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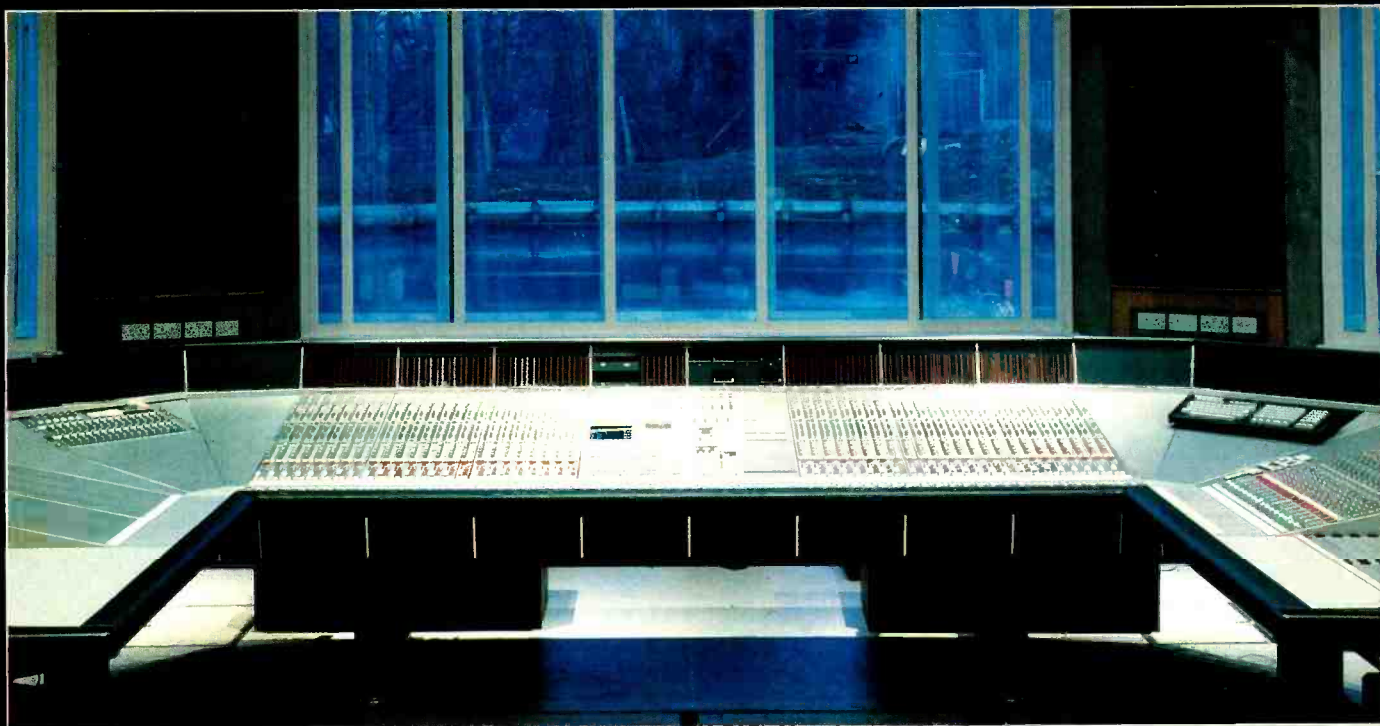


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Jus Musicalis

At a recent gig, UK rave act Altern 8 declared rock 'n' roll dead, employing a witch doctor to invoke spirits to watch over its corpse and (ironically) sacrificing a Fender *Stratocaster* to commemorate the event. Only days later I called the Virgin Records press office to discover that they were in over their heads trying to handle enquiries related to a forthcoming tour by aged progressive rockers Genesis. Add to this the recent spate of 'traditional' stage theatrics — tours by the likes of Michael Jackson, Guns 'n Roses and Prince, and there is a strong suggestion that someone, somewhere had got it wrong about rock 'n' roll.

But the question has to be raised: what is the purpose of live music in the '90s? After all, the general direction of instrument development is leading us towards a situation where instruments are no longer strictly 'live' tools — synthesisers, drum machines, MIDI wind controllers, drum pads and even electric guitars produce little or no acoustic sound. Such instruments become nonfunctional out of reach of a mains outlet, implicitly questioning the definition of 'live' performance. And even if you are using the older, truly acoustic version of a drum kit for example, what proportion of an audience hear this rather than the sound provided by the sound reinforcement rig? Admittedly the performance is 'live', but the sound...? So why continue to battle the vagaries of musicians' performance, hostile acoustics and the logistics of live venues when the studio environment can be made so amenable to the creation of music?

In fact, the matter of live performance raises several issues of surprising importance. The first of these concerns old-style rock music; while it is intellectually acceptable to claim that very little ground has been covered beyond that of Jimi Hendrix, Led Zeppelin and Deep Purple, such an argument leaves subsequent generations of music fans starved of first-generation musical performance. Instead, they are offered the past as a collection of poor recordings and a large helping of folklore. Indeed the whole business of viewing past live performances could be likened to looking at old black and white photographs and believing that the whole world once appeared only in shades of grey. Coming further up to date, the current dance phenomenon dubbed 'rave' only really produces records so that they can be replayed to a live audience; certainly, few such recordings are purchased for use as 'home entertainment'.

Curiously, rave culture gives us the cue to understanding the continued function of live music — the experience of being part of a communal musical event, as any advocate of jazz or classical music will surely confirm.

The old problems presented by live acoustics live on — reflections from venue walls if they have them, phase cancellations as unpredictable as the wind if they have not. The fact that thousands of people are prepared to sacrifice the consistent performance of their hi-fi in favour of the uncertain performance of the artist and the PA system (not to mention the occasional soaking handed out by the weather) is a tribute to the continued power of music irrespective of the state of the technology supporting it and of any specific musical genre.

Returning to the questionable posturing of Altern 8, it is true that rock music is showing its 30-odd years and that it no longer serves youth culture in the way it once did, but there are still generations of teenagers who are demanding a piece of the action — as one old-style rock band put it, 'It's the natural thing you did at the start, the natural blood starts to flow...'

Tim Goodyer

Cover: U2 Zoo Tour

Photograph: Mike Lethby

AUTUMN

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1992

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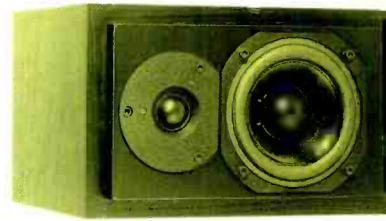
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Professional DAT News

A host of professional facilities make our own Aiwa HHB1 Pro (£995) ideal as a high quality portable recording device. Particularly cost-effective is the HHB1 Pro kit, comprising an HHB1 Pro with a Sony ECM 979 stereo mic, 2 rechargeable batteries and a cable pack, packaged in a metal flight case.

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PHOTO: JULIAN MITCHELL

Intimate studios, great for drums and table tennis

Intimate Madhouse

Pennington Street in London's Dockland is the home of *The Sun* and *The Sunday Times* newspapers, one of Britain's more controversial tabloids and one of the more popular Sunday broadsheets. Most human traffic along the street consists of demos against the papers editorials (the latest being a Jewish demo against the publication of the Goebbels' diaries in *The Sunday Times*), page 3 models, Tory politicians and more recently musicians.

The musicians, while glancing at the fortress gates of News International, the home of the papers, head for number 120, where an old recording studio has been refurbished and reborn.

Back in 1989 it was The Smokehouse Studio owned by Jeff Ward. He spent quite a lot of money on a naturally lit recording area with overdub space and a fair sized control room, but it was never going to be enough the beat the recession head-on. The studio was closed and left empty until May this year when Paul Madden, who owned a studio called Madhouse in Luton, found it and a leasing agreement that would allow the studio to be very flexible and responsive for fledgling bands.

Prototype Theft

MBI's new Series 5 and Series 10 low cost on-air consoles for local, college and hospital radio stations made their first brief appearance at the recent SBES exhibition before being stolen. As both desks are prototypes, neither carry serial numbers. Any info to Alison Brett at Soundcraft. Tel: 0707 665000

Madden brought in producer Errol Henry to base his Intimate Productions company there and renamed the place Intimate Studios, although The Smokehouse name has been kept as a monicker of times past.

The studio now has two rooms, the second being a programming room for Henry's work although its proving popular with its MCI desk and racks of MIDI equipment including Akai 1100 HD, MIDIMOog, PPG, C-Lab Multi-Port and a Yamaha TG100. The main studio is more conventional looking and attractive with its skylights and nest of highly cherished valve microphones huddling in a corner. The control room houses less conventional things.

Paul Madden bought a Harrison console from Marcus studios and then bought another from Red Bus studios. Not for two rooms but to be bolted together to offer 64 channels and to form the heart of Intimate Studios. Spares do not seem to be a problem as Madden opportunely bought all Bauch's when they went out of business. Automation for the desk is from Optifile's 3D system and until recently all recording was to two Otari MTR 90s. Now one has gone and in its place is Roland's new semipro DM80 hard disk recording-editing system.

Paul Madden, 'I'm from the old school, I'm a musician and needed the live room for drums which sound great in there. I don't believe in digital tape recorders especially now you can use tape like 3M's 996 and get nearly the same result for much less money. We knew though that the future was in hard disk recording and were looking for a basic editing system. We looked at Sound Tools but it seemed to offer more than we needed. The Roland system is so easy anybody who is used to an analogue multitrack can learn how to use it almost immediately.'

The Roland system is basically an

eight track one and consists of a largish remote and 3U box which houses the disks. As an all round recording system its still in its infancy, although software to remedy certain chase and lock problems is filtering through, Madden 'We have absolutely no problem with the sound of the system, its great, but you have to use it as a master. It doesn't lock to SMPTE at the moment only references to it and so when we had some slippage problems with the 3M tape on the multitrack, the Roland couldn't follow it when really it should have. But we are promised new software for this and complete machine control through a Mac.'

In fact the studio likes the system a lot, so much that they intend to add another eight tracks to the main studios capacity and put an eight track stand-alone system in the programming suite. They hope that having a Roland recording device will appeal to home programmers and tempt them out of their home studios.

At £35 an hour for the main studio and £20 for the programming room (this doesn't include the DM80) Intimate are trying to encourage young programmers and bands to either demo their songs or turn their demos into something worthwhile, although the studio does not turn down established acts, Errol Henry and his assistant Chris Madden (Paul's brother) have just finished six of the tracks on Lulu's latest album, they were initially promised just one, and since opening albums have been completed for The Jones Girls on ARP and PAN on Big Cat Records.

Outboard equipment is many and varied and includes some classics, all in racks and available. They are Ludwig drums, synths (PPG Wave 2.2, Juno 1 to name just two) and mics (Sony C12s, U87s, D12s to name just three). The main room can hold 30 musicians with an overdub room. Officially the studio isn't residential although if need be bands can stay on Madden's boat, which is moored at nearby St Catherine's Dock.

Intimate Studios are trying to move with the times and encourage good performance through good service and equipment at a reasonable rate. If that fits your bill then check them out.

Julian Mitchell

Intimate Studios, The Smokehouse, 120 Pennington Street, London. E1
Tel: 071 702 0789.
Fax: 071 702 0919.

A date with ADAT

In a surprise announcement made at the San Francisco AES show, Alesis declared their intention to make the technology behind their ADAT available to Fostex for use in their own digital audio recording system.

Ivor Taylor of Fostex UK comments: 'We spent a long time looking at which way to go. We already had a similar level of technology from time code DAT, so we originally looked at the ADAT on a competitive level and found it to be a clever, low-cost, reliable format which looks like having a long future.'

'We are very excited,' says Alesis' Allen Wald, 'because Fostex have a very powerful engineering and marketing team and we really admire what they do — it's actually not that different from what we do at Alesis.'

The unorthodox collaboration between these American and Japanese companies coincides with the first official showing (also in San Francisco) of Tascam's answer to the ADAT, the DA-88. Along with DCC and MiniDisc, these machines are set to present us with another 'format war' as the DA-88 records to Hi-8 video tape as opposed to the ADAT's use of S-VHS.

'We think we have a superior format,' speculates Wald, 'and Fostex wanted to do a deal to bring a Fostex ADAT to the market.'

'We didn't want to introduce a third format,' Taylor confirms. 'Having multiple formats for customers is bad, bad news — anybody who uses both Macintosh and IBM computers will tell you how bad that news is. This situation gives us the possibility of supporting a format with a long-term future.' ▶

In-Brief

● Central Productions, the subsidiary of Central TV based in Nottingham, has bought a Lightworks random access nonlinear video editor to edit dramas for ITV.

● Genelec are to install one pair of 1033As and two pairs of 1031As in the new premises of The Music Conservatory of Gothenburg, Sweden. Also Andre di Cesare, a record producer based in Montreal has decided to buy a pair of Genelec 1033As as main monitors and a pair of 1031A as nearfields. ■



Buddy Brundo (Conway Studios) and Chris Stone (WSG) with assembled WSG members

World Studio Group

A worldwide studio booking agency has been set up by Record Plant founder Chris Stone. The World Studio Group however will not be dealing with any studio, just the top 125 recording studios in the world. The Group already has 25 members although the service is not expected to start until the end of the year or the beginning of next.

The Group has been set up in the last two months and announced officially at last month's AES in San Francisco. They have seen a niche for this service which has been caused by a change in the booking methods of the people who pay bills to the studios. Booking decisions are now seen to be made more by the creative contingent than by the record labels or film companies. The argument is that those people would like an organisation whose judgment they trust to point them in the right direction as to what studios have what facilities and where.

The World Studio Group hope to be that organisation and are looking for 125 studios worldwide to work with. The studios will be asked, on an invitation only geographically weighted basis to join. Every year the members will be assessed again to make sure their high standards are kept up. Criteria would include equipment levels; ambience; amenities; tech support; a cost efficiency ratio based on cost per minute of music kept; downtime; tape cost; location; attitude and service for each industry speciality.

Once a studio has been accepted they will pay the WSG a 10%

commission of actual time booked and used, and they pay WSG when they are paid by the client. Their membership also qualifies them to book other member studios through the WSG for their clients when they travel, for which they receive 5% commission on the same basis.

Studios who are nominally signed up include Conway, LA; Andora, LA; Right Track NYC; Skyline, NYC; Bad Animals, Seattle; Paisely Park, Minneapolis; Arden, Memphis; Music Mill, Nashville; Skywalker Sound N, San Francisco; Crescent Moon, Miami; BOP, Bophuthatswana; Caribbean Sound Basin, Trinidad; Capri Digital, Italy; Wisseloord Studios, Holland; MG Sound, Vienna; Hitokuchi-Zaka, Tokyo; Mosfulm, Moscow; Rhinoceros Sydney, Australia; Metropolis and Nomis in London; Guillaume Tell, Paris; McClear Place, Toronto and El Cortigo, Spain.

Buddy Brundo, owner of Conway Studios in Los Angeles the first studio to join the Group commented, 'The WSG is a solid concept and the timing is absolutely perfect. I've met people who might have been adversaries but now we are partners in the challenge to make money in a very tough business world.'

Philip Vaughan of the British APRS recognised that as a commercial venture the market would decide how successful WSG would be. He was also keen to point out that the Group was not a competitor to APRS, something Chris Stone also underlined. Shirley Kaye of SPARS commented, 'In these days of heightened business competition, SPARS encourages innovative developmental business ventures which will broaden the economic base and working relationships of its members'.

World Studio Group, 216 30 N.Lucerne Blvd, Los Angeles, CA 9004. Tel-Fax: +1 213 465 7697.

Neve and AMS finally merge

As from the 1st of October Neve Electronics and AMS Industries merged their business interests. The merger has no direct effect on each company's product line, but does mean that Neve's headquarters at Litlington will undergo a phased closure with the loss of 80 Neve UK employees.

The Managing Director of the new merged company will be Mark Crabtree, the former MD of AMS. The Chairman will be Hans Haider, Group President of Siemens Audio and Video Systems and the Deputy Chairman will be Laci Nester-Smith, the former MD of Neve Electronics.

The new company's headquarters will be at Burnley, Lancashire. Manufacturing will continue at Burnley and the Neve facility in Kelso, Scotland, where considerable investment has been made over the past six years. Also the current AMS London sales and service centre will be expanded.

MD, Mark Crabtree commented, 'the strategy of the new company is to enhance the name and reputation of AMS and Neve jointly, while continuing to support both AMS and Neve product lines utilising the skills and experience of each.'

Agencies

● Amek-TAC have announced their exclusive dealer for the Irish Republic is Seadna Production Ltd, 115 Meadow Grove, Dundrum, Dublin 16, Eire. Tel: +353 1 298 9077

● Soundtracs have recently announced the appointment of Beyerdynamic (GB) Ltd as UK distributors for their Solo and Megas ranges of consoles. Beyerdynamic, Unit 14, Cliffe Industrial Estate, Lewes, Sussex, BN8 6JL. Tel: 0273 479411. Fax: 0273 471825

● French speaker system manufacturer Nexo and Klark Teknik have both appointed new company Network Ltd as their exclusive UK distributors. Network Ltd, Unit 2, 12-48 Northumberland Park, London. N17 0TX. Tel: 081 885 5858. Fax: 081 885 5151. ■

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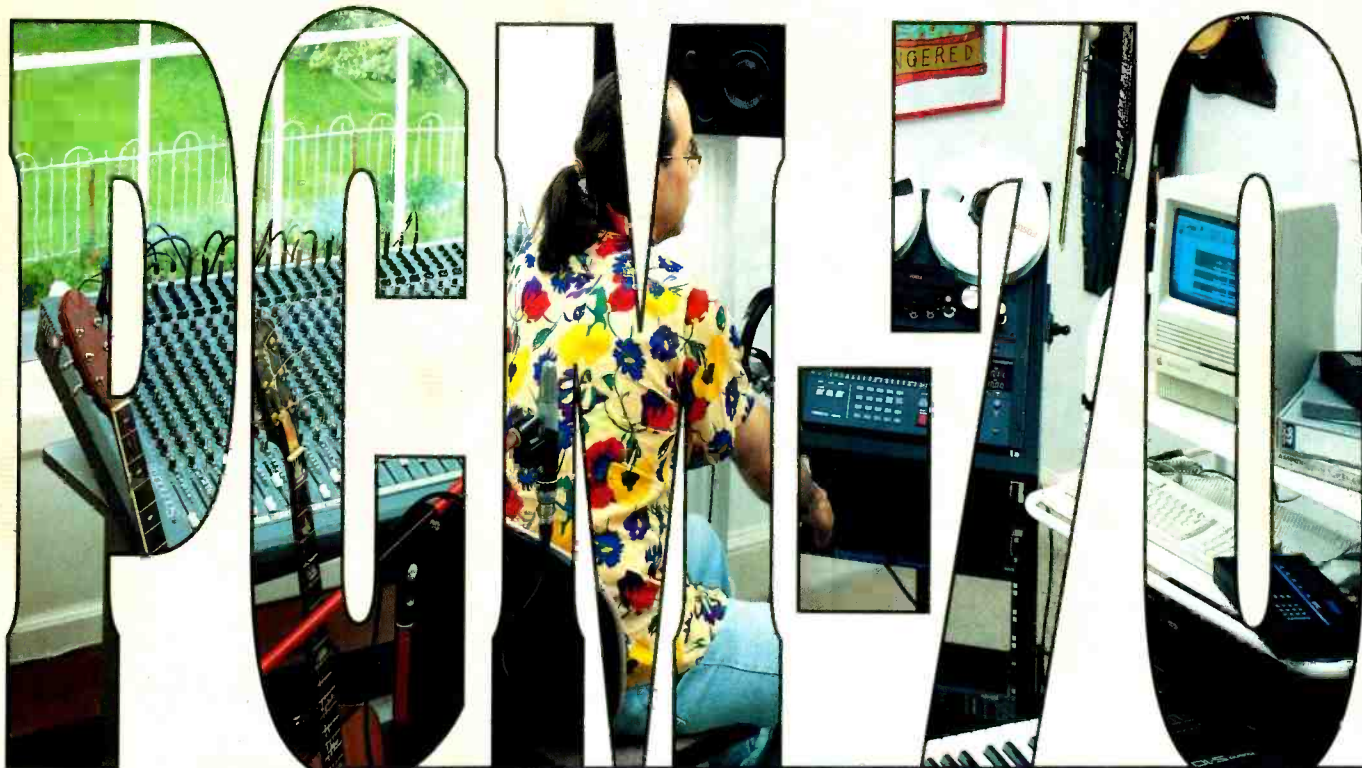
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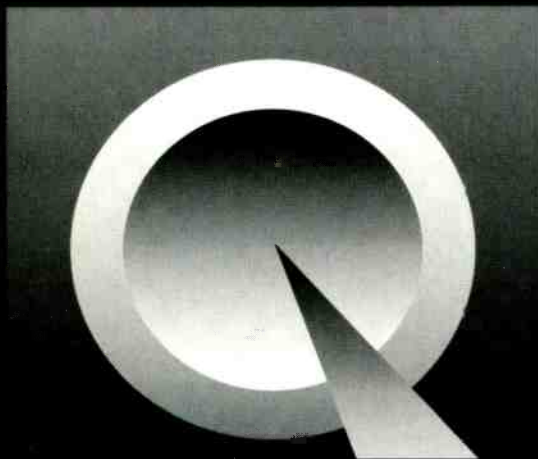
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UK AES DSP Conference

One of the most important factors governing the future of digital audio can be summed up in just three letters — DSP.

