTE meeting through the 4th. I could come home then for six or seven days. Then it's back to San Francisco for Video Expo on the 13th through the 17th, a flight to London to connect with Air India so I can be at the Indian International Engineering Trade Fair on the 19th and 20th of February. Back to London for Sound '89 on the 21st and then back to LA for the 'Grammys' on the 22nd. Then I could go home for another week.

"We begin March with the AES in Hamburg through the 10th, then on to the Leipzig Spring Fair through the 18th. Makes March the month for Germany, doesn't it? Then we end March with the New York Home Video Show! In April we will 'do' the Broadcast Financial Management Show in Dallas on the 9th, Comdex Spring in Chicago on the 10th through the 13th, then on to the Stage Expo in Calgary on the 14th, the Computer Graphics show in Philadelphia from the 17th to the 19th, TV and Video Programming in Cannes, France from the 21st to the 26th and we end the month of course with the National Association of Broadcasters reeaally big show in Las Vegas from April 29th to May 2nd.

"As for May, we begin with the Electronic Distribution Show in Las Vegas through the 11th, then travel over to Toronto for the AES Digital meeting on the 14th to the 17th, then on to Washington DC for the Intelemart May 15th-18th, then back to Dallas for the National Cable Television Association through the 22nd, a quick hop-skip-and-a-jump to Los Angeles for the International Tape Association Audio Seminar in the Marina Del Rey from the 22nd to the 24th, hustle back east to Syracuse for the Acoustical Society of America meeting on the 25th and the 26th, then fly south to Nashville for the National Sound Contractors Association on the 27th.

"I do realise, Miss Jones, that the dates I am giving you for these shows are not the complete schedule of each show but really Miss Jones—even I have to compromise some of the time! These shows do overlap, and there is absolutely nothing else I can do.

"Now, June, I could start with the Consumer Electronic Show in Chicago from the 3rd to the 6th, hop a flight to London out of Chicago and do the APRS show at Olympia on June 7th through June 9th. Then a hop back to Chi-town for the Summer NAMM (Music Merchants) show to see the latest in home studio and MIDI gear and then off to Montreux Switzerland. From June 17th to the 23rd, the 1989 Montreux World TV Symposium will be 'on'. I can then choose from several shows in New York, Washington DC and Detroit before jetting off to Tokyo for the AES 4th Regional Convention to end the month of June.

"Now, Miss Jones, it is fortuitous that I will be in the Pacific. I am told by my physicians that this schedule will possibly kill me but most certainly hospitalise me. Why, one of my doctors said that the Geneva Convention, which we don't go to, would prevent prisoners from being forced to do what I do. Now, if I should die in transit, as we have discussed previously my remains are to be scattered over the route of my choice. It is one of the 'perks' I get from being a gold platinum super frequent flyer. If I survive, assuming I have a complete physical and nervous breakdown, then book me into the Kaiser Hospital Waikiki. I want a penthouse suite facing the Diamond Head side. It is convenient on my way back from Japan. I should then be able to convalesce for the rest of July. That means in August you could book me in for the Anti-Nuclear DAT Proliferation Audio Show in Riyadh, Saudi Arabia. Riyadh is so overwhelming in the summer..."

Well, Ladies and Gentleman of the world's audio community—what do you think of them there apples? Needless to say I do not follow such a ridiculous itinerary. Close but not that close. Nobody could travel like that and live, one would think. And yet there are those in the audio industry who come close to maintaining such a Herculean schedule. That such a schedule would kill any number of healthy human beings not to mention horses is considered a fact. Yet the pressure of doing business in a fast-paced audio world has increased necessary travel by a factor of four over the last 10 years for many audio practitioners; especially those in audio equipment sales and marketing. Foremost among the causes of our current travel-mania is the never ending proliferation of trade shows, professional meetings, seminars and conventions. Now, this is not the first time I have railed against the dangers of constant show going. I must say I am gratified by the response I get from the industry that supports this column. Let me see, if I say something, everybody goes out and does exactly the opposite of what I say. Well then, I must come out against any industry-wide efforts to buy this columnist a Rolls-Royce *Silver Shadow* as a token of industry affection and respect. Now you can all go out and do exactly the opposite of what I say, as you usually do!

We now have at least 70 mainstream events in audio, audio for video or broadcast, audio for or in computing, music equipment and MIDI plus several major computer shows that cannot be missed if the progress of the industry is to be considered. That number represents almost six shows per month (to be specific 5.833). But even that figure is misleading since very little happens in July, August or December. So in fact nine months cover some 70 shows yielding the figure of 7.77 or nearly eight shows per month. By some measures, this could be construed as showing a very healthy industry. But the problem with shows is the cost to attendees and to exhibitors in personnel time, resources and expenses is beginning to overshadow the positives of attendance and/or exhibiting.

The real difficulty with the overloaded calendar of audio and audio-related events is the toll of the inevitable application of various correlations of Murphy's Law on the feet. Yes, the feet. It seems that the audio profession is at greatest risk in, or perhaps we should say on, its collective feet. Combine that with Murphy's Law and you have, "That which can go wrong will go wrong—for your feet—especially when you are travelling."

For example: your flight to the convention city will require a change of planes. Your flight will land at the far end of one corridor of the terminal and the next flight will take off from the far end of a parallel corridor. You must walk down one corridor to the hub and back out again through the other. Oh yes, you must do that in three and a half minutes with all your carry-on baggage.

At your final destination, your plane will land at the farthest gate on the newest extension, and all the 'moving sidewalks' will have been vandalised by a Gray Panthers Action Committee. You will then get to walk 1.3 miles with all your carry-on luggage.

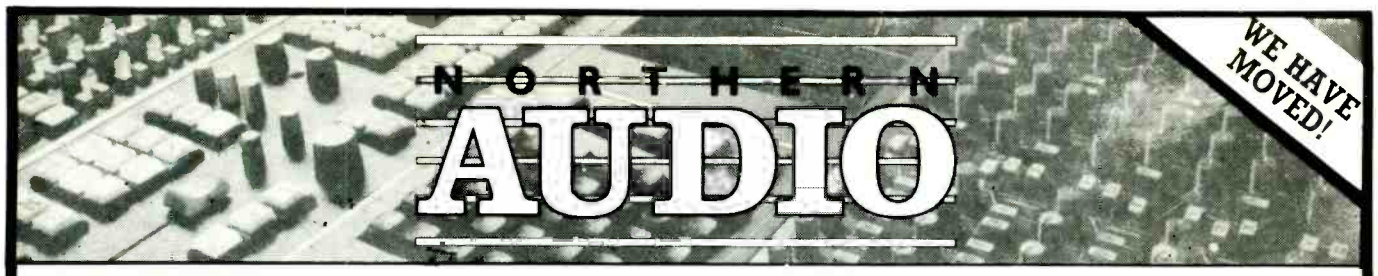
At the convention centre, all the shuttle buses to the convention hotel will either be full and leaving or empty and waiting to fill when you are ready to leave the show. Impatient, you walk the 14 blocks on already sore feet.