Keith Spencer-Allen reports on this important international conference

If any indication of how digital signal processing techniques were progressing, and finding applications in a wealth of audio situations was needed, the recent UK AES Conference on DSP provided a host of answers. Held in September at the Kensington Town Hall, actually in the council chambers where every speaker had a desk and mic to address the audience for questions. The conference was a sell-out with nearly a third of the delegates coming from outside the UK.

The two days were arranged into five sessions comprising a total of 18 presentations that managed to include introductory topics as well as new possibilities for those already active in audio DSP.

The first session — 'The Digital Signal Processor' swiftly brought the conference up to speed on basic DSP and current trends. **David Walsh (Loughborough Sound Image)** began by outlining the role of DSP and then moved through algorithm types and their implementation, ASICs versus general purpose DSP, sourcing of hardware and concluded with current DSP trends.

Having drawn our attention to the fact that DSP is not actually new, the technology having been around since before WWII, **Paul Lidbetter (Neve International)** ran through the decisions to be made by the designer to implement fixed or floating point architecture. Although he considered that floating point design offered design advantages he emphasised that careful application was needed to match the increased costs with gains in performance. A full grounding in parallel DSP architecture followed from **Ken Linton (University of Durham)** who concluded that such systems are now an economic reality although he echoed Lidbetter's words in saying that careful use is needed to retain the power and cost-effectiveness.

There was considerable emphasis throughout the conference on matters of sound quality and the importance of the perceptions of the listener.

The second session — 'DSP and

Psychoacoustics' kicked off with the only non-DSP presentation. **Simon Carlile (University Laboratory of Physiology, Oxford)** described the human hearing process — 'the wetware' in his words. He drew attention to recent analysis techniques using audio-visual horizon TFF plots and discoveries showing the auditory system should now be viewed as a far from passive receptor. **Bob Stuart (Meridian Audio)** following, described work undertaken to try and develop measurement techniques that follow more closely the human auditory system with the aim of bringing the specification of an audio system more into line with its use.

Ted Grusec (Ottawa Communications Research Centre) was unable to present the results of work on developing environments and techniques for subjective evaluation of codecs in person. However, a comprehensive taped presentation with slides followed by a phone-link to Grusac in Canada led to a lively transatlantic question-and-answer dialogue.

Session three — 'Developing Audio Processing' began with one of the highlights of the conference. **Tony Constantinides (Dept. of Digital Signal Processing, Imperial College, London)** presented a, normally, 20-hour lecture on filter design in 40 minutes, injecting humour and a style of presentation that defied anyone not to be conversant with filter design and impulse response measurement — the difference between IIR and FIR and their benefits.

Conference chairperson, **Rhonda Wilson (Meridian Audio)** followed with 'An Analysis of Filter Topologies', examining their suitability for audio applications while concluding that Direct Form 1 topology is most suited for digital filtering in audio.

Concluding the session **Ernst Eberlein (Fraunhofer — Institute for Integrated Circuits)** looked at 'Options for DSP Code Generation' and described a more efficient technique to reduce the time taken from development to implementation of complex algorithms.

This presentation also raised a number of questions from the floor suggesting that considerable work is currently being undertaken in many

places to achieve the same ends.

The second day of the conference consisted of two sessions on DSP applications. **Mike Kemp (Studio Audio & Video)** started the session with a detailed description of the design process he undertook to develop an open-ended DSP system to run on a standard PC. Both the hardware and software content were discussed and the presentation concluded with a brief demonstration of a working system.

One of the major themes of the applications sessions was the use of DSP in sound reproduction. **Michael Gerzon (Consultant)** and **Peter Craven (Consultant to B&W Loudspeakers)** described a practical adaptive room and loudspeaker equaliser for domestic hi-fi use. This entailed tackling both the acoustic problems in DSP and them presenting the end result in a consumer usable form.

Felipe Orduna-Bustamante (ISVR, Southampton) described work on multiple-channel signal processing techniques based upon measurements made in the reproduced sound field. The processing could then be used to manipulate stereo images particularly in locations where speaker-listener positions are not optimum. Following was **Ron Genreux (SigTech)** who outlined a system developed for loudspeaker and acoustic environment correction. Genreux takes a different approach to Gerzon & Craven aiming use at professional monitoring systems. Genreux described both the acoustic problems as well as the difficulties unique to creating inverse digital filters for these applications.

On a quite different but related topic, **Stephen Elliott (ISVR, Southampton)** described research on active control of sound and vibration within cars. Systems for monitoring engine noise and multiple in-car sensing leading to the introduction of antiphase signals through internal speaker systems were described including commercial applications where good results up to 200Hz were being achieved. He added example of use on internal aircraft noise and concluded by saying that these noise reducing systems would become more practical if the manufacturers of in-car audio systems would work with them to integrate the noise reducing signal output within their electronics.

Afternoon sessions began with **Dave Betts (Cedar Audio)**

presenting the role of DSP in Audio Restoration. He covered some of the basic digital noise removing techniques with demonstrations and then described the refinements and algorithms employed in the CEDAR system repeating examples to show the current possibilities. **David Kirby from BBC Research Dept** followed with three very practical case histories where the ability to develop DSP applications within BBC Research had led to some unique solutions within TV sound. The 'rescuing' of an unbroadcastable operatic soundtrack production from unimaginable digital 'nasties' against a tight schedule by the use of DSP and specific algorithm programming held the audience's attention intently.

'A Cost-Effective Approach to DSP for Audio Mixing' was a presentation by **Joe Tozer (Sony Broadcast & Communications)** who described the structure and design of DSP application within the Sony *DMX-E3000* digital mixer. The application used Sony developed serial bus DSP ICs originally developed for consumer applications. There were several queries as to the availability of these ICs commercially.

The last presentation of the conference was from **Jeff Bloom (Digital Audio Research)** who described the application of DSP within the *WordFit* program for automatic dialogue synchronisation within film postproduction sessions for dialogue replacement. He gave practical video picture and sound examples of the ability of the process to precisely synchronise a dubbed voice with the noisy rough guide-track recorded on location even if the attempt by the actor to duplicate his original efforts were not very exact. These systems are currently in use for this specialised application although Bloom did hint at wider musical uses.

The Conference concluded with a few words from conference chair Rhonda Wilson. Ms Wilson drew together all the individual threads of the presentations — the applications and the need to look also at the environment for DSP use. She ended with what sounded like a heartfelt plea to 'please, only ask sensible things of DSP'.

Copies of the excellently produced proceedings are available through the AES office at a cost of £18 for members and £22 for nonmembers. ■ **AES Secretariat. Tel: 0628 663 725. Fax: 0628 667 002**

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Dolby 740 Spectral Processor

It was not the unit itself that first caught my attention at the London AES exhibition in June, but the lapel badge referring to 'EQ with IQ'. Dolby? EQ? Haven't the company spent the last 25 years telling us that their recording products have minimal or no effect on sound? Yet here was a signal processor designed to do exactly the opposite — cause an effect.

While Dolby may never have a signal processor which modifies a signal to order, many of us have used Dolby products to achieve specific effects. The original A-type noise reduction unit A301, for instance, allowed access to the individual processing bands if you knew what you were doing. A more common trick was switching out of decode on replay from the multitrack; this frequently added 'sparkle' and a subtle compression impossible to achieve in any other way. Now, the Model 740 does not actually require any such abuse but if we keep thinking of that subtlety of effect — something that cannot be achieved in any other way — we are thinking the same way as Dolby with their 740.

Spectral Processing

The Model 740 is described as a Spectral Processor and, as the title suggests, aspects of the unit have been developed from Dolby's Spectral Recording process — Dolby SR. At

the time of writing, there has only been a brief description of the technical aspects of the 740 published, but this is enough to give an outline of what the unit is doing.

The heart of the system is a low-level Spectral Amplifier which acts only on low-level signals below a given threshold. These signals are then selected by frequency band, as determined by the equaliser section and by level as determined by the gain controls within those bands. As input signals increase in level, there is decreasing processing applied with very little occurring at high levels.

We can view the 740 as a low-level processor — or as Dolby put it, 'an audio magnifying glass'. It can also be considered that the processing actions are the exact inverse of a standard compressor that acts on high-level signals and ignores low levels.

Description

The 740 is a 1U-high rackmount unit housing two fully-independent channels of Spectral Processing. Construction is robust in the usual Dolby style. Effectively, each channel is divided into four sections: Threshold, Equalisation, Source NR and Output.

Threshold is a gain control with a graduated range of 20dB, which sets the level at which processing begins and ends when used with the 5-segment LED 'meter' above it. This meter is a fairly crude but highly effective way of judging what is

happening within the processor. The optimum operating level is with the middle of the range (which consists of three green LEDs and one orange LED at either end). Too little signal entering the processor will not allow the unit to differentiate between high and low signals and any tonal change will therefore be across the complete signal — as if the 740 were a standard equaliser. Too great a signal level will cause there to be little effect on signals at any level. While a very dynamic input may cause all these LEDs to light during a period of time, the nature of the processing is such that you do not perceive unnatural changes if the level passes briefly into an orange LED zone. Lastly in this section, there is a red clipping LED. There is no separate input level.

The Equalisation section follows. This is laid out as a 3-band crossover with three gain controls that apply up to 20dB of gain in the Low, Mid and High bands respectively. When the boost control is fully anti-clockwise, that band has no effect. The crossover frequencies between bands are continuously variable between 75Hz–1kHz (LF-MF) and 500Hz–8kHz (MF-HF). Each of the crossover controls has a centre detent which may seem rather odd but actually gives a good reference point from which to start. The manual informs us that with the controls in these positions, the centre frequencies of the bands are 80Hz, 800Hz and 8kHz respectively.

In the same section, there is the

selection toggle switch for effect in-out and side chain with red and green LED indicators. It should be noted that the 740 does not have a separate side chain output independent of the main output. Dolby suggest that there are benefits to bringing the side chain out and recombining it with the original signal in the console rather than within the unit itself. Dependent upon your console, you might consider automating the side chain mix level so that it could automatically alter with other musical aspects of the work in hand.

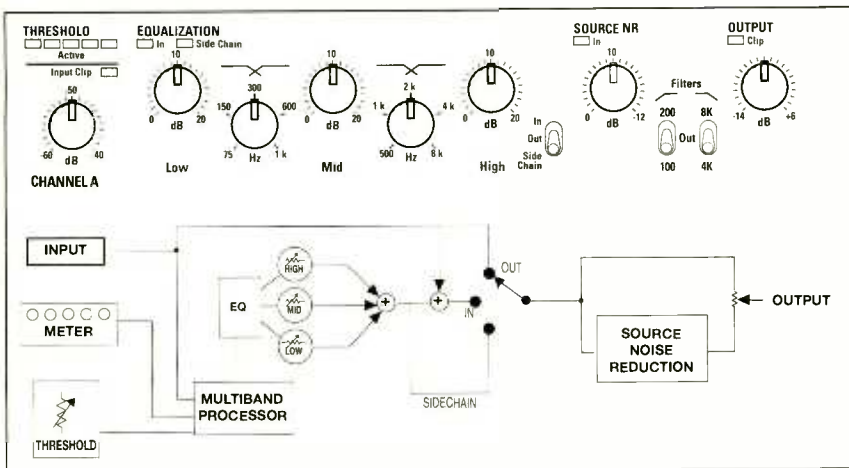
Source NR is a single control which allows the application of 12dB of noise reduction in the form of a sliding band-filter. Dependent upon the nature of the signal input or the degree of processing applied, it is quite possible to accentuate unwanted details of the signal such as noise. There is an off position (fully anticlockwise) and an easily visible green LED to indicate operation. Just below are two two filters which are switchable between 100–200Hz and 4–8kHz in the processed signal. Application is independent of the noise reduction control and can prove useful in conjunction with the EQ controls.

Output is a simple control with a gain and attenuation function, together with clipping LED.

The only remaining front panel control is the Stereo Link switch. When linked, the processor responds to the highest level signal within each band from left or right input channel. The manual points out that, if the Threshold control of one channel is turned fully clockwise, it is effectively slaved to the other. EQ and Source



A high quality unit providing versatile facilities and excellent sonic performance



Block schematic of the 740 signal chain

NR are independent of the stereo link.

The rear panel of the review Model 740 contains little other than left and right XLR I-Os and the power connector. Full production units will have a +4dB to -10dB level selection switch as well.

Hands on

While the front panel controls are clear and easy to understand, using the controls properly does require an

amount of familiarisation. Selection of Threshold level would be your first operation and here the LED guide is invaluable. Care should be taken over the Threshold setting, as all the effects are level sensitive and this parameter should be optimised before touching the EQ controls.

When you first adjust the EQ, the effect appears very subtle even on application of the full 20dBs of gain. But a little thought about how the three bands cover the complete frequency range and that widening

the effects of your actions are more evident.

Gradually it becomes obvious how this approach to equalisation works practically. With a standard equaliser you boost a signal at a specific frequency with the intention of highlighting some tonal characteristic. In doing this, you are likely to affect other signals present in the affected frequency range — with possibly undesirable results.

With the 740 and the correct Threshold setting, the controls are predominantly acting on the lower-level signals and ignoring the higher-level ones. It is therefore possible to 'look through' to the lower-level signals for the characteristics you wish to amplify, with a correspondingly small effect on the higher-level signals.

After a short period of experimentation, it becomes quite natural to work in this way. I first started by processing complete tracks and it quickly became clear how easy it is to brighten dull material in a way that does not sound simply like the application of HF boost. I brightened some recording which lacked HF in comparison with current taste and obtained satisfying results. I also found it possible to 'reach into' a mix and pull out certain points without unduly upsetting the overall balance — not every time, but frequently enough to suggest that this device has considerable applications in mastering.

What you can achieve with the 740 obviously depends on the material you have to work with but, with care, I found that I could gently move the apparent location of a sound within a stereo mix by pulling that sound forward within the balance on the opposite stereo channel. Reverberation or ambience could be exaggerated on certain signals and on one occasion I was able to achieve the opposite effect by emphasising a band of frequencies in a guitar signal that

were not prominent in the reverb. I was surprised to find that I could almost invert the musical balance on a track which had low-level bells and ringing percussion, and make this the featured aspect — against the original producer's intention and without causing any unpleasant side effects.

Now, there is also enough boost to really mess things up as well. I had trouble making precise modifications in the LF region but this may come with practice. Wide-band LF changes are effective, however, particularly when you are trying to gently 'warm' a sound.

It is worth watching the Threshold level since if this is reduced to any significant degree, much of the effect you have achieved will be changed.

On individual instruments, the effects of using the 740 are varied — as is the degree of benefit that can be expected over the use of a standard equaliser. For instance, it is possible to emphasise certain aspects of the tonality of drums and even the surrounding acoustics. It is equally easy to grab unwanted rattles and buzzes. Discriminating between the two is where the skill comes in. On signals where the only low-level element is ambience, the 740 offers lesser effects. Heavy metal-style guitar, for example, offered less scope than acoustic guitar but this is what might be expected.

After a few hours of use I had a pretty good idea of how I would use the 740, when it would offer considerable advantages over standard equalisation and on what types of signal.