In the convention centre your booth will be diametrically opposed to the water fountain, food vending area and bathrooms. You will log well over 10 miles a day walking to all of the above.

Your room at the convention hotel will be located at the end of a labyrinth of nine corridors. This is the equivalent of running for a touchdown over three American-style football fields, while trying to catch an elevator.

The three elevators that serve your wing are operating as follows. One elevator is broken. The second elevator is commandeered by the Secret Service to cater to his excellency, the ex-chancellor of the exchequer of Rwanda, who has taken up residence in your hotel as he applies for asylum in the US. The third takes 45 minutes due to the demand. So you take the stairs; all 29 flights of them.

By the end of the show, you are convinced that you will never walk again and will in fact be selling newspapers from a skateboard at Hollywood and Vine and be known to your friends



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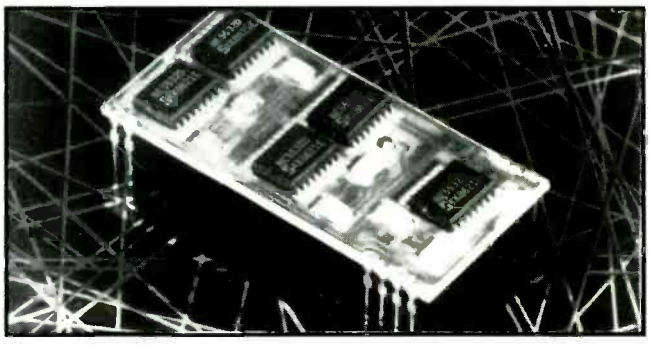

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as 'Stumpy'. The reality is seldom as bad as all that but it wouldn't hurt to pack a box of Dr Johnson's foot soap in your convention suitcase. After all, we must never forget that audio engineers listen with their ears and subsist via their stomachs but clearly it is their feet that take care of business.

Next to the feet, the stomachs of audio practitioners at conventions are another organ needing protection. Banquets at conventions have become quite a topic of conversation, both in terms of quality and cost. The foremost topic is erosion of the basis for deductability of banquet attendance. Even if the argument is made as to the value to the audio business of something like an industry-wide banquet, some manufacturers are choosing not to attend any such functions or else to pay for tables at trade-related events such as publication awards that more directly benefit the product.

A professional product manager for one of the Japanese electronic giants waxed eloquent on banquets: "Aside from the fact that they run too long, you pay more money than you ever thought possible to eat food that you never thought possible and the 'entertainment' could be used to extricate the truth from the dead, the change in tax practices makes banquet expense deductible only to the tune of 80% of the total cost and then 33% of that as a deduction. In the old days, a table of 20 seats at $50 per head would come out to $1,000 and deduct to $500. Today, the allowable entertainment cost for that same $1,000 table has an 80% ceiling, so now it is $800. The deduction is one-third of that, so figure on writing off $264. It is costing me twice as much for the same banquet experience. My policy now is not to attend unless one of our people is being honoured.

"All those who could not afford to attend to view the show, or give a paper, or 'shop' the exhibits would be totally disenfranchised. That option is totally unacceptable in an industry that has depended upon an exchange of ideas among its practitioners at events as one of the major tools in achieving technical progress."

Japan didn't like that initially because of 'face' but you would be amazed how much 'face' no longer needs 'saving' when the yen starts to dive below 120 to the dollar."

European audio manufacturers now face the same kinds of problems involving tax-related value judgements as those companies in the US do. Tax codes all over Europe are being reduced and 'harmonised' to match the needs of 'Europa-1992' and to eliminate the advantage held by those living or moving to the United States. The French have finally begun to find out about a 'brain drain' much as the English already have, when the 'best' and the 'brightest' decide to emigrate to the US of A and pay 28% taxes as opposed to well over 50% in their homelands. The reality of a lowered tax rate in a business setting usually redefines which activities are marginal and which are not, and show/meeting activity is frequently the loser.

In another category of meeting malaise, we find the inability of many companies to cover all the increasing costs involved in convention attendance. Obviously, the value of the lowered yen has begun to play a significant role in lowering the profile of many Japanese companies. The tax implications have also dramatically changed the financial landscape as far as show attendance and exhibition by US companies is concerned.

The cost situation is intensified by the problem of shipping products to and from the convention venue. Now let it be said that airlines are getting a very bad reputation for damage to technology-based products shipped as baggage or cargo. In fact, there is no evidence to suggest that simian help is indeed being used by the domestic airlines in North America. I maintain that the presence of the odd banana peel in cargo handling areas is simply circumstantial evidence and should not be viewed as conclusive. Also, the feeling of many shippers that 98% of all electronic equipment marked as such and shipped with 'Fragile' tags arrives in a trapezoidal shape is just not backed up by reality. In fact, only a much smaller percentage of all such marked shipments assume rhomboid dimensions. And there is no truth to the rumour that 'Fragile' tags really tell cargo help to kick the item out the aircraft door to the tarmac. Perhaps to 'drop' but never to 'kick'.

The shipping of equipment internationally to various trade meetings is the stuff that industry horror stories are made of. For audio industry professionals experiencing their own version of *Nightmare on Elm Street*, Freddy wears a uniform that says 'International Air Freight'.

One shipping manager of a large company with commitments at many of the various shows commented on recent developments in world shipping: "We will never see the return of easy shipping to trade shows for high technology and/or audio products. The explosion of the Pan Am jumbo jet over Scotland finished all that was easy in air cargo. That's all over and done with now. I suspect the American Federal Aviation Administration has mandated changes that are already in effect for most foreign carriers or soon will be. These changes will, I expect, require the physical inspection and functional demonstration of electronic devices at the airport before shipment is allowed. The same will be true for accompanied baggage and carry-on. Can you imagine trying to demonstrate a new technology power amplifier or a hard disk recording system to the zealots of GSG-9 at Frankfurt airport while staring down the barrel of several Heckler and Koch 9 mm sub-machine guns?"