Conclusion

The Dolby 740 Spectral Processor should be seen as another very worthwhile addition to the toolkit. It may require more thought than standard EQ initially but the results can justify the effort. It would appear to offer considerable opportunities in the field of mastering — for both correction and enhancement — while presenting an overall alternative approach to equalisation that should be taken just as seriously as other Dolby recording products. ■

Keith Spencer-Allen

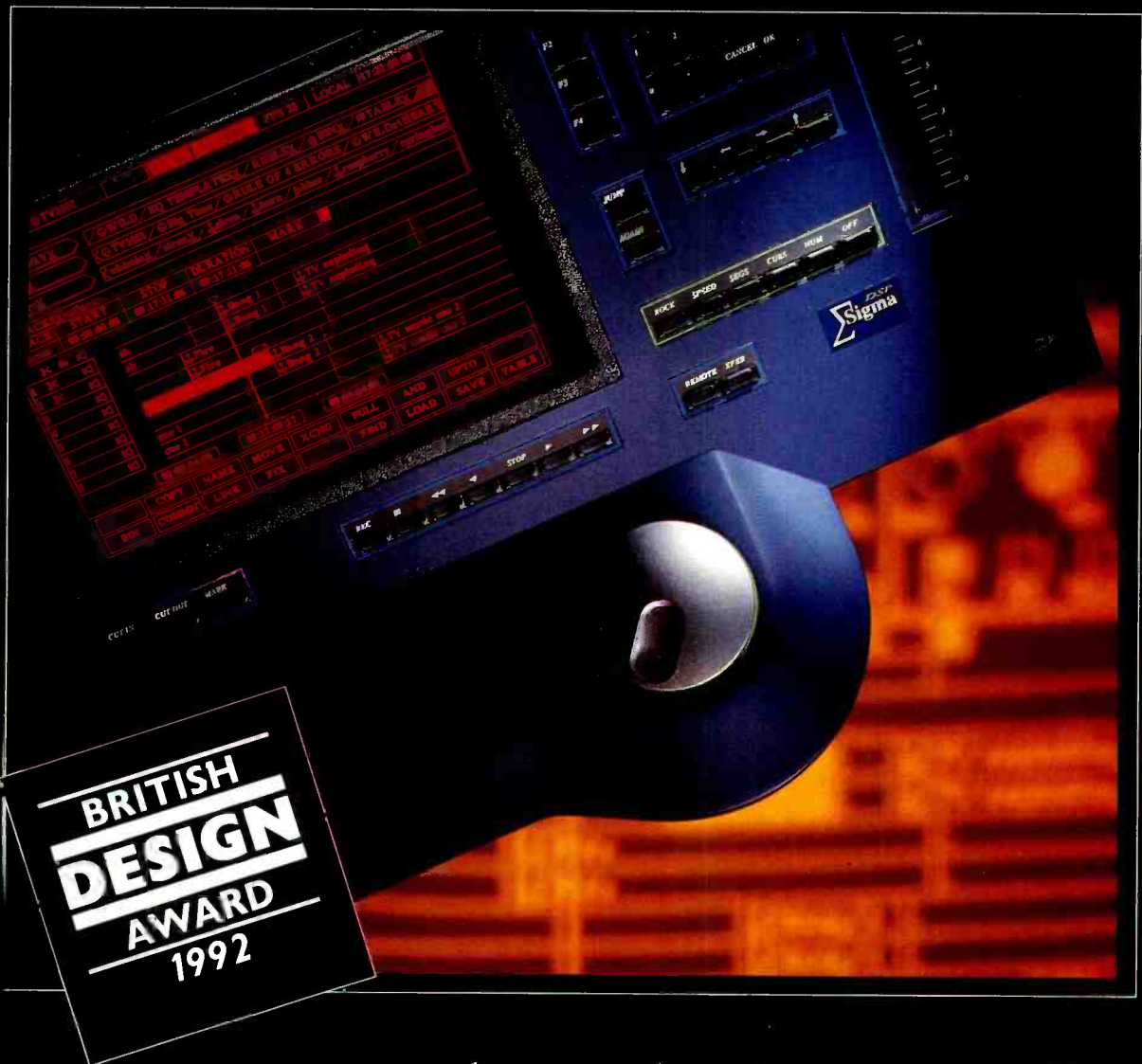
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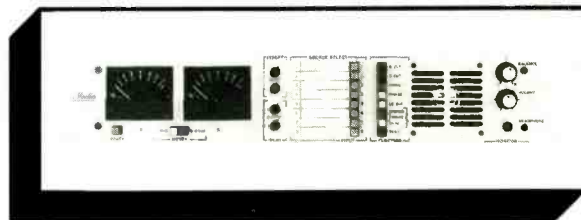
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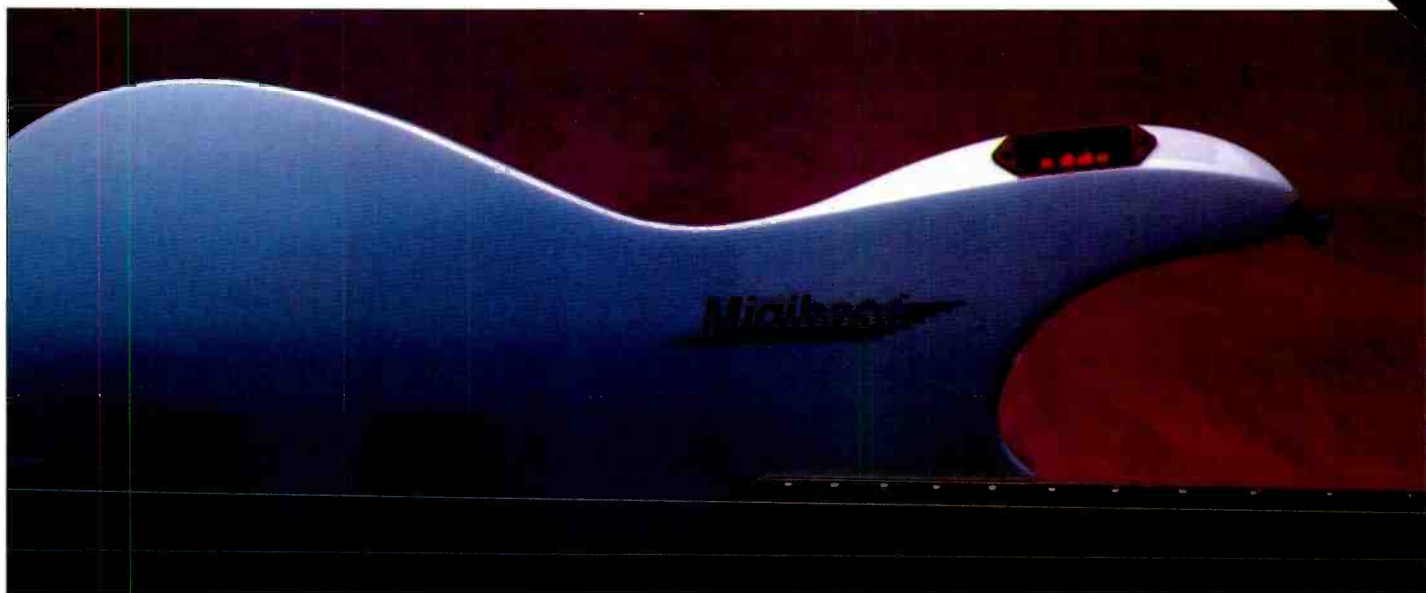
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Peavey *Midibass* — a handsome solution for the bass player who wants to generate sampled bass lines on stage

Zebra Board MIDI controller

Developed by Andrew Duncan, an amateur musician and engineer in Philips' CD-I R&D department in Los Angeles, the *Zebra Board* is a new type of MIDI controller that combines keyboard and fretboard logic in one instrument. Duncan presented a paper on the *Zebra Board* at the last San Francisco AES and states that interest has already been shown by such luminaries as Alan Holdsworth and Stanley Jordan.

It will be manufactured by Harvey Starr at Starr Switch in San Diego and is expected to retail for around \$2,000.

While there is often something decidedly 'Californian' about many of the new MIDI controllers — be they a neck brace or pair of oversized gloves — *Zebra Board* is different. Rather than cause you to react with the usual 'isn't that clever' closely followed by 'but I couldn't see myself getting on with it', *Zebra Board* actually makes musical sense and does not ridicule the player by making him act as if he were possessed.

Duncan is very tied up in the mathematics of musical theory and talks in his paper about the pattern-based nature of playing a stringed instrument on a fretboard in comparison to a keyboard and the advantage it offers. The upshot is that he has developed a 'MIDI controller to model a generalised string instrument' with a range wide enough to simulate an 'infinite fretboard'.

This means that the *Zebra Board* combines the black and white notes of a keyboard arranged in string-like rows as a type of lattice pattern of finger switches. Playing to the right

or 'up' the 'fretboard' the notes ascend chromatically while playing across the 'fretboard' to the next 'string' raises a perfect fourth as it would on the lower strings of a normally tuned guitar. The basic *Zebra Board* offers 23 'frets'— left to right — and 12 'strings' across the 'fretboard'.

Both hands are used to play the 10-note polyphonic instrument in the same way as a piano and because a hand spans the entire width of the board a wide range of notes is available to each. Consequently guitarists should find the concept relatively simple to grasp while keyboard players should adapt to the overlapping nature of the note plan fairly easily once the interrelation of notes is understood.

Things start to get a touch bizarre when it is revealed that chords can effectively be played on a single 'string'. This is a very definite advantage because the duplication of note values (notes are duplicated up to five times on the board) permits very compact chordings to be played with complex voicings and in many different inversions. Guitarists who finger tap should adapt naturally to the *Zebra Board*'s potential especially as all 'frets' remain the same size as you ascend the board.

While the MIDI capability of the *Zebra Board* is unclear as yet, the addition of aftertouch and other performance controllers would seem to be requisite at which point the integrity and speed of the externally connected sound generating module could become a limitation. Either way the *Zebra Board* is an exciting development on paper at least that deserves to be given an opportunity to develop and evolve.

However, I have to disagree with Duncan who states that 'Pattern recognition and variation' is the reason why 'many musicians find musical perception and expression on string instruments to be particularly

rewarding.' I believe the satisfaction has more to do with the string player's requirement to create the note that is to be played and the exquisiteness of the palette of possible ways in which that note can be played— anything from badly all the way through to perfectly for the context. In this respect the *Zebra Board* presents the musician with off-the-shelf notes — perhaps a 'fretless' incarnation of the *Zebra Board* would be a natural evolution.

At last a new instrument that is also an innovative MIDI controller and not just a gimmick. It makes musical sense and seems practical even without a hands-on demonstration. Its progress should be watched carefully.

Andrew Duncan.
Tel: +1 310 444 6590.

Peavey Midibass

On slightly more traditional tack, Peavey has launched into MIDI controllers with its *Midibass*. While a guitar MIDI controller looks possible, Peavey is insistent that the bass player is the more natural choice for a MIDI instrument and the most wanting — the predominantly monophonic nature of bass lines permits reliable and fast triggering to be achieved consistently and it is the bass player and not the guitarist who is being replaced by synths on a regular basis.

Peavey's *Midibass* is traditional in shape and functions as a stand-alone two-pickup instrument but differences become apparent on closer scrutiny. Polyphonic MIDI data is generated by a combination of electrical contact and hex pickup triggering. Frets are split into four discrete sections dedicated to the four strings, and fretting a note tells the bass's internals that you are interested in that note while a hex

pickup near the bridge detects a pluck which triggers that note's envelope. Pulling or pushing a string across its section of fret does not cause retriggering and the whole MIDI-note generating capabilities of the *Midibass* rely heavily on pitch-bend information to enable sliding of notes in a faithful manner. The instrument's performance when coupled to external MIDI modules therefore depends on the pitch-bending capabilities of the modules.

Midibass is joined to a power and control module by an umbilical cord from which the generated MIDI data communicates to the outside world. Peavey's *Spectrum Base* module looks the natural companion to the instrument offering 200 bass presets. 8-voice polyphony and multitimbrality.

General programming functions and preset selection are performed from the bass's fretboard by fretting a note that corresponds to a given programme number and flicking a switch near the guitar controls to confirm the selection which is also shown on a small LED display at the top of the guitar. Editing functions are performed in a similar manner but pressing a pedalboard controller into service should simplify things. *Midibass* has exemplary triggering performance and looks like a handsome solution for the bass player who wants to gig with an instrument that can generate modern sampled bass lines live on stage.

Peavey Electronics, 711 A Street, Meridian MS 39301, USA.

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**Music News is compiled
by Zenon Schoepe**

AES San Francisco

This month's roundup of new products comes directly from the recent San Francisco AES show.

Sony

As an alternative to simple truncation, Sony's *K-1203* Super Bit-Mapping Processor uses advanced digital processing techniques to maximise greater-than-16-bit recordings for standard 16-bit CD mastering. The unit operates on noise-shaping and psychoacoustic principles and concentrates its efforts on the 3kHz–4kHz signal range to which the human ear is most sensitive, moving quantisation noise to the extremes of the audio spectrum. Sony anticipate additional applications in digital broadcasting where the D1 and D2 VTR formats, for example, use 20-bit audio storage.

The latest addition to Sony's F-line of digital signal processors is the *DPS-F7* Dynamic Digital Filter Plus. Like the other units in this range, the *DPS-F7* is 1U of rack space high. It calls on ten algorithms to produce a range of filtering effects including parametric equalisation, dynamic switching and psychoacoustic enhancement and offers 100 factory programs and 256 user memories.

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Allen & Heath

The new A&H *GL3* live mixing desk comes in 16-input and 12-input configurations and may be expanded to carry a total of 32 inputs. The console offers six selectable aux busses (pre or post-channel EQ and faders), 4-band EQ (HF shelf, two swept mid bands LF shelf). A routing switch allows routing of the aux sends through both corresponding four sub groups and L-R paths facilitating the use of six discrete mixes.

Allen & Heath Brenell Ltd, Kernick Ind. Estate, Penryn, Falmouth, Cornwall, TR10 9LU, UK. Tel: 0326 372070.

Focusrite

Broadening their sphere of activities, Focusrite announced two new rack mount units, the *Red 1* 4-channel microphone preamp and *Red 2* 2-channel equaliser. Calling on the company's tradition of high-quality circuit design these units also use cost-effective hand production techniques to bring them within reach of a greater number of studios. The *Red 1* features -6dB to +60dB input gain in 6dB steps, channel-specific phantom powering, phase reversal and input-level switching. Metering is via circular VU-type meters.

The *Red 2* uses the same circuit topology as the Focusrite console and popular *ISA 110* equaliser and offers an HF section, upper and lower mid parametric ranges of 600Hz–6kHz, 1.8kHz–18kHz, 40Hz–400Hz and 120Hz–1.2kHz, and LF section all with 15dB of cut or boost. There are additional high and low-pass filters with 12dB cut or boost and channel-independent trim.

These units are strikingly stylised and form the basis of a new series of processors.

Focusrite Audio Engineering Ltd, Unit 2, Bourne End Business Centre, Cores End Road, Bourne End, Bucks SL8 5AS, UK. Tel: 0628 819456 Fax: 0628 819443

Meyer

Meyer Sound Labs' new *HD-2* high definition midfield audio monitor is based on the highly acclaimed technology of the company's *HD-1* studio monitor. The *HD-2* incorporates a 10-inch low-frequency driver and 1-inch (diaphragm diameter) high-frequency driver mounted on a symmetrical 60° horn in a vented enclosure. An active crossover, optimised pole-zero response correction filters, loudspeaker component protection circuitry and dual class AB1 power amplifiers are built into the enclosure. Each *HD-2* loudspeaker is individually factory-aligned under high-resolution FFT analysis in an anechoic chamber to meet exacting frequency- and phase-response specifications. Both *HD-2* drivers are

factory-tested for linearity; the bass driver incorporates Meyer Sound long-exursion suspension and coil designs while the high-frequency driver is of an entirely new configuration, incorporating a titanium dome and silk suspension. The HF driver is mounted on to a new horn that employs compound flare rates to achieve control of very-high-frequency directivity.

Suggested applications include midfield monitoring for recording or audio postproduction, and main monitors for studio projects.

Meyer Sound Labs, 2832 San Pablo Avenue, Berkeley, California 94702, USA.

Tel: +1 510 486 1166

Fax: +1 510 486 8356.

DDA

Forum is a new range of consoles from DDA. *Forum PA* is an 8-group general sound reinforcement or recording console; *Forum Composer* is a compact 8-group, 24-track monitoring recording console with LED metering; *Forum Matrix* is a dedicated sound reinforcement console incorporating a 18x8 matrix section. The input module feature 4-band EQ, six aux sends, a direct output from one of the auxes and 5-segment LED metering.

The *QMR* 24-track recording console shown at the British APRS Show now has full meter bridge and patchbay options which can be retrofitted without disturbing existing studio wiring and a MIDI mute system which can be readily retrofitted.

DDA, Unit 1, Inwood Business Park, Whitton Road, Hounslow, Middx TW3 2EB, UK.

Tel: 081 570 7161

Fax: 081 577 3677

Tascam

The current crop of new products from Tascam includes the highly-topical *DA-88* 8-track digital multitrack machine, *RA-4000* 4-track digital recording-editing system and *DA-60* 4-head time code DAT.

Taking advantage of prolonged delays in the arrival of the Alesis *ADAT* digital recorder, Tascam have launched a competing system based on Hi-8 videotape. The *DA-88* offers up to 100 minutes of recording time on a standard 120 tape at either 44.1kHz or 48kHz sampling rates. Up

to 16 units can be chained together giving a theoretical 128-track maximum capacity to the system. This can then be externally SMPTE synced using an optional *SY-88* sync board and uses a dedicated sync tape track rather than one of the recording tracks. A *DA-88* system can be remotely controlled with the *RC-848* remote which will address up to six units (48 recording tracks).

The *RA-4000* random access recording-editing system and *RC-4000* remote user interface is a dedicated system aimed at audio for video applications. The *RC-4000* offers a multitude of function-dedicated controls intended to make its use quick and instinctive while the recording section is configured to provide 2-channel record/4-channel replay from its internal 200Mb disk. Remote transport control from a video editor is provided via a 9-pin serial port, digital audio transfer via AES-EBU and SP-DIF ports and syncing to MIDI time code is also possible. Four *RA-4000*s can be slaved together to provide 16-track operation and further storage expansion is possible via SCSI.

The *DA-60* DAT machine features a RAM buffer for instant start, $\pm 12.5\%$ pitch control (on playback), two locate points, selectable copy protection, and gapless punch in and out. Connections to the outside world take the form of AES-EBU and SP-DIF digital I-Os, word clock I-O and a 37-pin parallel port for external transport control. The *SY-D6* synchroniser board provides a SMPTE-EBU reader-generator, SMPTE chase with offset and locking to video sync.

UK: TEAC Corporation Ltd, 5 Marlin Court, The Croxley Centre, Watford, Herts WD1 8YA. Tel: 0923 819630.

US: TEAC Corporation Ltd, 7733 Telegraph Road, Montebello, CA 90640.

Tel: +1 213 726 0303

Lexicon

Latest news from Lexicon includes the introduction of the *20/20 AD* 20-bit A-D converter and a drastic software revision (v3.0) for the familiar *Model 300* digital effects system.

The *20/20 AD* will operate either as a 2-channel 20-bit processor or as a 4-channel 18-bit converter. Both modes of operation offer improved dynamic range over 16-bit conversion



Seeing red? The Focusrite Red 1 and Red 2 mic preamp and equaliser

(2-channel/112dB; 4-channel/100dB). The unit also offers a variety of operating modes, sync option and interconnection interfaces.

The *Model 300* upgrade takes the form of two chips and makes it possible to operate the unit either in its normal configuration or in a number of 'dual machine' modes. In Dual Mono the *Model 300* becomes two mono processors with fully independent control, while Cascade mode allows these two independent channels to be linked in series — with the additional facility of being able to route the signal out of the unit and back in between processing stages. The new software also adds five new processing algorithms to the machine's facilities.

Lexicon Inc, 100 Beaver Street, Waltham, MA 02154-8425, USA. Tel: +1 617 736 0300.

CEDAR

Now in full production form is the CEDAR *DC-1* de-clicker module. The *DC-1* is a stand-alone, real-time signal processing module utilising the four-pass processing derived from company's full production system — twin 32-bit floating-point processors capable of handling 50 million calculations per second, 20Hz–20kHz frequency response, better than 90dB dynamic range and better than 85dB S-N ratio over analogue inputs. Amongst its other features are AES-EBU and SP-DIF digital I-Os, balanced and unbalanced analogue I-Os RS232 remote operation and 16-channel MIDI

control. The process is capable of removing a claimed 2500 scratches per second and is expected to find applications in broadcasting, mastering and archiving.

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

AMS

The *AudioFile Optica* is a 4-track, optical disk-based version of the popular *AudioFile Plus*. The *Optica* offers a low-cost approach to simple track-laying tasks with the option of transferring material to more powerful *AudioFile* systems for further refinement.

New software and hardware for the *Logic 1-AudioFile Spectra* include on-line M-O drive for recording and editing directly to-from a removable optical disk with a consequent zero backup time and Exabyte backup which provides four-times real time backup and the ability to audition cues from the backup tape.

Of the *Optica*, AMS state that this 'is the first in a new line of products that addresses all stages of the sound postproduction process'.

AMS, Billington Road, Burnley, Lancashire BB11 5ES, UK. Tel: 0282 57011. Fax: 0282 39542.

Summit Audio

Two new products from American sound processing specialists Summit Audio. The *MDSP-200* dual, peak and

average meter was designed in response to a perceived need for metering to match the climbing standards of high-end mixing consoles. The Meter is a modular unit simultaneously displaying instantaneous peak and average signal levels. DSP technology facilitates scaling and time constant functions. The Meter is remotely controllable.

The *MMP-125* modular microphone preamp is a single-channel valve (tube) preamp incorporating selectable gain (15dB–65dB in dB increments), line or mic inputs, a phase reversal switch, pad switch, overload indicator and claimed frequency response of 3Hz to 40kHz.

Summit Audio, PO Box 1678, Los Gatos, California 95031, USA. Tel: +1 408 395 2448. UK: HHB Communications Ltd, 73-75 Scrubs Lane, London NW10 6QU. Tel: 081 960 2144.

Disq

The *Disq Digital Mixer Core* represents a revolutionary new step in the development of the digital mixing console. Developed from AT&T's military technology (itself acquired from Russia), the *Core* is actually a parallel signal processor configured to handle digital audio. At present the *Core* has no dedicated control surface of its own but is intended to be connected to an existing console where it takes advantage of the scanning system of the automation system to read the

panel controls. This currently makes the *Core* suitable for use with automated SSL and Neve consoles — it was demonstrated with a 60-input Neve VR at the San Francisco AES Show.

Installation of the *Core* into an existing studio setup requires only the changing of two cards in the console's centre section and the whole job is claimed to take under four hours. As the existing audio routings can be left intact, the installation also leaves the user the ability to choose between the conventional operation of the console and use of the *Digital Mixer Core*.

The components of the system are as follows: the AT&T Parallel Processor is the processor at the centre of the *Core* and will accommodate up to 72 virtual ▶



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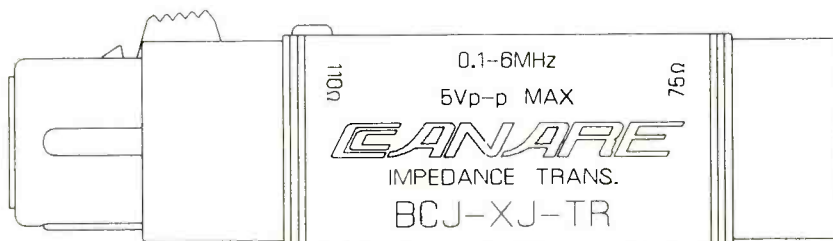
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112-114 Wardour Street, London, W1V 3LP
Tel: 071 434 3344. Fax: 071 437 9354
Tlx: 21624 ALLOFFD G

mixer channels; the AT&T Digital Audio Interface accepts SDIF2 format digital audio and presents it to the Processor while the *Digital Mixer Core's GML Series 2000 Automation Environment* is one of the current state-of-the-art mixing systems. Harmonia Mundi Acoustica interfaces are used on the Processor's outputs and these can be provided to interface with and standard digital format. The resolution of the *Core* processor is 24-bits — these are bitmapped or dithered down to 16 bits for mastering purposes.

The *Core* has been configured to make it possible to take advantage of powerful digital DSP technology without the necessity to learn a new control surface and operating procedures; and although the computer has been optimised to emulate conventions systems of panning, EQ and so on, the manufacturers are making much of the potential of such a system to provide as yet undeveloped signal processes.

The price of the *Core* could presently be regarded as being devastatingly high — although the manufacturers are confident about the future of this technology in the audio industry.

Disq Inc, 1790 Broadway, New York, NY 10019, USA.
Tel: +1 212 765 3417.
Fax: +1 212 581 8938.

Aphex

The familiar *Aural Exciter Type C* has had Aphex *Big Bottom* bass enhancement process added to its facilities. As the original unit synthesised and added harmonics to the upper frequency element of an audio signal, *Big Bottom* enhances the lower frequencies making 'an eight-inch woofer sound like a 15-inch'. The process uses adjustments christened *Overhang* and *Girth*.

Aphex Systems, 11068 Randall Street, Sun Valley, CA 91352.
Tel: +1 818 767 2929.
UK: Sound Technology Plc, 15 Letchworth Point, Letchworth, Herts SG6 1ND. Tel: 0462 480000.

Studer-Revox

The *Dyaxis 2* modular (8 to 48-track) hard-disk recording system offering an unlimited number of virtual audio tracks, 24-bit real-time digital mixing and 5-band parametric equalisation.



Genelec's 1032A

The system supports eight tracks of real-time playback for every four channels of audio I-O. Optionally available is Dolby AC2 data compression for 100 track-minutes per processor on 3.5-inch MO disks. Facilities also include Auto Conform and multitrack-style punch in and out — although this is not destructive. The system has machine control master and slave capabilities using TimeLine *Lynx* and *Micro Lynx* sync systems.

Studer International, CH-8105 Regensdorf, Althardstrasse 10, Switzerland.

Genelec

Genelec's *1032A* is an active 2-way monitor speaker enclosure using the company's Directivity Controlled Waveguide technology to enhance off-axis listening. The *1032A* contains 10-inch LF driver and 1-inch HF dome drivers bi-amped with 160W feeding the LF and 120W feeding the HF. A pair of *1032As* are claimed to deliver 124dB SPL at one meter.
Genelec, Tehaantie 17, SF-74100 Lisalmi, Finland.
Tel: +358 77 13311.
Fax: +358 77 12267.

Fostex

The *DCM-100* and its partner, the *MIXTAB*, form a new digitally-controlled mixing system from Fostex. The 1U-high *DCM-100* is an 8-input (stereo or mono) unit featuring two effects sends, two stereo returns high and low EQ, pan position, mute-solo and master output — all of which are controllable via MIDI. The *MIXTAB* can control and store 100 snapshots which can be recalled using MIDI program changes. Alternatively, the *DCM-100* can be addressed directly via MIDI ►



DL241

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Tascam's DA-88 8-track digital tape recorder — see page 22

from a sequencer. *DCM-100* units can be linked to provide a theoretical maximum of 48 inputs, which may all be addressed by a single *MIXTAB*.
UK: Fostex UK, Unit 1, Jackson Way, Gt Western Ind Park, Southall, Middx, UB2 4SA. Tel: 081 893 5111.
US: Fostex Corporation of America, 15431 Blackburn Avenue, Norwalk, CA 90650. Tel: +1 213 921 1112.

Euphonix

The *Cube* is a flexible outboard routing matrix which is intended to

be integrated into the Euphonix *CSII* digitally controlled analogue mixing consoles or used as a self-contained, computer-controlled unit. The *Cube* is a flexible system with many potential applications in the *CSII* architecture — it can be used to replace a patchbay or fitted with DCAs and used to provide additional aux sends, additional mix buses, multichannel film buses or mix minus buses for broadcast.

Euphonix, 10647B Riverside Drive, N Hollywood, CA 91602, USA. Tel: +1 818 766 1666.
UK: Studio Sales, 9 Hatton Street,

London NW8. Tel: 081 963 0663.

Athan

The Athan Corporation's high-quality replacement parts and enhancements for profession multitrack tape machines has been extended with a hard-wearing tension guide swing-arm assembly for the Otari *MTR-90* machine. The arm has been under development for two years and will eliminate tape path misalignment due to bending.

Athan Corporation, 50 So Linden Avenue #10, So. San Francisco, California 94080.
Tel: +1 415 589 5206.
Fax: +1 415 742 9091.

Quested

A passive 3-way monitor called the *H208* is the latest design from Roger Quested. The enclosure features two 8-inch LF drivers a 3-inch soft-dome MF driver and 1 1/8-inch HF driver. The *H208* is intended for postproduction and home-project installations and suitable for use with amplifiers rated at between 200w and 400w.

Quested Monitoring Systems Ltd, 59 Maltings Place, Bagleys Lane, London SW6 2BX, UK.
Tel: 071-731 7434
Fax 071-731 3280

Yamaha

The *PM4000M* Stage Monitor Mixing Console is derived from the company's recently-released *PM4000* live console. The 'M' is available in 44 and 52-input formats with eight VCA groups, eight mute groups, 4-channel parametric and variable high-pass EQ on input channels. The console can provide routings for no less than 22 discreet mixes simultaneously.

The new *FMC9* AES-EBU Format Converter will convert up to eight

AES-EBU channels into Yamaha's own proprietary digital format making it of potential interest to users of the company's digital audio equipment. Data can be input at 32kHz, 44.1kHz or 48kHz and appears on a 25-pin D-SUB connector in either Y1 (*DMP7D*) or Y2 (*DMR8*) format.

Yamaha have also released a 20-bit D-A converter called the *DA2X*. This uses delta-sigma, single-bit conversion giving a 110dB dynamic range, 2Hz–22kHz frequency response and THD below 0.001%. The *DA2X* accepts AES-EBU, SP-DIF and Y2 format signals. The unit will sync to 32kHz, 44.1kHz and 48kHz sources and will accept signals with a pitch variation of ±12%.

Also new from Yamaha are software upgrades for the *DMR8-DRU8* digital multitrack systems and the *DMC1000* digital mixing console, and Project Manager Apple Mac software for use with the *DMC1000*.

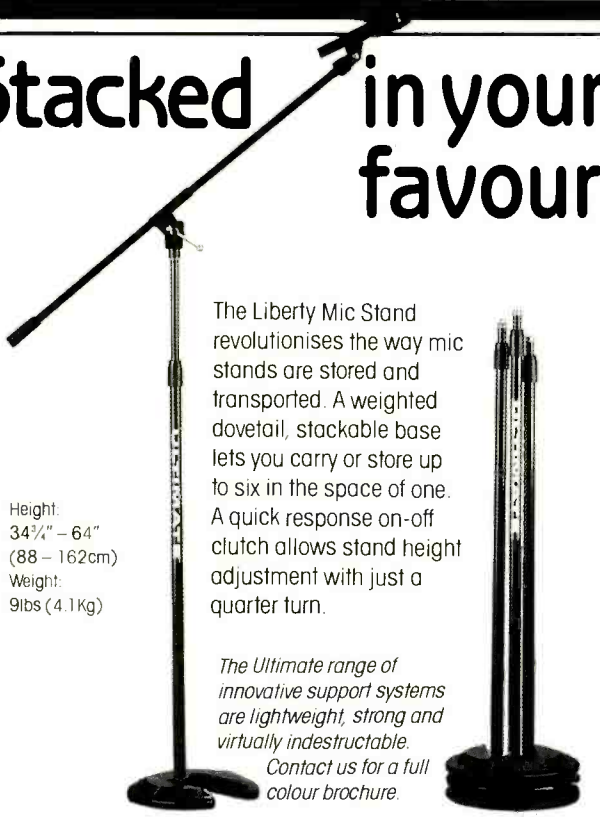
UK: Yamaha-Kemble Music UK Ltd (Pro Music Div), Sherbourne Drive, Tilbrook, Milton Keynes MK7 8BL.
US: Yamaha Corporation of America, PO Box 6600, Buena Park, CA 90622-6600. Tel: +1 714 522 9011.

Soundcraft

The popular *Spirit* range of Soundcraft consoles has been extended by the addition of the *Spirit 4 Live* console. The '4' is intended for use as an FOH desk and comes in 12, 16, 24 and 32-input sizes. All offer four subgroups, 3-band EQ (2-band sweepable and high-pass filter) and balanced mic and line inputs.

UK: Harman International, Cranbourne House, Cranbourne Industrial Estate, Potters Bar, Herts EN6 3JN. Tel: 0707 665000.
US: Soundcraft USA, 8500 Balboa Boulevard, Northridge, CA 91329. Tel: +1 818 893 8411. ■

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Euphonix

Live Sound Desks



Genesis soundman Rob 'Cubby' Colby at the Midas XL3

ATI

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Audio Technology Inc.
Tel: +1 503 624 0405.

Midas

The Midas *XL3* console launched in 1990 is available in 24, 32, and 40-input versions but can be expanded by a further 16 channels with the *XL316* extender. Recently introduced options include a detachable VU meter bridge, a centrally positioned master section, upgraded flightcase, and automation featuring both snapshot and dynamic capability. A 56-input automated *XL3* has just been installed at the Chatelet Theatre in Paris.

MIDAS. Tel: 0562 741515.

Soundcraft

Soundcraft's top of the range live console the *Europa* has been



D&R's Axion

enhanced with the introduction of a stereo module and a dual matrix module. Other live consoles from the company include the *Venue Theatre*, *Venue II*, *Delta DLX* and *SR*, *Vienna* and the *Vienna Monitor*. The latest addition to the range is the nonmodular 4-bus *Spirit Live 4* which is supplied in 12, 16, 24, and 32-input versions.

Soundcraft. Tel: 0707 660482.

Yamaha

New from Yamaha is the *PM4000* live console (reviewed on page 46 of this issue) which supersedes the popular *PM3000*. The *PM4000M* monitor version was launched at last months AES along with the midpriced *MC0411* series of sound reinforcement consoles which replace the long serving *MC04* range.

Yamaha. Tel: 0908 366700.

Soundtracs

The *Sequel SR* console featuring a 4-band parametric EQ and available with 24, 32 and 40-inputs. *Megas Stage* is a dedicated 8-bus SR desk

with three different frame sizes that can accommodate a combination of mono or stereo input modules, and up to four matrix modules. *Megas Monitor* desk provides 24, 32 or 40 inputs into 12 monitor sends. *Solo Live PA* mixer is a 4-bus split console with the option of 16, 24 or 32 inputs. *Solo Rack* is designed for 19-in rack fixed installations, with 12 mono inputs each with a swept 4-band EQ. *Solo Monitor* has been designed specifically for stage monitor applications and compliments the *Solo Live FOH* desk.

Soundtracs. Tel: 081 399 3392.

Cadac

The J-Type is Cadac's most recent theatre console and maximises on flexibility by allowing modules to be fitted in any order the operator chooses. The company's other new desk the *Concert* features centrally assigned switching and a full status recall facility. Both consoles can be fitted with Cadac's theatre automation system which caters for static and moving fader cues.

Cadac. Tel: 0582 404202.

TAC

The *SR6000* offers a quite comprehensive VCA grouping and muting system. Unusually for a desk in this market, it also has a single VCA output group with a master fader. Thus all 10 outputs can be individually assigned to one overall fader, without affecting the relationship between them. The *SR6500* is the *SR6000*'s companion foldback console. The desk shares no components with the *SR6000* apart from the frame. The specification includes 18 discrete monitor mix outputs, eight VCA-mute groups and a choice 24, 32 or 40 mono inputs. A new 4-band swept EQ is also fitted.

Total Audio Concepts.

Tel: 0602 783306.

Allen & Heath

The *GL3* is Allen & Heath's latest live sound console. Designed as a general purpose compact mixer, it can quickly convert from front-of-house to on-stage monitor use via panel-mounted status-switching. The console comes in 16 and 24-input frame sizes and can be expanded in blocks of 8 up to 32 inputs.

Allen & Heath. Tel: 0326 372070.



Soundcraft's Spirit Live 4 a four bus PA mixing console

D&R

The new *Axion* mixer was launched at the Frankfurt Music Show. The console is fully modular with two standard frame sizes 32 or 40 channel, space for 12 stereo-return modules as standard. Two consoles can be linked as master and slave with all buses connected together without any loss of input channels. The *Axion* has a programmable mute system. Up to 64 mute patches and eight VCA groups can be stored internally in the console and with a back-up battery that D&R claim is good for five years.

D&R Electronica.
Tel: 31 2940 18014.

DDA

The latest addition to the DDA range is the midpriced *Forum*. The *Forum PA* provides a general purpose 8-bus sound reinforcement mixer or recording desk, while the *Forum Matrix* is designed specifically for live applications and features an 8 x 8 matrix. Other live consoles include the *D Series*, the *Q Series*, the *Interface* and the top-of-the-range *Arena*.

DDA. Tel: 081 570 7161.

Ramsa

The *WR-S44* borrows many of its features from Ramsa's flagship monitor console the *WR-S840*. The new range of 4-bus live consoles are supplied in 12, 16 and 24-input sizes with the largest measuring just under one metre wide. Features include the ability to individually assign one of the four auxiliary sends as a direct-channel output, low noise discrete circuitry, dust-sealed 100mm faders, and moulded rubber buffers at the rear to protect cables from damage.

Ramsa. Tel: 0344 853550. ■



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SOLO MIDI. A recording console available in 16, 24 and 32 input frame sizes (36, 52, 68 in remix). Automated MIDI muting on all channel inputs, monitor inputs, group outputs, stereo effect returns and auxiliary masters. Four band EQ with two swept Mids, assignable to monitor inputs. Six auxiliary sends – four assignable to monitor inputs. Four stereo effect returns with two band EQ, balance and level controls. Raised meterbridge.

SOLO LIVE. A sound reinforcement console available with 16, 24 or 32 inputs. Four independent sub-groups, right/left master and mono sum output. Four band EQ with two swept Mids. Six auxiliary sends. Balanced inputs and outputs. Four stereo effect returns. 48V phantom powering for all mic inputs. Raised meterbridge.

SOLO RACK. A 19" rack mounted stereo version of the Solo Live available in a 12-2-1 format.

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It could have been the classical festival of the decade

10 DAYS IN MOSCOW

The Red Square Invites classical festival staged in Moscow during July has already joined the live sound industry's hall of infamy. Mike Lethby reports

Two years ago a Russian cultural entrepreneur named Omari Sokhadze had a vision. As Director General of Intertheatre, a Moscow performing arts centre, he envisaged a grand celebration of his country's musical heritage in Red Square.

Before 1991's failed coup such an event would have been inconceivable. Even now, in Boris Yeltsin's free but impoverished Russia, few would contemplate (or have the political clout to undertake) so bold a scheme.

His vision became reality last autumn with a \$6.5 million guarantee from the state and outside sponsors. The week-long *Red Square Invites* festival, scheduled as five concerts playing to 80,000 people a night in July 1992, was on.

It could have been the classical festival of the decade.

Sokhadze had useful connections: AVL Broadcast, a West London facilities house (whose

MD Andrew Somper was eager to expand his company's activities into live event production) and Andy Ward, a producer with a premiere league track record including 1991's *Pavarotti In The Park*.

In turn, Ward's contacts with Mario Dradi, José Carreras' manager, helped secure the star's services and a host of other internationally-known performers.

As is happening more often nowadays, television called most of the shots and it was the broadcast production team who led from the front.

AVL, whose core business lies in mastering, standards conversion and editing, coordinated all of the broadcast, recording and live sound elements. It is an area which Somper aims to develop. 'One of the keys is bringing together extremely good creative and technical personnel,' he says.

Ward and Somper started drawing together a

classy production team: TV production and sound coordinator Toby Alington, sound designer Derrick Zieba, staging production company Birchwatt, the Fleetwood mobile and O21 Television.

Alington suggested the London Chamber Orchestra as potential participants. Their response was enthusiastic, offering to write a new work with Dave Stewart and the Hothouse Flowers.