To set aside the somewhat jaundiced eye being cast at trade meetings here, we finally must realise that the audio industry—and its human resources—cannot tolerate the current proliferation of audio and audio-related industry events. It seems likely that the current professional audio financial pie will expand again by another 3 to 5%, which seems to be our current yearly level of expansion. In fact, for each company within the audio profession, that expansion may not track to increased profitability. The total pie gets bigger to some large extent because the number of companies lured to the 'glamour' of professional audio continues to increase. It also increases because certain companies have become mini-conglomerates and virtually dominate the business within their sector of the audio economy. But profit for one company frequently comes from sales expectations for another. Thus, the increased costs from trade show and event activity are not going to be easily digested across-the-board, despite the perception by event organisers of overall financial well-being in the audio industry. And let's not forget that the cost of show attendance and exhibition activity is rising at a much higher rate than is audio industry profitability.

Far more important is the likelihood of trade show, convention and professional meeting activity in audio becoming the province of a privileged few, who can afford both the increased costs and the increase in the number of events. That would mean that only the biggest studios could attend the biggest shows and view the exhibitions of only the largest manufacturers who possess the resources to exhibit at such shows. All those who could not afford to attend to view the show, or give a paper, or 'shop' the exhibits would be totally disenfranchised. That option is totally unacceptable in an industry that has depended upon an exchange of ideas among its practitioners at events as one of the major tools in achieving technical progress.

The answer in all cases is for the electronic entertainment industries to take their cue from other businesses who have learnt to manage carefully certain aspects of show involvement. Trade show and meeting organisers have to recognise that existing shows must be kept affordable, both in terms of fees and in terms of municipal venues, hotel rates, dining options and air fare packages. It may be very 'sexy' to hold a meeting amid the glamour and glitz of New York City or London but the reality of serving less-affluent memberships may demand Las Vegas or Brighton. Equipment manufacturers need to analyse carefully their attendance at various meetings to control the negative backlash of 'too much' show activity. To some great extent, many companies do suffer from self-inflicted wounds in this area.

If we can learn to control show activity, before our collective ashes have to be spread over 'our favourite route', then we will have struck an acceptable balance.□

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DIGITAL AUDIO RESEARCH
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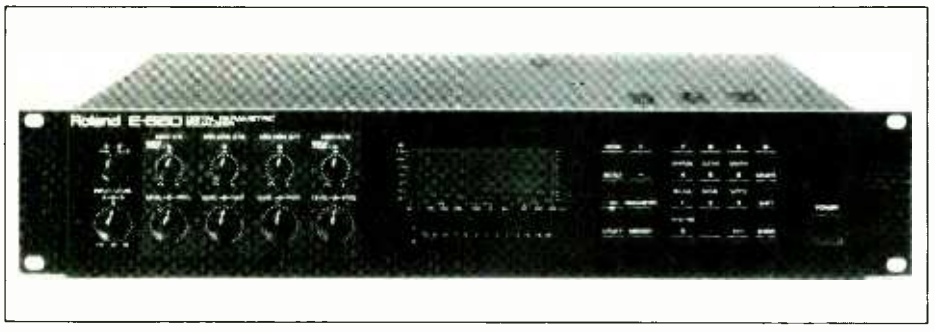
Roland E-660

Technical evaluation of Roland's E-660 digital parametric equaliser by Sam Wise and Dave Foister (operational)



First impressions of the Roland *E-660* are of quality. Everything looks well made and finished, and the controls feel good, too. Internally, this impression stands up. The PCBs are of *Fibreglass* with soldermask and component legends with very little internal wiring. All PCBs are on plug and socket connectors making disassembly for service easy.

On initial operation (as usual without reading the manual), basic functions are reasonably intuitive, though not as good as some other programmable products. However (after reading the manual), once the correct operating mode is set, adjusting the four equaliser bands is just like a traditional unit. The rotary equaliser controls are a great relief compared to the pushbuttons provided on other digital equipment. The only complaint is the use of dual concentric control for frequency and boost/cut but not everyone hates concentric controls.

The backlit LCD display gives both tabular alphanumeric data and graphics, and is usable over a wide viewing angle. The graphic display provides a useful estimate of the equaliser curve. One disappointment is the time that the display takes to draw the curve, though in most instances equaliser adjustment would be done by ear.

The front panel is described in the accompanying operational report. The rear panel contains paralleled *XLR*s and jacks for analogue I/O and paralleled S/P DIF and fibre-optic digital I/O connections. Mains input is by IEC socket, complete with all of the required labelling.

Inputs and outputs

With the gain set to unity and the equaliser flat, the inputs reach overload at a level of +25.0 dBu or more over the whole audio band with a balanced input impedance of 21.5 kΩ. **Fig** 1 shows the common mode rejection of both inputs and is typical of an electronically-balanced input without high frequency compensation. Performance is good at the most susceptible lower frequencies.

The outputs delivered +25.1 dBu into a balanced 100 kΩ load. Reducing the load to 600 Ω reduced the output to +22.5 dBm. Output impedance measures 192 Ω.

Noise

Noise measurements in **Table** 1 taken with the equaliser flat, are a bit disappointing compared to good analogue parametric equalisers, giving a dynamic range of about 96 dB, 10 to 20 dB worse than good analogue products. The CCIR-weighted measurement reveals that this worsens within the ear's sensitive region. This is confirmed by the swept ⅓-octave noise spectrum in **Fig 2**. Here, a peak of nearly 10 dB centred at 3.5 kHz can be seen in channel A and a bit less in channel B. This is probably digital hash breaking through into the analogue signal path. The noise level was unaffected by the gain control setting.

For those not familiar with different types of noise measurements, note that a ⅓-octave filter has more Hz underneath at high frequencies than at low ones. If the noise contribution of white noise (equal energy per Hz) under a filter is summed up, there will be more total noise energy as the number of Hz covered by the filter increases. Thus it is normal to get a response rising at 3 dB octave, which is nearly equal to 10 dB per decade. The general upward slope of the ⅓-octave swept noise plot is therefore actually white noise. A flat plot can be obtained from white noise by using a constant bandwidth filter (equal Hz underneath at all frequency settings) such as from a heterodyne analyser or by FFT analysis.

TABLE 1 Broadband output noise equaliser flat

Measurement method	
22 Hz to 22 kHz RMS	−71.5 dBu
400 Hz to 22 kHz RMS	−73.5 dBu
CCIR unweighted Q-Peak	66.3 dBu
CCIR weighted Q-Peak	−58.8 dBu

The ear, however, responds similarly to ⅓-octave filters, so pink noise (decreasing in energy per Hz at 3 dB/octave, or equal energy for an equal percentage of bandwidth relative to the centre frequency) was invented to give a flat measured response using ⅓-octave and single-octave filter sets. It also sounds flat.

The swept response is most useful for finding unwanted peaks like the one here at 4.5 kHz or more usually hum components.

Time did not permit the usual investigation of noise versus equaliser setting since the unit was only available for one day. In order to give comparable noise measurements of units in practical use, Dave Foister and I are creating a set of typical equaliser settings for both parametric and graphic-type equalisers. In use, some equalisers give more noise increase than others, and some increase noise almost as much with cut settings as with boost settings. Hopefully these future standard curves will improve user assessment of noise measurements. Any suggestions from the readership are welcome.

Distortion

Distortion measurements are from analogue input to analogue output. All high level distortion measurements are generally good, being essentially noise limited. At +18 dBu, THD+N over a 80 kHz bandwidth is just above 0.01% up to 10 kHz, rising to 0.035% at 10 kHz. **Fig** 3 shows a DIM (Dynamic Intermodulation Distortion) measurement with the output level swept from 0 dBu to +24 dBu at unity gain. This result shows an unexpected rise to 0.08% at +13 dBu.

Fig 4 shows the linearity error over the whole dynamic range. Note that at lower levels around

Manufacturer's specification

Inputs: Balanced *XLR* +4 dBm typical, −18 dBm max, 10 kΩ. Unbalanced 6.3 mm jack: −4 dBm typical, +18 dBm max, 25 kΩ.
Outputs: Balanced *XLR* +4 dBm typical, −18 dBm max, 100 Ω. Unbalanced 6.3 mm jack: +4 dBm typical, +18 dBm max, 100 Ω.
Digital interface: CD player/DAT compatible, 20 bit, phono connector and optical (CP-340 standard).
ADA converter: AD 16 bit linear. DA 18 bit equivalent (digital companding).
Sampling frequency: 48 kHz/44.1 kHz, automatic selection.
Frequency response: 20 Hz to 20 kHz, ±3 dB.
Dynamic range: >94 dB.
S/N ratio: >80 dB (IHF-A at rated output).
Total harmonic distortion: <0.015% (1 kHz at rated output).
CMRR: >75 dB (1 kHz).
Channel separation: >85 dB (1 kHz).
UK: Roland (UK) Ltd, Amalgamated Drive, West Cross Centre, Brentford, Middx TW8 9EZ. Tel: 01-847 5665.
USA: Roland Corp US, 7200 Dominion Circle, Los Angeles, CA 90040-3647. Tel: (213) 685-5141.

85 dB below clipping (equivalent to 60 dB below 0 dBu output at unity gain), there is an error of about 5 dB on channel A and 7 dB on channel B. This is significantly worse than other digital products tested to date but is only likely to be audible under good listening conditions with a mono or stereo only source, otherwise masking will be likely to cover it up.

Quantisation distortion in **Fig 5** reveals converter errors at levels of about 10, 50 and 80 dB below clipping. The error at 10 dB below clip is more significant than those previously encountered and corresponds to the peak in DIM discussed above. In **Fig 6**, the modulation noise over the input level range from 100 dB to 40 dB below clipping is given. This shows a difference of about 5 dB between the upper and lower curves, indicating the excess noise produced by errors in the digitising process. This is also higher than other digital devices measured to date.

Equalisation

The 'flat' frequency response is shown in **Fig 7**. Note that the unit has a good overall response but has a built-in roll-off of 3 dB at 20 Hz. This remained in all conditions except when hum cancellation was in use. More of a problem was the level matching error of 1 dB between channels. This could be removed by adjustment of the dual concentric stereo level control at one level setting but then affected pot tracking as the level was changed. Presumably there is a preset out of calibration somewhere.

Fig 8 shows the effect of boost/cut adjustment, looking typical of a parametric equaliser. In **Fig 9**, the frequency only is changed for the LF section in peaking mode and is again typical of a ▷

FIG.1 COMMON MODE REJECTION OF AN EQUALISER

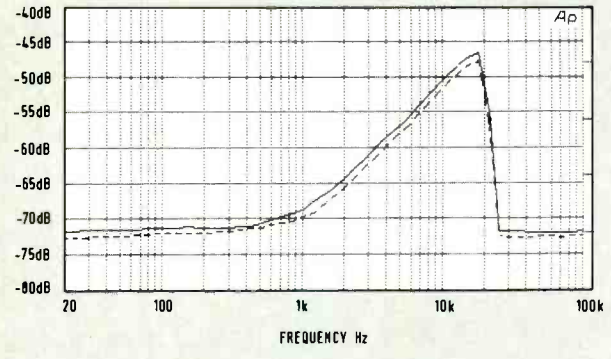


FIG.2 1/3-OCTAVE NOISE SPECTRUM TEST SET FILTERS AT 10Hz AND 30Hz INPUT TERMINATED WITH 50Ω CURVES FOR A AND B CHANNELS 8-FILTER MODE

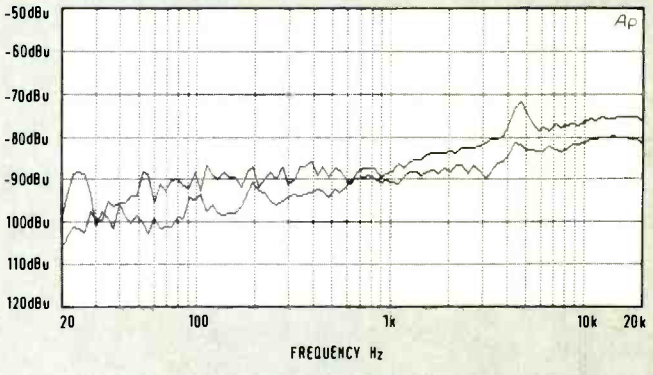


FIG.3 DIM-AM MEASURES DYNAMIC INTERMODULATION DISTORTION vs AMPLITUDE

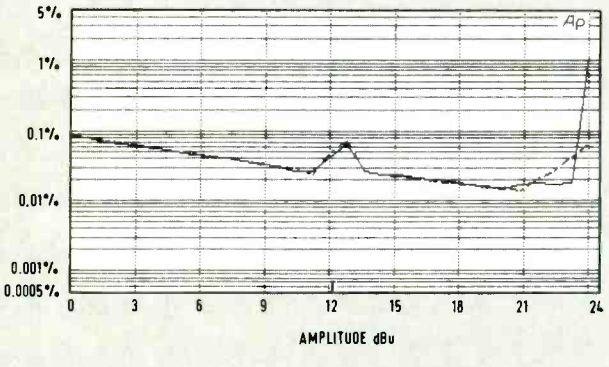


FIG.4 INPUT-OUTPUT LINEARITY, 200Hz INPUT SIGNAL

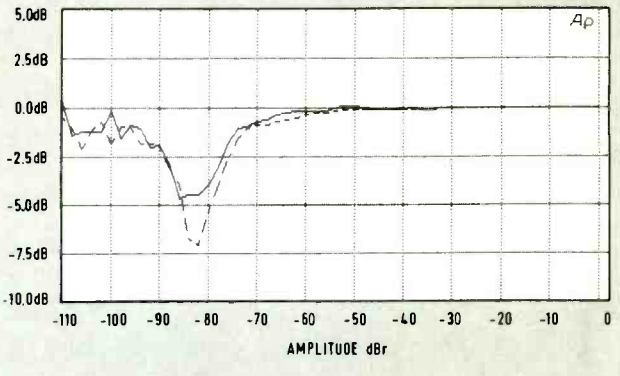


FIG.5 THD+N vs AMPLITUDE (QUANTISATION DISTORTION) AT 1kHz. DISTORTION EXPRESSED IN dB BELOW MAXIMUM OUTPUT. STEPS IN DISTORTION OCCUR WHEN SIGNAL PEAKS NO LONGER TRAVERSE BITS WITH HIGH WEIGHTING ERRORS