Paul Staples came up with a radical site-design whose centrepiece was a 120-ft-tall open pyramid, supporting all the sound delay arrays, TV cameras and follow spots.

Unfortunately, storm clouds were already gathering in the form of delays and uncertainties at the Russian end.

A production on this scale demands a six-month lead time; it was only in March that Sokhadze backed his concepts with cash. Confirming the line-up took another six weeks. The timing was already too late to cut the TV deals needed to generate profits. Commercial sponsors, in turn, began turning away.

Nor were promotional activities proceeding well. Sokhadze had ruled out hiring an experienced promoter, appointing a PR agency instead. Basic promotional essentials like advertising were virtually nonexistent. Ticket prices were too high: a couple of weeks' wages for the average Russian or \$50 for foreigners.

Inside information

Translating technical information was a big problem. On one occasion — hilarious with hindsight — Birchwatt Productions' head, Mick Kluczynski, spent two hours on the telephone establishing that a 20,000-seat 'grandstand' Sokhadze thought he had found was in fact 20,000 cushions. On technological matters it got worse. Birchwatt had realised why their faxes were going unanswered: Sokhadze's office couldn't understand them. Kluczynski: 'The promoter was inexperienced at large events and our task often went beyond the expected brief.'

But by the time the trucks rolled up in Red Square, the British team had several 'inside sources' of its own. Orion, a Moscow PA hire company, had just taken delivery of a large Turbosound Flashlight PA. Owner Sergei Korovin gave Britannia Row's crew, who brought the remainder of the PA, invaluable advice on the ways of Moscow.

Even more crucial, Head Electrician Lawrence Dunnett had been warned that no on-site power would be available. In July, generators and trucks were as scarce as grandstands, so this was bad news. So Dunnett befriended the local electricians. He already knew technicians from Moscow's Olympic Stadium — Valera, Vassilych and Eugeny. They introduced him to Aida, Victor and their Kremlin electrical team. 'Those guys were absolutely brilliant,' says Dunnett, 'they helped us make it all happen.'

Sokhadze's lack of promoting experience ultimately proved to be the event's downfall. With audiences running at barely 10% of expectations each night, huge losses mounted daily and late on Wednesday night, the plug was pulled on the LCO show. Although participants had mostly been paid in advance, there was nothing more in the coffers. It was a sad end to a bizarre 10 days.

By then Mick Kluczynski had been in Moscow for a month. He commented: 'We've learnt a lot from the Russians, but I don't think they've learnt much from us — they're very proud people and seem to have missed the point about the relationship between them and us.'

As the festival wound up, Sokhadze was already

talking in terms of 1993's festival. The idea of gathering the cream of classical performers in a stunning arena for a week is fine. The industry can only hope that he has taken some highly expensive lessons to heart. ■

Diary of a festival

WEDNESDAY, 1st JULY



Paul Staples' set had to be moved at the Kremlin's request

18.00: Arrive in Red Square. The sight is impressive. With the Kremlin Wall and Lenin's tomb on our right, the first thing we see is a pair of Star Vision screens dividing the seats from the standing audience area. On towards St Basil's Cathedral with grandstands to either side and Paul Staples' stage set ahead, positioned at a slightly skewed angle to the square. It transpires the stage has been moved from its designed position at the Kremlin's request.

19.00: Chris Hey is engaged in what diplomats call 'tough talking' with the Bolshoi Orchestra's leader who ordered 120 mics and a desk to be supplied for the small stage for tomorrow. He appears to have overlooked the fact that the stage itself will barely accommodate 30.

THURSDAY, 2nd JULY

Alington and Bennett are finalising the stage layout — the boards must be painted tonight. Carreras will now be arriving tomorrow evening, and will come straight from the airport for rehearsals. The crew crosses their fingers. With luck the PA will be ready in time.

FRIDAY, 3rd JULY

9.00: I spend the morning trying to fax England. Communications are dire: you are really on your own here. There is no international line to the site — the nearest, and heavily oversubscribed, is in Intertheatre's office 10 minutes walk away.

13.00: At lunch, the sky looks ominous. Shortly afterwards, the weather goes ballistic. A short but savage gale scatters the audience seating like confetti, tears down speaker scrims, rips two large pieces of wood from the stage set. Lightning crackles. The intercom warns: 'Important announcement... all listeners... power down immediately.' The storm means that soundcheck will be delayed because the soaked stage cannot be finished. And this is supposed to be Russia's most reliable period for weather.

16.00: Zieba and Hey decide to get as much done to the PA as possible, despite having to work under plastic sheeting on the mix tower. After a few minutes of this, they make an executive decision to build their own roof. The lighting crew, who can't do a thing in the downpour, huddle in the catering marquee peering morosely into cups of coffee. Crew come and go wrapped in bits of black plastic, like ravers after three days at



The polite José Carreras

Glastonbury festival.

18.00: At last it has stopped raining. The sound crew are fighting against the odds now to get even part of it ready for Mr Carreras' rehearsal, scheduled for 22.00.

23.15: The stage is finished; Mick Kluczynski completes a tour of inspection sporting a vastly oversized camouflage jacket and a broad smile. José Carreras has arrived, but appears relaxed about the wait. Messrs Hey, Alington, Cast, Zieba and Bennett are finishing the orchestral miking while the musicians tune up. It is now very cold indeed.

23.20: José Carreras has nipped on stage unnoticed. The baton falls. *Red Square Invites* ▶

THE PA

Derrick Zieba of Dimension Audio was appointed as sound designer and FOH engineer for the festival, through his work with the LCO.

He worked with the main PA contractor, Britannia Row Productions, to design a PA layout for an audience of 80,000.

The main FOH PA centred on a Turbosound Flashlight TFS cluster, purchased in July by Orion, which was suspended from a crane. This was used to cover the grandstand seating areas and arena audience seating.

In the stage wings, Britannia Row's Turbosound TMS-3 arrays provided front fill, while the delay towers (two main delays and one further back) consisted of Maryland Sound hi-low packs and TMS-3s.

Derrick Zeiba and Clinton Cast mixed FOH for each show on two Yamaha PM3000 consoles, with Alan Bradshaw mixing monitors on a Ramsa S840 desk. ■



FOH Yamaha PM3000

has music.

Carreras has a reputation for suffering neither fools nor poor PA sound gladly. There is some nervousness backstage. After five minutes, he stops the performance and calls for the stage manager, Colin Rowell. Could his two mics possibly be moved forward a yard? he asks Rowell. If the sound guys don't mind, he adds politely. No problem at all, replies Rowell, relieved.

However, during the rehearsal it becomes apparent that there's a small but extremely persistent buzz in the PA — a potentially horrendous problem. Everyone has a different theory. Lights, as tradition dictates, are blamed first — to the indignation of Nick Jones's Theatre Projects team.

A search is launched to find out whether someone's patched something into a circuit somewhere without telling anyone else.

Alington explains the joys of earthing in Red Square. 'If you're going to hold a concert anywhere in Russia, this corner of this site is the worst place you could choose. Nothing would normally get through our integral stage earth. But there's so much going on at this end of Red Square that there's a background of 5 amps constantly all over the stage. We can deal with it, but it certainly doesn't make our life easy.' The team has learnt from various 'sources' that radar and a powerful long wave transmitter are two of the devices aimed at the stage. 'The other problem is that the Kremlin's earth is so dirty it isn't really an earth at all.'

The sound crew becomes the night shift while I head for bed. Mr Carreras will finish his rehearsal in the morning.

SATURDAY, 4th JULY

13.00: Half the sound crew have not slept. The other half slipped away at 7.00 to get some sleep before 11.00 rehearsals with José Carreras. But The Great Buzz has finally been eliminated: there are weary smiles all round.

It was a combination of the sheer quantity of mains and signal cables around the stage, and the unfriendly electrical environment. Much of the cabling has been rerouted and Dunnett has done some dark diplomacy with his Russian 'sparks'.

One theory — which later proves to be true — has it that a KGB bunker full of powerful computers lies directly under the stage site. Steve Moss observes that the crew have been hammering

long copper stakes into the cobbles precisely where this bunker is supposed to be.

Alington says: 'It was funny, because we had a panic phone call from the Russians two days before the trucks were due to leave, asking us to confirm that none of the equipment had excessive radiation or radio emissions. We wrote back saying, yes, all our gear conforms to FCC and IEEE regulations. Then we got into Red Square and found you can virtually stand there and glow!'

14.00. The FOH team's impromptu roof will have to come down, says Kluczynski. 'It's obstructing the VIP grandstand,' he explains. 'Sorry.' It's back to plastic sheeting.

21.00. Boris Yeltsin is due to make the festival's opening speech before Mr Carreras' concert. The arena looks depressingly empty. People are encouraged to come forward, to fill the seating blocks. Yeltsin's First Deputy steps out and make his own speech, then shuffles his papers, steps to Mr Yeltsin's microphone — and makes Yeltsin's speech. It seems the President is otherwise engaged.

The Deputy has a party trick. He grasps the AKG microphone neck, assuming it to be some sort of flexible gooseneck design and bends it slowly towards himself until, with a loud crack, it snaps. (Sound assistant Doug Bennett tells me later he was wearing headphones in the mobile and almost fell off his chair when this happened.)

SUNDAY, 5th JULY

9.00. At breakfast, people are relieved that the first show went off without a hitch. Zieba now has more time to fine-tune the *Flashlight* PA, but comments that without it, even untuned, the results would not have been half as good given the short setup time available.

Intertheatre claim there were 30,000 in the crowd for Mr Carreras. 5,000 is far more like it. Would it not be a good idea, I wonder, for Intertheatre to cut their losses and fill the square with free tickets? Someone has had the same idea, it seems, for 'Free Concert' is boldly displayed on the Star Vision screens. Later, Sokhadze appears in Screenco's cabin, demanding the word 'free' be deleted forthwith.

Tonight's Moisseyev show is not going live to TV so there's a calmer atmosphere; Ollie from Edwin Shirley Trucking and Bryan Grant go cap badge-hunting.

11.00. The Moisseyev turn up for a run-through,

with an unfathomable mixture of noninformation concerning their requirements. Meet the 'Virtual Violinist'. This is a man who demands a radio mic because, he says, he must start his piece offstage and make a grand entrance playing his fiddle. A Sony radio mic is duly provided. Whereupon he tells the crew, don't worry, I only mime on stage. Zieba says the Moisseyev have already supplied four different stage lists. When the troupe and their orchestra finally arrive, the line-up is substantially different again.

Bennett: 'In the end we just left the stage for an hour and let them set it up, then we went round the stage, looking at the parts and trying to work out the Russian — is that a viola? It's like the choir. Just before each show there's supposed to be a liturgy sung by a choir. We allocated six channels for them that we could have used elsewhere. And guess what — they didn't turn up.'

Alington: 'And at the start of each show, there was supposed to be a special peal on the Kremlin bells. It turned out to be a guy standing beside the stage with a set of handbells on strings.'

16.00: It looks, once again, like rain. Drops spatter the square, but thankfully there is no deluge.

18.00: Monitor man Alan Bradshaw demonstrates his latest backstage technology. A roll-up plastic 'door' to the mix area is accompanied by a Starship-Enterprise-like hissing door effect courtesy of a pink noise generator.

22.00: The Moisseyev Ballet are taking Moscow by storm. They exude tremendous energy, vitality and originality, bringing the cold, sparse crowd to its feet time and again.

The *Flashlight-TMS-3* main PA sounds superb, even if half of it (the parts directed at the empty grandstands) is now redundant. The delay towers have been turned off: with a standing audience of about 50, there is no point in wasting electricity. The only fly in the audio ointment is the Spassky Tower's clock which chimes loudly every quarter hour. It cannot be turned off, although Bennett notes: 'For some of the show it was in tune with the music.'

MONDAY, 6th JULY

10.00: Lighting technician Laura Patterson has fallen 20 feet off a tower. Bruised and shocked, she is taken to hospital. On her return she talks of having a possibly broken arm manipulated by a swaying doctor reeking of vodka. She flies home tomorrow.

Security is another issue. AVL's Tim Handley last night found two men in his Moscow Hotel room, bent on robbery. Birchwatt fire messages off to the British Embassy, Intertheatre and the Moscow authorities.

14.00: No show tonight, but the Bolshoi Orchestra want to rehearse on stage with the square open to the public. Bridget Shaw frantically rings everyone concerned to find out if this is OK. Colin Rowell says that they are welcome to rehearse whenever they like. Andy Ward, tracked down at a radio station interview, dittos the decision. He adds: 'Call it a matinée if you like.'

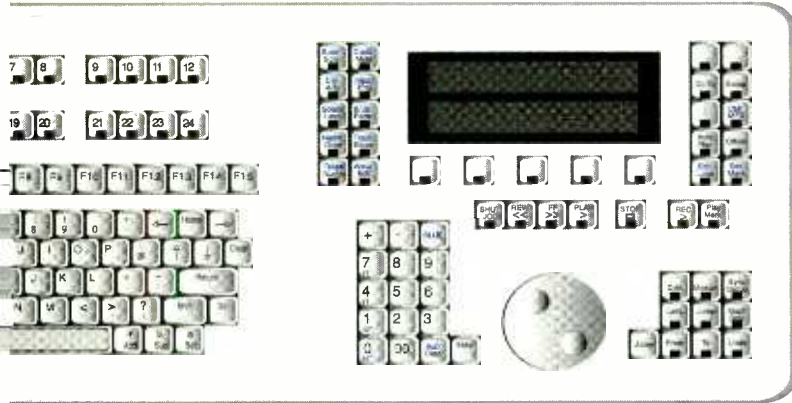
The English-language *Moscow News* is deeply scathing about Intertheatre's promotion. But we hear that the final show (LCO-Dave Stewart-Hothouse Flowers) is to be free admission — which should help make it truly spectacular for the cameras.

23.00: Back at the hotel, security has been tightened. Six large silent men with grey suits and granite faces pace the lobby and corridors. They are, it is whispered, mafiosi.

TUESDAY, 7th JULY

By now the festival is coasting along. The ►

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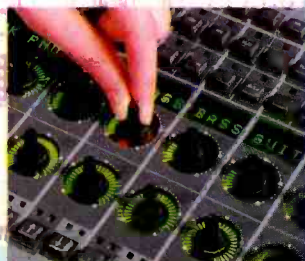
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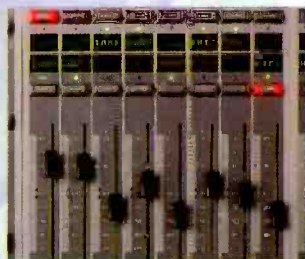
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Bob Birch, Mick Kluczynski and Colin Rowell

production is running like a well-oiled machine, with the exception of the TV feeds which suffer occasional hiccups as a result of being routed through the Kremlin.

WEDNESDAY, 8th JULY

16.00: It is now sunny and warm, for almost the first time this week. There is no word on the final show as yet, which is looking a little uncertain given that total attendances so far are no higher than about 14,000.

Tonight is the International Gala Opera, again with Carreras, joined by Nesterenko and a host of other stars. The *Moscow News* comments that many Russian's did not believe these performers would actually turn up: 'They have been promised Carreras so many times before and got a Russian instead,' it says.

The first 30 minutes of the show do not go out live to South America — as was expected — because the Kremlin team forgot to switch in a vital link. 'We'll have to retransmit that part later,' says Alington.

Andy Ward notes: 'It's a strange thing: we're in control of all our technical side until it leaves us — then it's in the hands of the Russians and you can't get any straight answers. They have no concept of urgency or production standards. They wanted their presenter to commentate on the ballet like it was a motor race — on air and through the PA. 'Yes, and he's coming up to the microphone . . .' There are a few Russians on the team who do know what they are doing, though.

THURSDAY, 9th JULY

11.00. Denouement. A crew meeting has been fixed for 11.30 in one of the Moscow Hotel's brooding lobbies. Everyone knows, of course, that things are not good, financially, for the festival. But there is a lot of optimism that it will run on as scheduled. The crew gathers, on a small island of cheap red sofas in an imponderably vast sea of marble.

Andrew Somper, Mick Kluczynski and Andy Ward stride in looking grim and tired. Somper faces the half-circle of crew. 'The LCO show is off,' he says without preamble. 'The government, for whatever reason, says it does not want a rock band playing in Red Square.' There is complete silence while we digest this news, shocked, not wanting to believe the gig is off. Ward makes a speech, sugaring the pill. 'We have four fantastic shows in the can,' he says, 'and the whole crew has been brilliant.' Tonight's Russian Gala show, he says, will continue but without the mobile or the screens.

His last words to the meeting have the ring of bitterness. 'I can't tell you how sad I feel after all this work that it's been so completely screwed up.'

12.00: I have been summarily appointed by

Mick Kluczynski as press spokesperson. Terrific. My interrogator is a determined woman from the English-language station Radio Moscow who asks politely how we feel to be in her city before homing in for the kill: 'So tell me Mike, who screwed up? Your lot or ours?'

'Ummm, ahhh, it's not quite as

simple as that, Irina . . .'

13.00: Toby Alington says that Russian TV's live broadcast of the International Gala Opera was somewhat last-minute. 'They did everything

correctly,' he says, 'except telling people they wanted a feed of the show. It came as rather a surprise.'

FRIDAY, 10th JULY

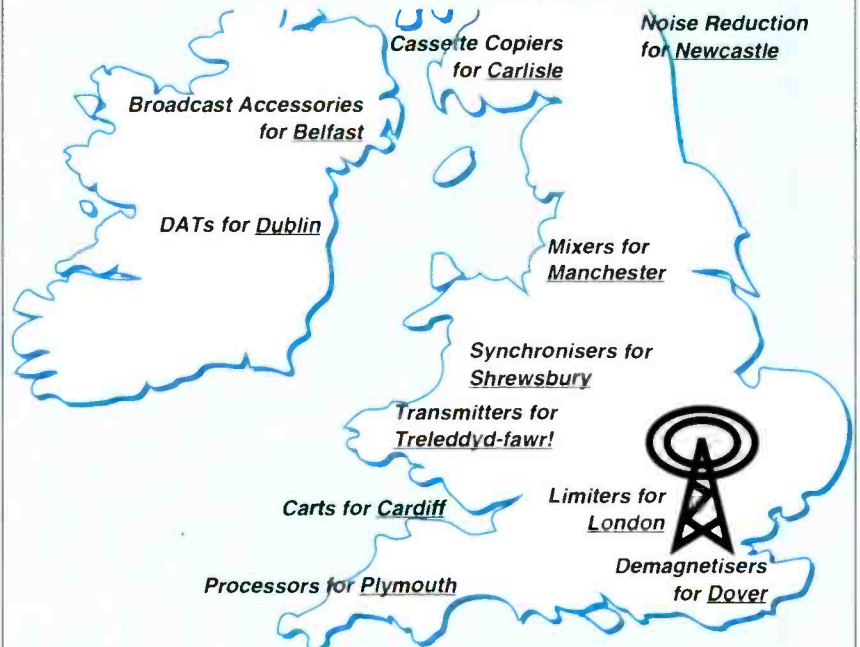
Today, instead of preparing for one of the most innovative concerts in Russia's history, the crew is de-rigging. The Fleetwood mobile has gone already. I learn later that Customs 'requested' \$50 to sign off each of the 43 trucks. The payoff was made with vodka instead.