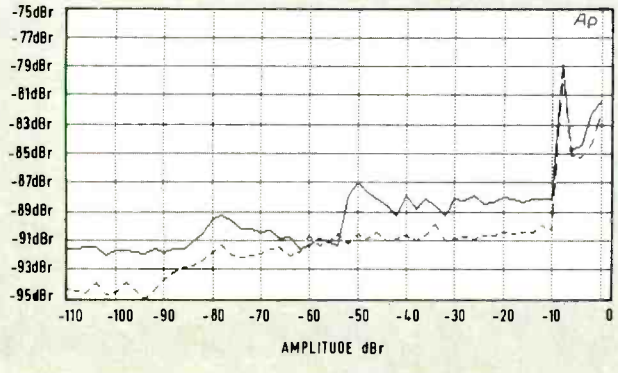
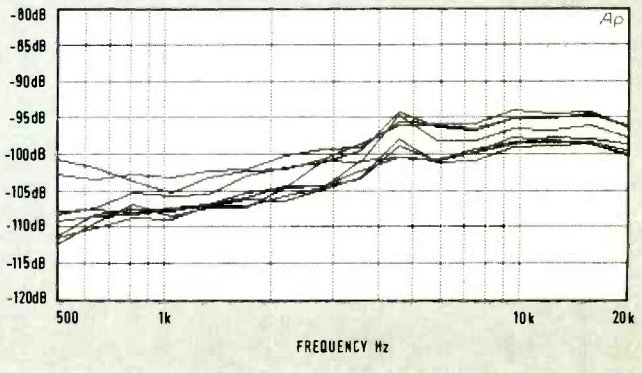


FIG.6 MODULATION NOISE USING 20Hz TONE VARYING IN LEVEL FROM -100 TO -40dB BELOW OVERLOAD LEVEL. NOISE REFERRED TO OVERLOAD LEVEL. 400Hz HIGHPASS AND TRACKING 1/3 OCTAVE BANDPASS ARE USED



quality device. In shelving mode the filter is also consistent with the analogue filters we are accustomed to. The effect of the Q control is shown in **Fig 10**, all bands are similar. To check the combining of filters, the curves of **Fig 11** were run. They show that the filter bands behave as if they are individual, non-interacting filter sections wired in series.

Adjustment of the equaliser 'live' is just not on. The unit grumbles about almost every change of front panel control setting, so cannot be regarded as a replacement for your analogue parametrics. However, where a number of preset but fixed states are required it is very useful, and would certainly make a good effects device.

The unit didn't seem to work properly in 4-band parallel mode, which seems to be a tracking stereo mode, both channels controlled in unison from the one set of front panel controls. However, the unit is a pre-production model, so perhaps the problem with manual or product will be resolved before it is available for sale.

The hum canceller is interesting and its effects are plotted in **Fig 12** as the RATIO control is turned up. The difference between a ratio of 10 and 40 is relatively insignificant, producing good rejection of all hum components, although the depth of the individual component notches seems fairly random. However, when ratio is turned up to the maximum of 99 as shown in **Fig 12c**, the