Andrew Somper sums up: 'It was tremendously rewarding to produce great programmes — and technically it was flawless: the whole team gave us fantastic service throughout.' There is nothing left to do now but pack our bags and go home. ■

The LCO-Dave Stewart-Hothouse Flowers show was successfully staged on July 12th — minus Dave Stewart — at the Tallin Rocksummer Festival in Estonia. It was, ironically, the eve of the tiny republic's first anniversary of independence from Moscow.

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AUGAN 408 OMX

Yasmin Hashmi examines the optical disc-based recording system from Holland

The number of tapeless systems that are using optical as the primary recording medium are on the increase. This should come as no surprise since the advantages of using optical over hard disk, from the user's point of view, are fairly obvious. However, from the manufacturer's side, providing multichannel replay using optical is not as easy as it would seem and for this reason there are currently only a few whose products do it. Of those that do, the maximum number of simultaneous replay channels is generally limited to four from one disc — particularly if the system's random access requirements are high. Augan are no exception, but they managed to be the first to provide a system which supports 8-track playback as standard. They did this by using two optical drives in parallel — along with a little help from a hard disk and some RAM.

Company Background

Augan Instruments are based in the Netherlands and have been trading for around seven years. They started as a retail outlet for professional audio systems and, inevitably, their attention turned to tapeless recording. Having concluded that the market lacked an affordable multipurpose system, the company decided to build their own. Their primary activity thus changed from being a retailer to a manufacturer and their aim was to design a multichannel system based on a removable recording medium. The obvious choice for such purposes was the magneto-optical disc but, at the time, the access time of optical was not high enough to cope with the demands of multichannel operation. Augan therefore designed their own chip set for handling sound files and housekeeping and accommodated the optical's limitations by using a hard disk as a cache.

The first prototype of the 408 OMX was shown at the 1991 AES in Paris and the production model became commercially available in October of that year. Since then, a number of distributors have been appointed including Studer in the UK. At the time of writing Augan were also in the process of setting up distribution in the USA.

Hardware

All processing, I-O and storage is housed in a 4U-high, 19-inch hardware rack. This contains two

optical drives, which combined provide 8-track replay. The system supports four inputs and eight outputs of three types of format, namely analogue, AES-EBU and SPDIF. On the front of the rack are eight PPM-style level meters, four analogue input level controls and a headphone socket.

The interfaces supported include a standard Sony P2 protocol RS422 serial port, a trigger input (for GPI start-stop), a SCSI port, a Centronix parallel port, an RS232 serial port and MIDI In, Out and Thru. The system will chase lock to LTC, can also synchronise to video signal or word clock and can control external machines via the RS422 interface.

The user interface consists of a flat remote, an alphanumeric keyboard (without mouse) and an electroluminescent display which clips on to the top of the remote. The remote provides transport controls, eight track-select keys, function select keys, edit keys and a multipurpose wheel for jogging, shuttling, scrubbing and scrolling. Next to the LCD display are display control keys and beneath is are soft keys whose functions change according to which operational procedure is active.

Operation

The system will record a maximum of four tracks simultaneously and replay a maximum of eight tracks simultaneously. There is one main operating screen and this displays any eight of the 64 virtual tracks as horizontal strips with audio highlighted as blocks. If a track is displayed it is immediately available to be made active for recording or replay, if not it remains inactive in the background. The functions of the soft keys on the remote will change according to whether the user is in recording or editing mode.

There are a number of recording modes to choose from, depending on the application. For monitoring purposes, there are analogue input level meters on the rack and level meters on the screen. These display a digital representation of the analogue meters' monitor output, that is the complete signal path from A-D, through processing to D-A.

For straightforward recording, the user can make up to four tracks active for simultaneous recording and can assign any of the four inputs to any track (although it will not record the same input to more than one track at a time). The user must also assign each track to one of the optical drives. By default, tracks 1-4 are assigned to drive A and tracks 5-8 to drive B. However, any

track can be assigned to any drive and this can be changed while recording takes place. This feature is made possible by the buffering system and allows long, continuous recording over multiple discs.

For example, tracks 1 and 2 could be assigned to drive A and recording for the duration of the disc in drive A. When there is less than 5 minutes left on disc A, the system displays a warning. While still recording, the user can switch tracks 1 and 2 to drive B, remove the disc from drive A, replace it with a fresh one and switch back to this when the disc in drive B is full and so on.

Each disc is given a unique ID, part of which consists of the unique code for the particular OMX system in use — thus no two discs anywhere can have the same ID. When audio is recorded, the system makes a note of the ID of the associated disc and will thus prompt the user should the disc associated with a selected cue be missing from the drive.

The buffering used for the optical discs consists of a 45Mb hard disk and 18Mb of RAM. On recording, audio is fed directly to the hard disk which then feeds the appropriate optical disc. On replay, the optical discs feed the hard disk which in turn feeds the RAM. This internal operation, however, is transparent to the user. During recording, the tracks fill up with blocks representing the audio and once recording is stopped, the system automatically gives the take a name (which can be changed using the alphanumeric keyboard).

Up to four tracks can be punched-in simultaneously and the system's operation is the same as that of multitrack tape machine in that all eight tracks can be monitored pre, during and post-punch-in. Punch-in points can be defined by markets which can be made on the fly or by typing in a time. There is a loop and rehearse function which loops between the points, waiting for the user to select record and new points can be set while recording is taking place. Punch-ins can be undone, but if they are kept, there is a clean-up mode which will scan all 64 virtual tracks and erase all unused audio, leaving five-second handles (that is some audio pre and post-edit point) on the remaining audio.

There is a gate function which automatically generates cues from long recordings. It allows a threshold level and a release time to be set which makes the system drop in and out of record only while audio is present, automatically updating the cue name each time. The gate function can be used independently on each track, allowing different settings for each track and thereby allowing checkboards to be reconstituted.

The system has a number of recording modes which are designed to work in conjunction with video editing systems. The 'simple device mode'



The OMX uses a mixture of optical discs, a hard disk and on-board RAM to provide seamless production

turns the *OMX* into a slave machine, synchronised via LTC and controlled by a video editor which would make the track selection and drop the *OMX* in and out of record. The 'full device mode' performs the functions of simple device as well as allowing transport functions of the *OMX* to be controlled. In both of these modes there is two-way communication between master and slave. In the 'listen mode' there is only one-way communication. This mode allows the *OMX* to be inserted in between a record VTR and an editor, such that the *OMX* eavesdrops and will checkerboard and record handles, the length of which are defined by the video editor.

The system is also capable of background recording. Apart from the selected record tracks not being audible during recording, this mode does not interfere with normal operation, that is all other tracks can be replayed and/or edited while background recording takes place.

During replay, the timebase of the track display can be expanded or compressed to represent from 1 second to 12 hours and can be changed at any time, even while recording or replaying and can also be used as locators for a VTR. When slaving to time code, the system chase locks and on seeing code, will jump a few frames ahead of the time at which the VTR starts playing. It then uses varispeed to get into true sync. The *OMX* will varispeed across all eight tracks with a tolerance of $\pm 10\%$ while maintaining a digital output with a constant sampling rate. Conversely, the system can control the shuttle or scrub of the VTR, with the audio following suit.

Editing mainly consists of cut-and-paste type operations with one level of undo. Tracks to be edited are selected on the remote and editing

operations can be carried out on a single track or globally on multiple tracks. There are specific keys on the remote for marking-in and out points of cues and any cue can be moved or copied to any track.

There are various ways of locating edit points. These include using transport controls, markers, the goto function, nudge keys and the wheel. The goto function is used in conjunction with typing in a location time and a number of locations can be saved and quickly recalled. The wheel can be used for scrolling along the timebase and scrubbing, and the keys can be used for nudging forward or backward in time. The resolution of the nudge can be set from subframes to event resolution (whereby an entire cue is selected for moving, cutting and so on). The user can also choose to jump to cue-in or out points or to markers. In addition, the system allows auditioning up to and away from markers but will not perform and audition between in and out points. However this limitation can be overcome by copying the section to spare track and replaying it in isolation.

For detailed editing purposes, a graphic envelope display can be called up which replaces the standard recording-editing screen. It allows various cue parameters to be edited in real time including crossfades, fade ins-outs and a cue's volume envelope. It also allows a cue's trigger point to be offset such that a point other than the in-point can be used to synchronise a cue to an event time. Volume envelopes can either be defined as an overall step level or as a graduated envelope determined by level break points. Crossfades of varying durations can be selected with a choice of linear, log or exponential shapes and fade-in and fade-out durations can be edited

and auditioned independently. The edit-point itself can also be trimmed and an entire crossfade can be moved to a different position.

In addition to cue levels being set, the user can also assign an overall static level and/or perform automated dynamic level control on each track individually and/or globally to a group of selected tracks. Any track can be assigned to any output such that, for example, up to four tracks could be assigned to Output 7 and another four to Output 8 for a stereo output. Tracks can also be internally mixed down such that a maximum of seven mono tracks can be mixed into one — or 6-into-2 (for stereo). Other editing functions include an autofill feature and time compression (but not expansion) by up to 40%.

MIDI

Although dynamic level control can be performed using the wheel, the system will support control via a MIDI mixer. Other MIDI functions supported include reading note-on/note-off commands (which can be recorded as events), reading and generating MTC and the ability to assign up to 64 cues to a MIDI keyboard. Up to 16 mono or eight stereo cues (or any combination therein) can be triggered simultaneously without constraint on a cue's length. Alternatively, cues can be triggered by assigning them to keys on the remote and/or the alphanumeric keyboard.

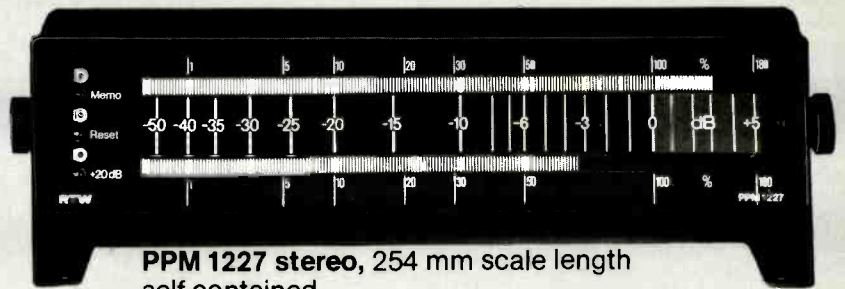
Library function

Tracks and cues can be named and cues can be saved in a library. Each session has its own associated library which can store up to eight separate lists of cues and there is an autocopy ▶

RTW Peak Programme Meter

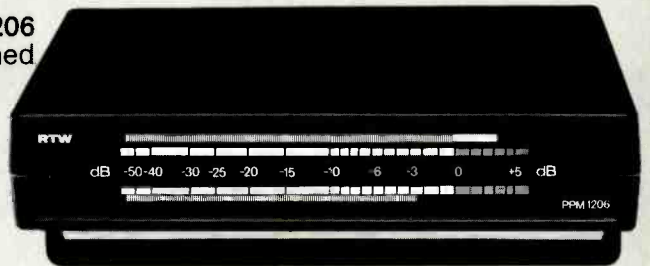


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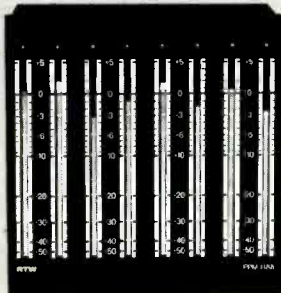
Model 1206
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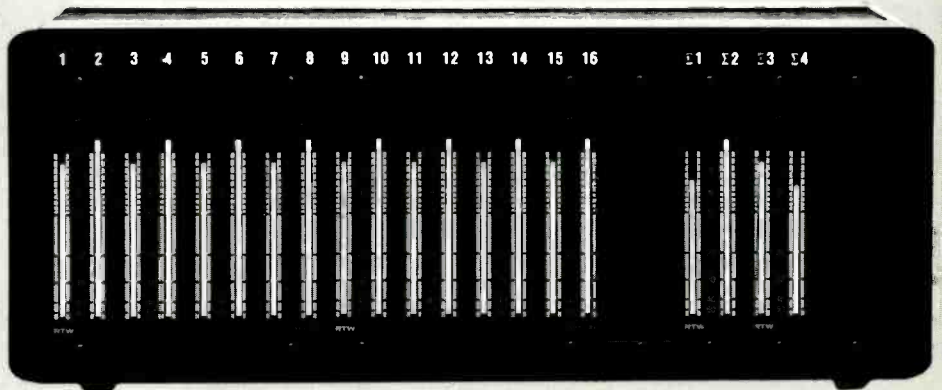
Peak programme meters
for monitoring the peak level
in analog and digital audio



PPM 1118
2-Channel
Module



PPM 1188
8-Channel
Module

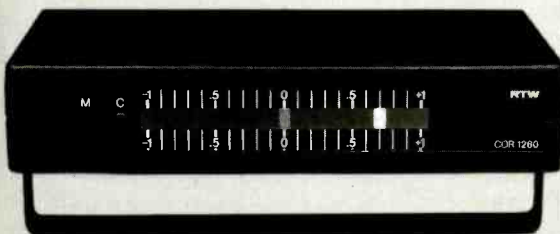


Multi-Channel Unit 16-4 and 24-4

RTW Correlator

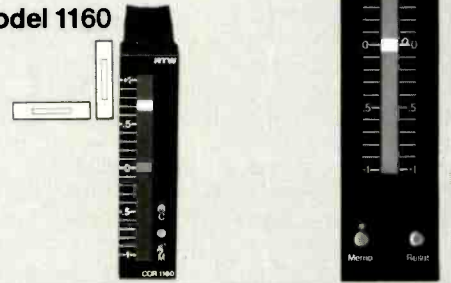
Compatibility meter
displays the phase correlation
of stereo recordings

Correlator Model 1170



Correlator Model 1260
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Correlator Model 1160



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function which will copy all cues on a track as individual elements in the library. At the time of writing, the databasing software was not yet available. In the meantime, in order to select a cue from another session, the complete library from the other session would need to be imported. The desired cue(s) would then be selected as required and once the current session is over, the system would recognise which cues had been used from the imported library and copy these into the current session's library.

All audio and all information concerning a project, such as edit information, events lists, input and output routing etc. is saved on the optical discs. If a less expensive archive medium is required, the system will backup to DAT via SCSI.

A database system for library functions should be available by the autumn. There are also plans to provide EDL autoconforming either directly from a video editor via RS422 or, since the *OMX* does not have a floppy drive itself, from a PC via RS232. In terms of increasing the number of simultaneous replay tracks, the system will currently allow up to seven additional *OMXs* to be sampled locked together for 64-track replay controlled by one remote. However, since higher-density discs will have faster access times, Augan intend to use these, once they become available, to provide a 16-track system in one rack. This will also mean that existing users can upgrade without having to completely replace their hardware.

Applications

At the time of writing, around 45 systems had been sold, mostly in Germany, Italy and the UK; the applications for which the system is used are

fairly diverse. In Germany and Italy it is mainly being used for replacing film transports whereas in the UK it is also being used for audio for video postproduction and for radio production. German Radio are using the *OMX* in conjunction with an optical jukebox (connected via SCSI) for automated playback of commercials.

The system was also used by the BBC's Outside Broadcast Unit for the Barcelona Olympics to edit interviews for radio — which were then sent via satellite back to the UK. They also made use of the background recording mode for recording new conferences while editing and replaying.

The loop and rehearse mode can be used for ADR purposes. Using the system's machine control, it will control the loop of an external VTR and will wait, before commencing replay of the loop, for the VTR to catch up. Since the system recording medium is removable, facilities with multiple systems could employ a smaller *OMX* for the listen or device mode and take the disc to larger system for multitrack purposes.

Conclusion

The fact that the system uses optical disc as the recording medium makes it an attractive proposition particularly for those users who have multisystem applications or who need a fast turn around time between sessions. However, the *408 OMX* has more going for it than simply the use of optical alone. Its recording and synchronisation features are comprehensive and make it a versatile system, equally applicable to specific applications as to general ones — a fact highlighted by the diversity of users the system already has.

Despite this, the *OMX* does not pretend to be

everything to everyone. It does not, for example, provide time expansion and the compression algorithm used is fairly basic. Neither does it provide equalisation and, at the time of writing at least, the library functions were very basic. In addition, there are some editing functions and operations which could be improved. Nonetheless, the system is continually evolving — suggestions for its improvement since its launch have been acted upon and, no doubt, further enhancements are to follow. Software updates are provided to customers every two or three months and Augan maintain that these will be free of charge for the foreseeable future. In addition, they have built a certain amount of headroom into the system's hardware (it is theoretically capable of handling 128 audio channels simultaneously) and intend to provide an upgrade path existing users as optical technology progresses.

With such a clear commitment to its development and with little or no competition in its price range, the *408 OMX* appears to have a bright future ahead of it, for the time being at least. ■

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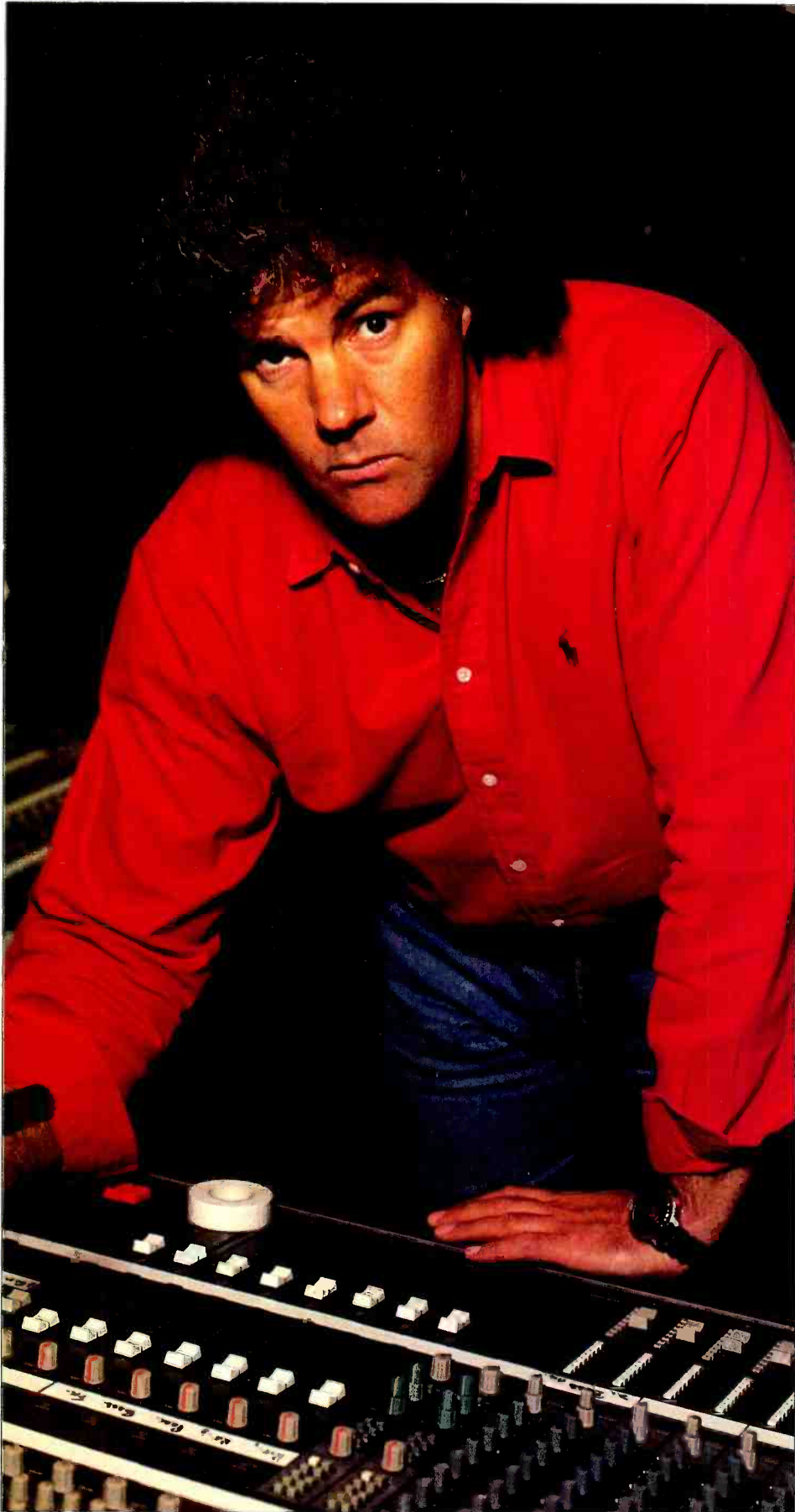


PHOTO: RALPH DENYER

Ralph Denyer talks to veteran live sound engineer Roger Lindsay about his career

Roger Lindsay is a live sound concert engineer and consultant who has worked with an impressive array of major acts since he made his way to London from his native city of Liverpool at the tail end of the '60s. He played trumpet and studied music to Royal College of Music Grade 8, eventually playing with the National Youth Orchestra. He also recalls 'playing guitar and singing rather badly in local Liverpool bands,' before working as a roadie with the likes of Jack Bruce, Velvet Underground and Procol Harum during the late '60s and early '70s.