FIG.7 EQUALISER IN CIRCUIT, ALL BOOST/CUT CONTROLS SET TO 0

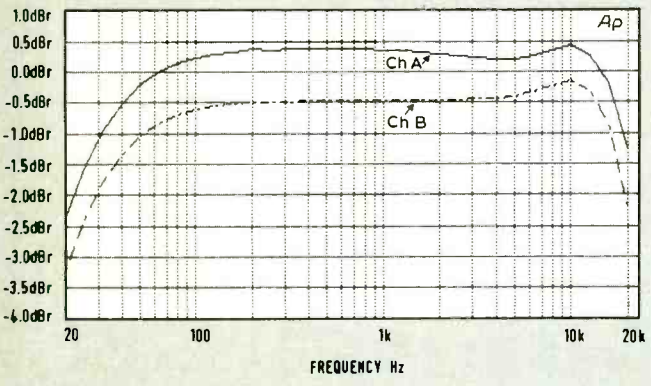


FIG.8 Q SET TO 2.6, FREQ SET TO 2600Hz. BOOST/CUT ADJUSTED IN 2 dB STEPS

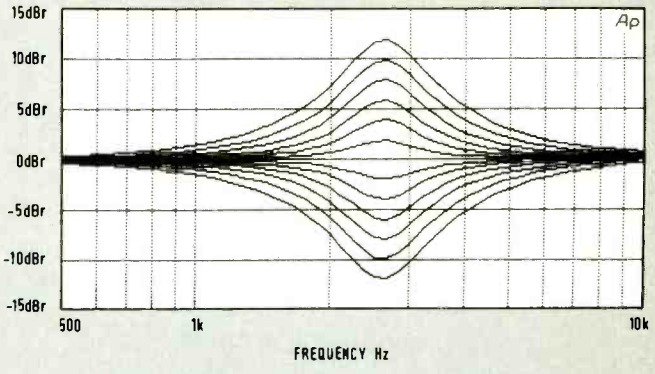


FIG.9 Q SET TO 2.5, 12dB BOOST, ADJUSTED FREQUENCY OF LF BAND

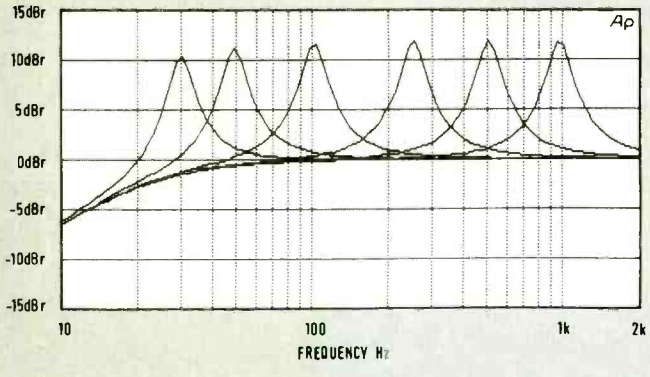


FIG.10 LOW MID BAND
FREQ SET TO 998Hz
BOOST SET TO +12dB
Q VARIED FROM 0.30 UP TO 9.9

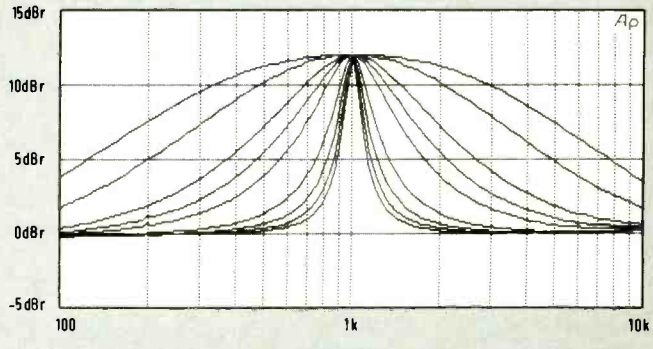


FIG.11 LOW MID BAND: FREQ SET TO 998 Hz
BOOST SET TO +12 dB
Q SET TO 0.30
HIGH MID AND HIGH BANDS:
FREQ SET TO 1kHz
CUT SET TO -12 dB
Q SET TO 9.9
ALL CURVES SUM AS CASCADED FILTERS

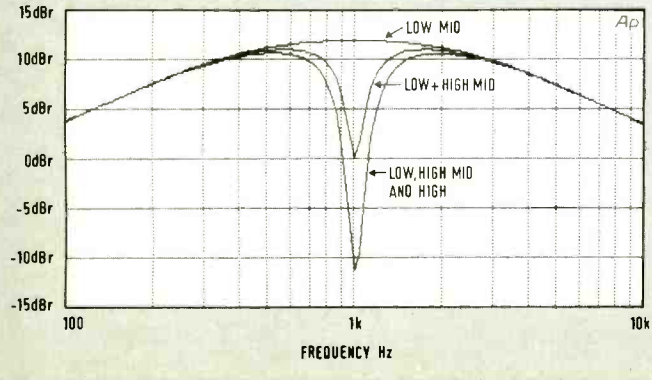
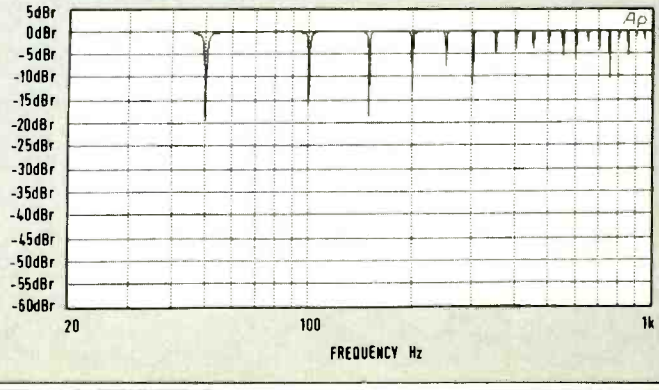


FIG.12A HUM CANCELLER EFFECT WITH VARIOUS RATIO SETTINGS: A - RATIO = 10



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width of each notch increases radically and a boost of 5 dB occurs at the frequencies in-between. In general, the hum canceller seems a good idea and there are times when such a device would be welcome for this facility alone.

Other matters

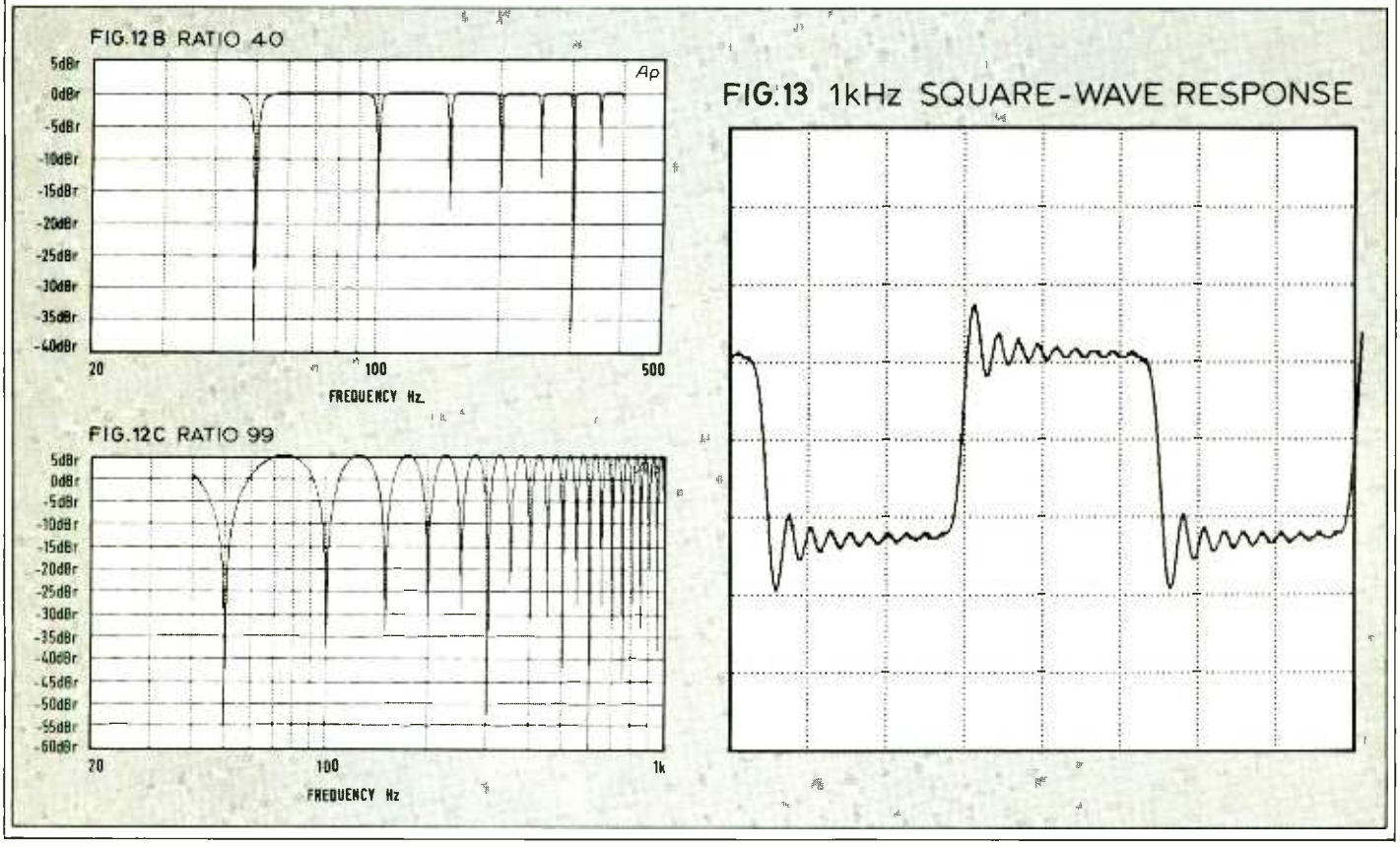
Pot tracking error is within 2 dB down to 45 dB of attenuation. From 0 to 10 dB of loss, the error is less than 1 dB. Stereo separation in the 2-channel mode is good at 80 dB throughout the audio band. Phase error between channels A and B is negligible below 10 kHz, increasing to 5° of difference at 20 kHz. This is unlikely to be audible. Due to time restrictions, the adjustable delay in the unit was not checked out (sometimes time delay would come in handy for things other than audio and video).

The fixed group delay with the equaliser flat is about normal at 620 μs for frequencies below 10 kHz, growing to about 680 μs at 20 kHz, an increase of 60 μs. This amounts to a phase shift between 10 kHz and 20 kHz of a little over 400°. In **Fig 13**, the squarewave response at 1 kHz reveals ringing caused by input and output filtering.

Summary

The Roland *E-660* digital parametric is a very flexible unit by anyone's standards and generally easy to use. The hum canceller is an added bonus, which for many users would justify purchase on its merits alone. When used in a 16-bit digital system, bypassing the analogue I/O, performance is excellent. For use in a digital edit or transfer suite it is ideal, however, when using the unit in an analogue system, an otherwise excellent product is let down by converters, which are not as good as others tested, in addition to the fact that its usable dynamic range is significantly less than its digitally programmable analogue relatives.

The *E-660* is not for everyone but will carve its niche in the market until 20-bit digital comes of age.□



Roland E-660

Dave Foister gives an operational report

I've never been very impressed with the idea of programmability in equalisers, feeling that of all studio processes, EQ is least likely to have its settings repeated in different situations, is relatively easy to set up manually, and loses out most when adjusted via the indirect controls, such as nudge buttons, often necessary on digitally-controlled equipment. The Roland *E-660* sidesteps all these reservations since its programmable memories are incidental to its main features and its user interface centres on a set of cosily familiar knobs.

The thing that sets the *E-660* apart and allows it an impressive versatility is the fact that all the EQ processing is done in the digital domain. Analogue audio inputs are immediately converted to digital via 16-bit linear ADCs, and all processing and equalisation is done digitally using a 28-bit parallel arithmetic Digital Signal Processor. As if to point this up, and perhaps as a portent of things to come, the unit also incorporates two sets of digital ins and outs, suitable for DAT and CD signals, one on phono sockets and the other on optical connectors. Switching of sample rates, pre-emphasis and copy-prohibit flagging is automatic, and although I did not have a DAT machine available, the standard digital output on my CD player performed perfectly. Digital and analogue inputs meet at an input mixer with software-controlled pads on both (separate from the analogue input pots), and levels are shown on a horizontal LED display under the main screen.

Leaving aside the quality of processing for a moment, an important corollary of the unit's software basis is its variable configuration. Probably the most generally useful mode is what Roland call '4-band serial', which gives two independent (or stereo ganged) channels of 4-band parametric EQ. Very detailed control is provided in the 8-band mode, which gives a single-channel of 8-band parametric, and the final variation is the 4-band Parallel mode, which configures the ▷

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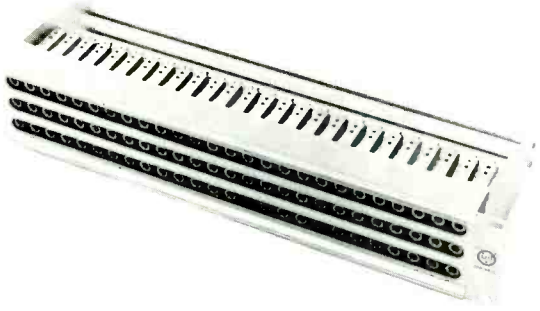

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system as a 2-channel, 4-band, bandpass filter.

The frequency bands cover the general areas of low, mid low, mid high and high, although with overlaps of more than two, three and four octaves respectively these are only guideline labels; the frequency range of each band spans about five octaves, and with even the low and high bands overlapping in the middle, great freedom of control is available. The Q on each band is variable from 0.3 to 9.9, with the high and low bands being switchable to a shelving characteristic if required. The only area where the control range is rather more modest than one would have liked is the actual gain adjustment of each band, which is only ±12 dB.

All these parameters can be adjusted via the nudge buttons or can have values entered directly from a numeric keypad but the big plus point as already mentioned is a full set of dedicated control knobs for all 12 EQ parameters. The frequency and level controls for each band are dual concentric pots. Even the peaking/shelving characteristic of the end bands is selected from these controls, by pushing the relevant Q knob.

However the unit is being used, a large clear backlit LCD display provides a variety of information about its status. The most direct way of keeping track of things is the straight numeric readouts. Each band's set of Q, frequency and level parameters occupies one page of the display; if keypad control is used the correct page for the band to be adjusted must be called up first, and the required parameter selected. This is all simple enough but if the knobs are being used the display automatically switches to the relevant page as soon as a control is moved, and the associated value changes in realtime.

It is worth noting that each knob becomes active as soon as it is moved, and its value immediately corresponds to its real physical position. This of course means that parameter values can jump when adjusted this way; this might be a problem if the controls were to be adjusted live during a mix, say, but this is largely impractical anyway since the software doesn't always produce smooth transitions as adjustments are made—fast moves are too much for the processor and steps and jumps result. As the pre-release draft manual puts it, 'You may hear a click noise while adjusting a knob but there is nothing to worry about.' (I think the review unit was pre-release as well—the boot-up screen announced itself as a 'Parametlic Equaliser'.)

The alternative main display mode is a graphic representation of the currently-set EQ curve, set against a frequency scale at the bottom of the LCD panel. This is extremely effective and to my mind much more intuitively useful than a series of numbers, showing as it does the relationship and interaction between the settings of the four (or eight) bands. The resolution is of course limited by the number of dots on the screen (96×32) but shows surprisingly small nuances; I'll leave it to someone else to find out just how accurate the curve is. The disadvantage with this display mode is that the unit takes some time—often several seconds—to recompute the display after an adjustment has been made, and this time is doubled up in the 8-band mode. Fortunately an LED blanks out during this time and comes back on when the curve has been updated, so there should be no confusion between what you see and what you hear.