During 1972, in partnership with Soundcraft Electronics, Lindsay then formed Europa Concert Sound, one of the first UK live-concert sound companies to evolve to meet the increasing demand for large scale sound reinforcement systems. At the same time as administering Europa, Lindsay was also house engineer on UK, European and world tours. The company serviced for acts such as Bryan Ferry, Ry Cooder, Stanley Clarke, Willie Nelson, Emmylou Harris and the Hot Band, Bonnie Raitt, James Brown and many others. In 1981 he bought out Soundcraft's interest in Europa and effectively renamed the company Lindsay Audio. During 1987 Lindsay sold his interests in the equipment side of the business. His accumulated experience and proven ability meant that many artists were requesting his services out on the road. As a result it was quite viable for him to devote all his time to working as a live sound engineer and consultant.

The list of credits continued to grow. Live and studio work with Alison Moyet and Elaine Page followed, as did consultancy work for Frank Sinatra and Hall & Oates. Most of 1987 was taken up travelling the globe as FOH sound engineer for Sade. Then the same for Everything but The Girl, Basia and Marc Cohn.

Other miscellaneous credits include B.B. King, Blondie, Carole King, Chieftains, Crusaders, Christians, Cyndi Lauper, Dire Straits, Dolly Parton, Frank Zappa, Go West, James Last, Joe Cocker, London Symphony Orchestra and Chorus, Liverpool Philharmonic Orchestra, Liza Minelli, Nils Lofgren, Sister Sledge, Terence Trent D'Arby and Paul Young.

During 1992 he was FOH sound engineer at ▶

LIVE AND PROSPEROUS

the Glastonbury Festival, toured again as consultant with Sinatra, and supervised for Britannia Row Productions in Spain at the main Olympics and the Paralympics. At the time of our interview he was carrying out preparatory work for Sade's 1992 world touring requirements and for a one-off charity concert at the Royal Albert Hall featuring Dave Gilmour plus assorted Floydians, The Count Basie Orchestra, Elvis Costello and others.

Experience

Lindsay is in an enviable position for a live soundman. Because of his experience in dealing with a wide range of musical situation he is never short of work.

'I suppose when you're younger you have the rock and pop snobbery. You'll work for the flavour-of-the-month rock act but you wouldn't be seen dead with a MOR act. When I was younger that was definitely the way it went. Over the years I've learnt that it's not necessarily the type of music that's played but how it's played.'

'I've worked with artists that initially I wasn't that enthusiastic about, not the type of music I might listen to when I was off duty or whatever, but it was musically valid. There were good players involved, good arrangements, good sounds, and that was enough for me to want to improve or enhance a performance and to help to make it something special. Whereas years ago I probably dismissed 90% of music and my education wouldn't have been complete. Julio Iglesias is a good example. I wouldn't go home and listen to him but millions of people worldwide do. However when I actually saw him performing — initially they flew me over to Reno to listen to him and talk

to him about the possibility of working together — and I realised he had a great voice, it was a big band with lots of great sounds, percussion, Latin influences and musical interest. In sonic terms it was really interesting and new for me, and stimulating to work on.

'To be honest there are certain acts, rather than types of music, that I know I could never make sound good. There has to be something in the music I can enhance or improve. If I can't stand the music there's no way I'm going to be able to mix it and make it sound good. You have to love what you do to do it well. It's no more complicated than that.'

During the early '70s in the days of Europa Concert Sound, it was Phil Dudderidge who encouraged Lindsay to work with acts outside of mainstream rock music. 'Phil would come in one day and say: 'We've got a tour with so-and-so and they've got a 50-piece orchestra. You'll do that won't you?'

'And, with the best of intentions, he'd just give me that nudge. I'm glad he did nudge me because now nothing holds any fear for me. Years ago I would worry about being able to deal with some situations. But over the years I've probably mixed most kinds of music. And I'm glad because each time you do something different, you learn and you can apply that extra knowledge to the next project. It might seem unlikely but you can learn something dealing with an orchestra that might work the next time you engineer for a rock band. It may be something as simple as an effects sound that works well on a string section which you can then use with electronic strings.

'The ideal-sized band for me — if there is such a thing — would be around ten piece: maybe with vocals, three horns, backing vocals, a couple of

guitars, keyboards, percussion, that kind of thing. And I'm lucky in that a lot of the acts I've worked with fall into that slot. Sade is a great example. A perfect line-up and they use dynamics.

'I toured with Frank Zappa during the mid-'70s and the thing that has stayed with me from just a few shows was his use of dynamics. Dynamics can make or break music. One minute it's rock'n'roll full in your face, the next minute there's just a soprano sax with a Hammond underneath or something, and then just as fast, straight back in your face. No lasers, no dry ice, just musical impact and I find that very exciting.

'Nowadays I've found that with a lot of electronics in use, perhaps people are forgetting dynamics. I mean, typically, it's hard to get dynamics into a drum machine. At Glastonbury this year, I was engineering for Buddy Guy and after three days he was one of the first acts to use dynamics. He'd go from loud full Hendrix-type licks right down almost to a whisper. I love to hear that. And it's not just confined to rock music. In Classical music or anything, dynamics can make so much difference. Nowadays a lot of acts seem to explore other avenues when dynamics are just sitting there and anyone can use them and to devastating effect.'

Sound systems

We spoke at length about the contentious topic of the merits of various sound systems. Lindsay works with most of the major concert sound systems and therefore is able to give an interesting perspective on the subject.

'Most of the engineers I've known over the years have their particular preferences regarding equipment, but not necessarily to the exclusion of

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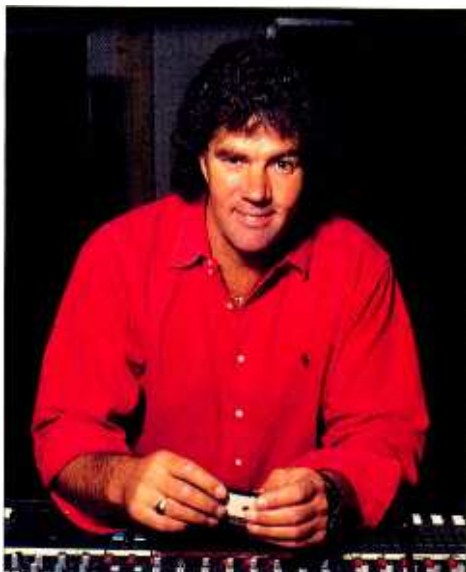
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PHOTO: RALPH DENYER



'When you can just fax a list of state-of-the-art equipment; whatever boards, effects, speakers you want to Clair Brothers, Show Co or Britannia Row, it's not really surprising you can make it sound good. Basically you're getting everything you could possibly desire.

'But when you go into a club which has a considerably less than state-of-the-art house system that you may never have seen or heard before and still achieve a good result, that's when you earn your money.

'I think the choice of equipment is very important. But at the same time the skill that makes a good engineer can only be partly explained through experience and the types of acts they've worked with. It's also involves having the ability to deal with less than ideal circumstances both in equipment and surroundings and still get a good result.

'To qualify the whole thing, I don't think that nowadays there are any bad systems in use on the major touring circuit because there is too much at stake. Companies using poor equipment would fall by the wayside too quickly and reputations are built over the years.

'Over the years I get people saying things to me like: "What's the best mike for kick-drum?" Or: "What's the best mike for an acoustic piano?" I tell them: "Whatever sounds best to you. Use whatever sounds best to you because at the end of the day you have to please yourself." This is a question that pops up less and less as I get older because I suppose people tend to hire me because of reputation or whatever. When you're young you probably have more interference. Someone will come up to you and say: "I think this will work better." At the end of the day you have to make those decisions. You have to sit there in the middle

of a stadium or arena, regardless of what a manager, an agent or anyone else around you thinks. You have to say: "This is as good as I can get it. This is how I feel it should sound." and hope that 99% of the people in the arena agree with you.

'Sound is a very subjective thing, more so than anything I can think of. After a show you can take a cross-section of the audience and ask what they thought of the sound and sometimes you'll get half-a-dozen completely opposed opinions. And it's not that any one particular person is right, it's just that that's the way people hear concerts. I have engineered shows which I came away from feeling that I didn't nail that one down. Yet managers and people have come up to me and said: "That's the most amazing thing I've ever heard!" And you can't tell them they're wrong because that's how they feel about it. For them you made it sound good and you made it special.

'I believe that at the end of the day what keeps you on the straight and narrow is trusting your own ears. If it doesn't sound right to you, you have to act on that, regardless.

'It's like artists reading their own reviews. If a show is bad, you know it's bad. If it's good, you should know it's good. But at the end of the day you are the only one who can make that decision. It's more difficult when you're a young engineer. You're under a lot of pressure. There'll be manager, promoter, agent, and record producer, one of whom might thoughtlessly make some remark and you'll go: "Oh God! It isn't loud enough," or whatever. When you do that you're lost. Remember the Troggs tapes? You cannot have six producers in the studio or on a live show. At the end of the day you have to make that decision and stick with it. And hopefully over the years you'll make the right decisions.' ■

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YAMAHA PM4000

Following in the tracks of Yamaha's popular *PM3000* PA console, the *PM4000* combines many familiar features with some welcome improvements. Review by Patrick Stapley

With sales well in excess of 1,000, there can be little doubt that the *PM3000* was a hugely successful product for Yamaha. The console's strongest market has been in the US, where it has been the top-selling, top-end front of house desk since its introduction in 1986. Consequently Yamaha have been loathe to radically change the design, preferring to update and improve it where necessary. The *PM4000* then represents a spruced-up version whose familiarity will certainly appeal to past users, but those looking for bold new features, such as automation, will be disappointed. I asked Yamaha's UK manager for specialist pro audio, Alan Martin, why automation was not included, bearing in mind the desk's VCA capability?

'We did look at the possibility of adding automation quite closely, but we felt that adding a comprehensive system would be pushing facilities beyond what the majority of people expected from this console. Also, with the current recessionary climate, we didn't feel that the extra cost, which automation would have necessitated, would have been very well received.'

Changes and enhancements

The console is supplied in 24, 32, 40 and 48-input configurations; four additional full-facility stereo input modules are included as standard, replacing the previous aux returns. These modules can be switched from normal stereo operation to accept left or right inputs only, or left and right summed. Additional stereo modules can be added in place of mono inputs as long as the total number of inputs does not exceed 64.

The console contains six types of module all of which have been reduced slightly in width; this along with a reduction in the number of output modules has resulted in a 48-way *PM4000* being little bigger than a 40-way *PM3000* (2086 x 1121mm as opposed to 1919 x 960mm). Keeping the console compact has obvious advantages both in terms of portability and saving valuable auditorium seating.

An area where the *PM3000* came in for criticism was signal-to-noise, and Yamaha have addressed this by redesigning some of the electronics including a new head-amp, which has considerably improved the specifications. The dual-concentric gain pot has also been replaced with a 50dB gain trim and 30dB pad, permitting quicker, less fiddly operation with a range of -70 to +10dB. The input gain controls have been moved to the top portion of the module rather than appearing just above the fader as before — this is to satisfy US requests and may not be so well received elsewhere. All input faders are VCA, and a further sonic improvement has been made here with the addition of new VCA circuitry. Although signal-to-noise has been improved throughout the console, the phones circuit remains noisy.

Perhaps one of the most significant changes is to the 4-band equaliser, which has been completely redesigned, and has already received an enthusiastic response at early demos. Now fully parametric, the overall frequency range has been extended (30Hz to 20kHz ± 15 dB), also due to the use of 'times 20 multipliers', each band benefits from an extremely generous overlap. The HP filter remains variable between 20 to 400Hz at 12dB/octave. The insert point (balanced +4dBm) has been equipped with a PRE-POST EQ switch (stereo inputs must be switched internally) — when selected pre, the insert is positioned between the EQ and HP Filter.

The auxiliaries feature eight mono and two stereo sends. As before each send includes PRE-OFF-POST switching, but the switch itself has been changed to a sealed type to guard against dirt and resulting noise problems. Additionally individual sends can be internally switched so that the prefade signal is derived post EQ. Each stereo send may be switched between stereo operation (level and pan) and dual mono operation (level left, level right) — thus if the stereo sends are operated in mono, each channel is capable of 12 discrete auxiliary outputs. The stereo auxiliary masters also switch from stereo (level and balance) to dual mono operation. All aux masters are now fitted with switchable insert points. The stereo input channels are fitted with an internal switch that causes the odd numbered mono auxiliaries to

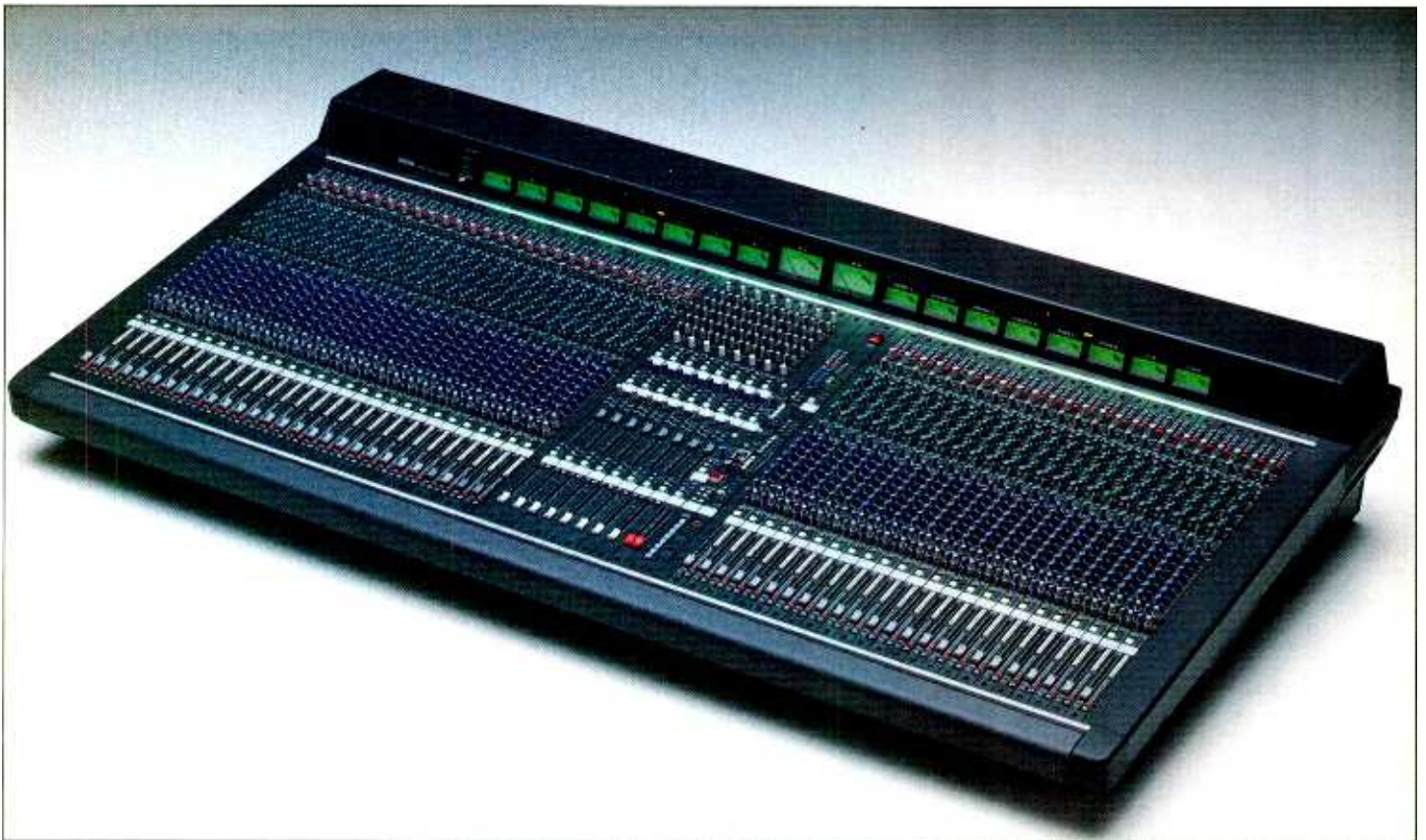
source the left input and the even numbered the right.

Above each input channel fader is a 6-segment LED meter (a pair for stereo channels) which may be switched pre-or-post fade. These replace the clip and signal LEDs previously fitted, and provide a quick method of confirming signal as well as providing useful level information, particularly for peak and overload. An additional peak LED is included next to the gain control, which is activated when the signal directly after the channel preamp reaches 3dB below clipping.

The eight VCA-group and eight mute-group selector buttons beside each fader remain the same apart from two changes: the LED indicators are now incorporated within the switches to accommodate the narrower channel strip, and a MUTE SAFE button has been added to isolate the channel from any mute group switching. The VCA masters now also include mutes, so providing another completely separate level of group muting.