What you hear is, of course, the nitty-gritty of any equaliser, and this is perhaps (as it should be) the most impressive aspect of the *E-660*; this is where the digital processing really shows its worth, the control advantages being mere spin-offs. It is a little unnerving to hear an equaliser do nothing but equalise, to do what it's told without side-effects. There is no sense of phasiness, no feeling of impending instability or overload even at extremes, no honk or squawk of complaining inductances and negligible noise or hum. To be able to crank up the top and upper mid of a clean source without a trace of added noise is quite a treat; whatever you do to the sound the *E-660* remains clean and transparent.

The memory capability is about what one would expect these days. There are 99 non-volatile memories, all of which can be assigned names, plus a scratchpad or edit buffer—memory 0—which simplifies editing and memory assignment. Full MIDI patch change mapping is provided, although the only other MIDI function (apart from the obvious channel change/omni selection) is a system exclusive bulk data dump to another *E-660* or other storage medium.

The fact that the processing is all in software on digital data allows a few extra features not normally found on equalisers. The first is a variable pre-delay of up to 500 ms, available in all modes and independently adjustable on each channel. In the bandpass filter mode separate post-delays—up to 99 ms—can be set for each band. Quite what this achieves I'm not entirely sure, particularly as the unit does not have separate outputs for the four bands, which might have made it useful for active crossover systems for instance. The manual says the post-delay is for 'shifting the phase level or timing of sounding', which leaves me none-the-wiser but may be just what you're looking for.

More useful is a Hum Canceller function, separate from the main EQ and available even when the unit is in bypass (or 'Thru' as Roland choose to call it). This appears to use a delay-generated comb filter to reduce mains hum and its even multiples; its fundamental frequency is finely adjustable between 30 and 90 Hz and the Ratio, or degree of hum reduction, is also variable. This is very precise and effective, and its only side-effect is a slight metallic ringing, which gets more noticeable as the amount of hum reduction is increased, evidently as a result of the short delay required to achieve the cancellation. In many situations this may be considered a worthwhile trade-off for effective hum removal. Settings for the Hum Canceller and all the other non-EQ parameters and utilities are shown and altered via easily-selected pages on the main screen.

The digital equalisation at the heart of the *E-660* alone makes it worth investigating; the other features are useful bonuses. It employs the growing trend towards full digital signal processing to good advantage, and its high sonic quality and versatility should help bring Roland firmly into the serious pro-audio market.□

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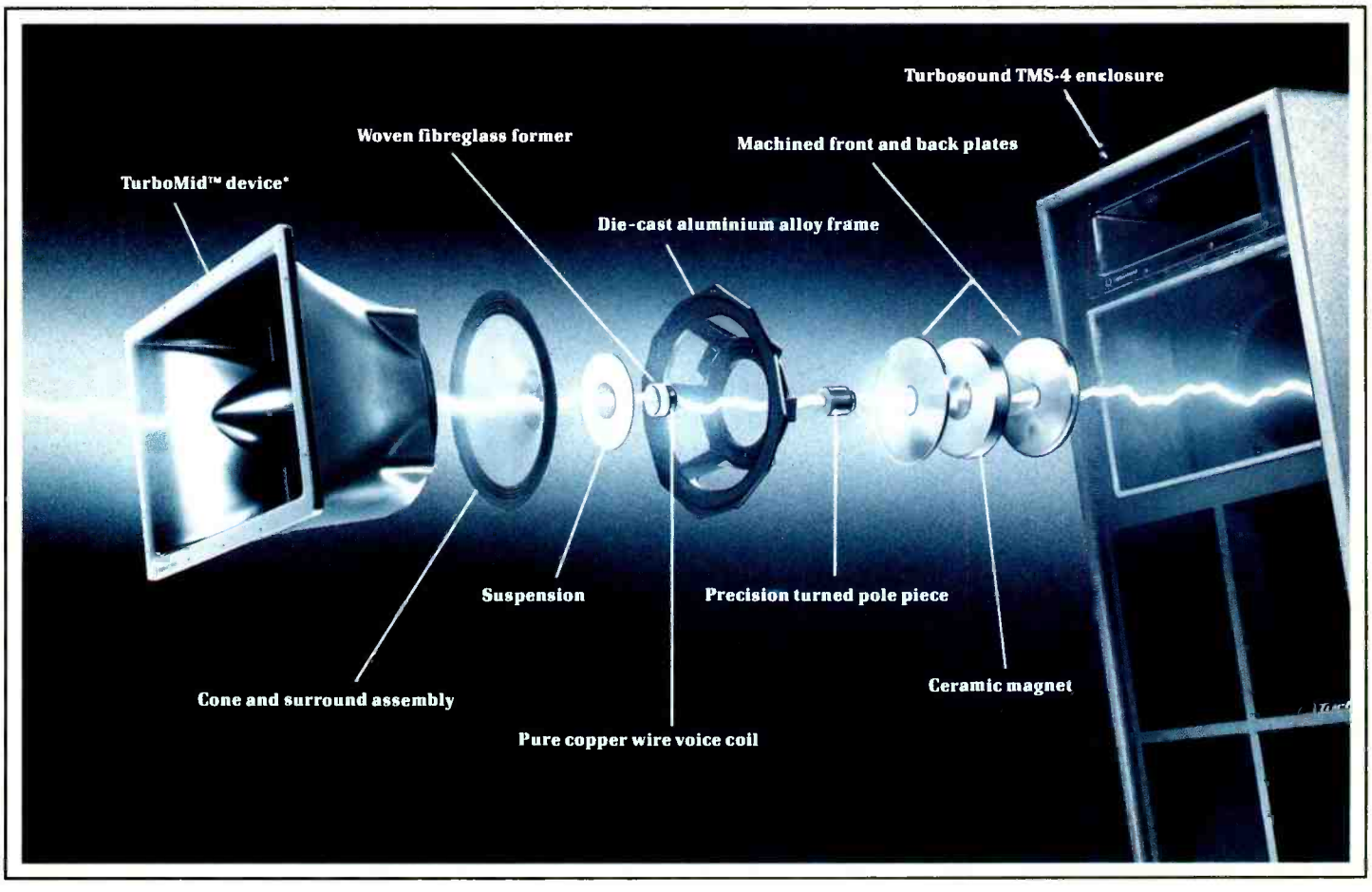

*TURBOSOUND PATENT INFORMATION: Australia: 515, 535 Canada: 1,076,033 Japan: X113424/77 UK: 1,592,246 U.S.: RE 32,183 West Germany P2742600/2 Other patents pending.

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