The CUE-SOLO button has been moved from its original, and possibly vulnerable position just below the fader, to the bottom right of the module. Cue (PFL) or solo (SIP) modes are switched globally from a centrally placed button protected by a flip-top cover. This button along with a solo warning light will flash once the destructive SIP mode has been selected. The stereo input channels include a recessed SOLO DEFEAT microswitch above the CUE-SOLO button, enabling the channel to be isolated from SIP muting, thus the console can be configured for SIP with effect. As before all SOLO buttons on the console are double-action — a half-way press causes momentary operation, and a full press will lock the switch. The cue systems retains input priority, so for example if a CUE button has been selected on one of the group masters, it will be overridden by a cue selection made from an input channel. This enables the engineer to check an input channel without first having to deselect cues on the output modules. As supplied from the factory, the cue signal is derived prefade, but an internal jumper in each input channel permits the source to follow the PRE-POST button that switches the channel LED meter.

The console's VU metering capability has been enhanced by the addition of METER SOURCE SELECT buttons placed within easy reach of the engineer, rather than being individually positioned above the meters themselves. The number of output meters fitted will vary depending on frame size — 24 and 32-input consoles have 14 VUs including two large stereo L, R meters, while the 40 and 48-input frames have 18, including the stereo meters. All meters are illuminated and now include peak reading LEDs. The meters are arranged into two banks (2 x 4, or 2 x 8 depending



Users of the PM3000 will be impressed with the improvements on the PM4000

on console size); these banks can be separately switched to source group, matrix or auxiliary levels — for example a 48-input desk could be switched to display the group levels on the first eight meters and the matrix levels on the second eight; if the second bank of meters were selected to auxiliary, they would display the stereo auxs, monitor A (see later), talkback, and oscillator levels.

Routing

The routing structure remains the same in that the input channels can feed to eight groups and the stereo bus; there is, however, now a direct output available from mono channels only via rear jack sockets (internally switchable pre-post fader). Groups can be routed to both the mix matrix and the stereo bus, and the stereo bus can route to the matrix. Switchable inserts have been provided for the stereo, group, and matrix circuits.

The mix matrix has the same 11 x 8 configuration as before. Each strip contains rotary level controls for the eight groups (pre or post master fader depending on internal switching), the stereo bus left and right (also pre-post selectable), and a sub input from a rear connector. These mix via a matrix master level control to a discrete rear panel output. The eight outputs from the matrix can be used in a variety of ways to send different mixes to different parts of the house, to set up stage monitor mixes, to feed local and remote programs simultaneously, and so on.

Two new sections have been added — monitor A and monitor B. Both are equipped with a selection of SOURCE buttons (more for monitor A), LEVEL control and ON-OFF switch, and feed-to-stereo outputs at the rear. In addition, monitor A's output is fed to the phones circuit (two stereo jack sockets), and can be picked up by the VU meters. When the cue circuit is activated, a LED lights on the monitor A section indicating that the preselected source has been replaced by the cue

bus. Monitor B can source the output from monitor A, so allowing identical outputs with separate level control. Both monitors can source two stereo tape machine inputs appearing at the back of the console, as well as directly sourcing the signal from stereo input channels 3 and 4 or other stereo channels that have been internally switched to do so.

As before the talkback and oscillator outputs can be assigned to individual buses, and this now includes monitor B. The talkback mic XLR socket is now phantom powered, and a 48V ON-OFF switch is placed above it. The previous TALKBACK button has been replaced by a two-way level switch providing momentary contact when pulled down and a locked contact when pushed up. The communications circuit, featured on the PM3000 has been removed.

The back and beyond

All XLR and jack sockets are balanced. Optional input transformers may be fitted, and output transformers can be supplied in an external 19-inch rackmount package.

Sub inputs are provided for slaving additional PM4000 or PM3000 consoles, and a CUE-SOLO switch determines whether the remote logic is linked through. VCA groups and mute groups can also be linked and independent switches select VCA (1-4, 5-8) and mutes (1-4, 5-8) to slave, master or off — this method of dividing group authority between consoles is very helpful when configuring for multi-operator use.

The remote power supply has been redesigned, and now connects to the back of the console via a single umbilical (rather than two). It also features a digital read-out displaying the input AC line-voltage. Cooling has been improved with a pair of low noise fans that replace the original two-speed fan. Power supply LED indicators are

now fitted to the left-hand side of the console meter bridge.

The console control surface is lit by five 'LittLites' (48-way console) which connect to 4-pin XLR sockets at the rear of the meter bridge. The dimmer control, previously positioned at the back of the console, has been moved to the front.

To add extra strength while keeping weight down, a new chassis design has been employed which features aircraft-style bracing. Module retention has also been improved with the addition of rear retaining screws — in the past modules have occasionally become displaced during transport. The previous lift-up carrying handles at either side of the desk have been replaced by recessed grips — the weight of a 48-channel console (minus power supply) is 183kg (403lbs 7oz), as opposed to 137kg (302lbs) for the 40-channel PM3000.

Generally speaking, the appearance of the console has been improved, and although the module width as decreased the operational ease has not. This is altogether a better laid-out control surface, resulting in better ergonomics; a helpful feature has been the extensive use of LED switches (the console does not use lamps).

Conclusion

The PM4000 adds enhancements and new features to a proven design. Users familiar with the PM3000 will have no difficulty finding their way around the console and should be impressed with the improvements on offer in particular those made to the EQ section. Although it would have been an advantage to incorporate some form of snapshot automation — and there seems no reason why this should not become a later option — it may be viewed as simply icing on the cake which already contains the necessary ingredients to continue the popularity enjoyed by its predecessor — already orders for the PM4000 have reached three figures. ■

IN THE COURT OF THE PURPLE PRINCE

Of all the live shows this year, this was the show everyone wanted to see. There is something about a Prince show breezing into town, even in a summer which has seen a slew of major acts on the European stadium circuit, that excites hardened liggers more than anything else.

The man's unique drawing power remains immense, despite the lengthy absence from the boards.

Dave Natale, FOH engineer for PA company Clair Brothers, affirms: 'More people have come to see this show than any tour I've ever done. Gabriel was here, George Michael, Gilmour, Joe Cocker's band, this is the show with the reputation. And when you see it you understand why everyone else wants to see it, too.'

The world tour included a two-week stint in Japan and three weeks in Australia. The full production travelled everywhere: as ever with Prince, there was no conspicuous slackening of standards for the sake of saving a few dollars. Roy Bennet was hired as lighting designer, and his typically imaginative input added much to the extravaganza.

At sea in the court

In London, the chosen venue was Earl's Court 1. That we are obliged to watch an artist like Prince in such a place is, if one is honest about it, a pretty poor reflection on London's cultural facilities. Like the smaller Wembley Arena, Earl's Court has improved its facilities in recent years, both technical and audience-related, but it has not been able to offer much in the shape of improved acoustics.

Effective solutions, of course, would come expensive: the venue's standard music arena, with a maximum capacity of 18,000, is a temporary rectangular structure, backed by scrims, which sits squarely in the centre of a vast (250,010 ft²) triangular-shaped concrete exhibition space. If you have ever been to an Ideal Home Exhibition,



PHOTO: JAMES CUMFESTY

Prince has one of the best reputations for live sound in the world. Mike Lethby assesses the royal condition

you know how *big* this place is; a controlled acoustic environment it is never likely to be. The ill-fated Docklands Arena, during its brief working life, showed that a large hall (11,000 seats) could sound fairly decent. Unfortunately, the easiest way to get there was by bicycle. So now, between Wembley Arena (7,000 seats) and the Stadium (72,000 seats) there is but one medium-size option in London, and that is Earl's Court.

Prince's promoter, Barry Clayman Concerts, had the foresight to get together back in the spring with Marshall Arts (who staged Dire Straits here in June) to tackle the venue's notorious LF resonance, which has sunk many a show in sonorous sonic fog. Having rejected one idea which involved filling the underfloor pool with 2.2m gallons of water, they spent £25,000 on heavy

damping drapes installed under the ceiling and in the empty pool. I had not been to a show here since a Bob Dylan show in the early '80s, when the mix became unintelligible from anywhere further back than the desk. These promoters' efforts helped overall clarity a lot and one hopes the venue will adopt these measures, if not more, as standard fixtures for future musical events.

The other drawback of such a space is the visual aspect, particularly relevant to a show like this. A Prince show is full of subtlety and detail, both visual and musical. If you were further back than the desk, and not in possession of a powerful pair of binoculars, you may as well have watched the show on television. (Indeed, you did watch it on TV, via the twin projection screens, for which, interestingly, some of the stage close-ups were ►

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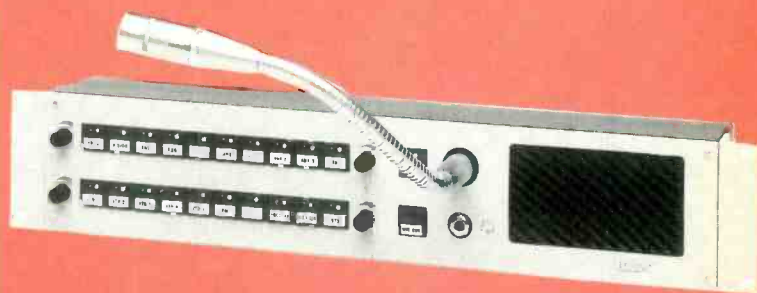
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furnished by a dancer using a hand-held video camera).

You could have enjoyed Roy Bennet's sparkling light show from a mile away, but you would miss the stagecraft detail. Prince and the NPG is not just a rock band, it's an experience, showmanship and pure musicianship of the highest order.

Much of this superhuman effort was dissipated by this barn of a hall. Those of us who were lucky enough to be close to the action on the *Lovesexy* tour, in the round at Wembley Arena, remember the pure theatre, the intimacy in glorious close-up.

However, enough of the court. The staging of Prince is what we are here to see.

A band of diamonds

Sitting at Dave Natale's FOH riser in Earl's Court, surrounded by acres of confetti from the previous night's show, I asked him to explain the nature of the show. He drew a deep breath and made an expansive gesture at the elaborate set.

'It's big, with thousands of cues. Something's going on all the time.

There's 18 people in the band. Prince plays guitar, then there's another guitar player, two keyboard players, a bass player, a percussionist who also dances, another dancer who raps; a dancer who just dances; three female dancers; and five horn players. So it's very busy there's never a dull moment. This is a punchy show, I guess that's the way to put it; it is supposed to be like a disco, basically: lots of low end, kick, drums, stuff like that; lots of feeling.'

There's no support act, which is good, because there's barely room out here for all this stuff, let alone another console for support.' Natale pauses for thought. 'How shall I put it? The essence of it

is that we have to be ready for *anything*, at any time.'

Indeed they did. Another crew member on the tour told me of the stipulation to be ready to jump out of bed at any time of the night should Prince decide to call an impromptu session of jamming, writing or rehearsing. This is not, be assured, whimsical capriciousness, but a creative urgency which brooks no weakness in the body-clock — his or anyone else's.

Since Prince has a formidable reputation as a producer as well as a performer, and he is more conversant with the arcane lexicon of live sound than most musicians, his standards are equally high on stage. Nobody — from his band to the backline techs — expects to give anything less than the max for the privilege of his endorsement.

Lethby: 'On the *Lovesexy* tour the band's musicianship was almost implausibly tight: segueing from one groove to another key and tempo so smoothly you could never see the joins. This is a different band but presumably his standards remain the same?'

Natale: 'If these guys couldn't do that they simply wouldn't be here, it's the way this gig is. Everything is perfect; it couldn't get any better.'

Lethby: 'The rehearsals must be fairly intense?'

Natale: 'They have to be: like I said, there's so much going on. It's the most organised thing I've ever mixed; these guys are second to none. You've got great stuff starting out on stage; it can only get better coming out here. Something this size with below-par musicians would be a nightmare. With this amount of stuff it's potentially difficult, but with these guys it's a lot easier than you might think, because they know exactly what they're doing and they're so well rehearsed.'

'It's a great show: two and a half hours long. A

lot of people play for 90 minutes with a support band; on this show people really get their money's worth, because it's a whole two and a half hours of the artiste you came to see. I like that.'

Sound by Clair Brothers

'With this tour to add to their summer roster of the US, Michael Jackson, Elton John and Bruce Springsteen, Clair Brothers,' says Natale, 'have more S-4s out in Europe right now than they owned last year.'

The Earl's Court arrays — a total of 88 S-4 cabinets — were installed by system engineer Jim Devenney and technician John Leaman.

Natale: 'With a big array like this, we get great projection. We're using 88 S-4s indoors, which is a pretty gargantuan amount, when we do the outdoor shows like the RDS in Dublin, Manchester and Glasgow, we'll have 160 S-4s — to get enough weight on the low end we need all those 18-inch drivers.'

Thirty-two cabinets, a mixture of long and short throw and front-fill types, were flown each side, in two four-high columns from four 8-foot flying bars. Twelve more short-throws were ground-stacked along with four front-fills. Four aside provided delays, flown above the mix position, 'as this is an industrially large-sized building,' noted Natale. Amplifiers were Carver's, via Clairs' standard TC Electronics drive racks with TC 1128 EQ.

Of Earls Court's acoustical qualities Natale opines: 'I've never been in here before but I actually like it. The draping helps a lot and the PA sounds fine in here; it's no worse than any other building that wasn't designed for sound.'

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Walking around, there's no escaping the cavernous RT that dominates the back half. With or without a delay system, the engineer is stuck with the building. If promoters genuinely aim to give an audience its money's worth, the only answer here is to do everything in the round.

Mixing the pearls

Natale's FOH corral was dominated by three Clair Brothers 32-channel consoles, those impressive, ingeniously folding 'mil-spec' machines designed uncompromisingly for the road. Like the equally venerable Midas PRO-40, it is a desk that has stood the test of time both sonically and physically.

He says: 'You can see the scale of the show on my desks — 88 channels, and it's not automated, so I wheel around in my chair a lot, pushing things up and pulling things down.'

Lethby: 'A lot of riding the faders?'

Natale: 'Yeah, there's a lot of different patches on different stuff, the levels are always a bit different. It's either that or put lots of limiters on. I've got limiters, but only as line amps; they really don't do much else. There's four Aphex 612 gates, for the drums and kick and on toms 1, 2 and 3. The bass limiter, a dbx 160, is simply compressing the bass hard, just nice, tight and in its place. That's it.'

The two main desks are linked together as one large desk, and the left and right mix outputs of those go into the rear master console.

'Then there's all my other stuff, like my DAT, cassette, any kind of playback we have, plus video with audio; and a DAT and a cassette up on stage. None of this is really specified for anything; it's all 'just in case', so anything is instantly accessible

and instantly usable, because that's the way it has to be.

'On the master desk I also have an audience mic mix coming back in from one console. Left and right distribution amps drive the input to the cassette, the input to the DAT that sends a stereo mix back to the video people, and a stereo mix up to the stage in case Prince wants to record on his own DAT up there.

'In the effects department I've got six REV-5s, four gates and eight line amps; I am trying to keep it simple. With all this other stuff, the last thing I wanted was loads of racks interconnected through the desks — setting myself up for buzzes. And we just don't have buzzes!

'It's all basically the same stuff I've used for every band I've ever mixed: only the quantities change as the number of inputs grows.'

Natale jerks a rueful thumb at the confetti-strewn floor. 'If all these flowers weren't here you could see the rack patching's actually very simple, I've got it all on 12-pair connectors, so there's very few individual XLRs or jacks to track down. We can set the whole thing up in about 20 minutes.

'Every day it's been perfect, we patch it in and everything's working; no buzzes, no dead lines, nothing.'

On stage

On stage, monitor engineer Ed Dracoules had two Harrison SM-5 monitor consoles with some 15 mixes on the go, using all 64 channels.

Natale: 'Those desks are set up in the same configuration as my master desk, and just like out here, everything has to be available to be turned up at any time.'

Stage monitors comprised 24 Clair 12-AM

wedges, with ML-18 sub-low wedges for the drummer and sidefills of two Martin 2 x15 bins and two Community M4s aside — all powered by Carver amplifiers.

'Although the horn players on the back riser had their own mix,' Natale says: 'you can't walk out of the sound pattern anywhere on stage. The majority is in the sidefills because that has the low end to make the kick drum happen.'

As for mic choice and placement, Natale says: 'Again it's like most of the tours I've done. When I find something that works well I stay with it.'

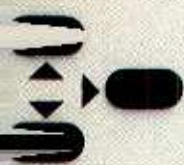
'The mics I have for the vocals, percussion and the drum kit are the same as I've been using forever. A Beyer M88 on the kick, and AKG 414 for the hat, Sennheiser 409s on the toms, horns and the 'dirty guitar', Sennheiser 416s for the overheads and Shure 57s for the snare, congas and bongo. The rest is either personal equipment or DI's.

'Some of the things are special: particular vocal mics; certain radio mics that are owned by the client. And on the horns and one of the backing vocals we have the Sony WRR-840 UHF system, which is working out really well. The main vocal radio system is a giant Sennheiser rack, which works great until they get dropped—but that's the way they are.'

My last question to Natale (How much does MIDI control feature in the show?) was received with an injured grimace. It was like asking whether Prince uses backing tapes.

'It just hooks up a couple of drums machines. Everything else is totally live. Why do you think I am rolling around so much back here?' ■

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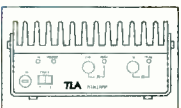
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BOMBAY MIX

Dubbing Disney in Hindi is all in a day's work for an Indian studio. Caroline Moss discovers the studios supporting the world's largest film industry

Western visitors to India can be taken aback by the unabashed curiosity of complete strangers who walk up uninvited, demanding to know all about them. Depending on outlook this can be welcoming and hospitable in a foreign culture or seem invasive, ruling out any thoughts of personal privacy which may have been entertained. That Indian recording studios reflect this open attitude was immediately apparent on my first and unplanned visit to an Indian studio to collect some delayed luggage which had been very kindly sent from Bombay by Mr Ramakrishnan, owner of the Pro Sound distribution company.

The studio, part of a large film complex in Bangalore, appeared to have no reception and no office. On enquiry I was directed towards three large acoustic doors. 'Go in, go,' implored my guide. Behind the doors in a huge recording hall a full orchestral session was under way and I did not think they would be too pleased to be asked the whereabouts of my rucksack. There was much bemusement as I declined to interrupt the session, preferring to scour the building until eventually an office worker was discovered in an inner sanctum and I was happily reunited with my luggage.

Several weeks later in Bombay I put my journalist's hat back on and went to visit some studios in something other than a foreigner-in-distress capacity. Once again the open house feeling I had encountered in Bangalore seemed to apply as interviews in both studios were conducted mid-session and between takes.

Films Division

The first studio on the agenda was the Films Division music recording studio owned by the Government of India. Located in the film district of Pedal Road, the complex makes documentaries, newsreels and cartoons which are shown in cinemas throughout the country before the feature film. In a country where cinema-going is more widespread than television watching, the emphasis is on informing and educating the public.

Although the company has existed since 1948 it transferred to its current premises just two years ago. Designed by leading acoustician Ajit Zaveri the complex houses a large recording studio, a projection room and a dubbing suite. Most of the equipment was supplied by Pro Sound, the largest pro audio distributor in India representing Soundcraft, Dolby, Tannoy, Genelec, Lexicon, BSS and other manufacturers.

I was shown around by Mrs Sheela Laulkar who has held the position of chief maintenance engineer for 17 years with responsibility not only for recording equipment but also cameras, lighting and, it appeared, the unpredictable telephone system. When I told her that it would be unusual to find a woman holding this position in the West she was greatly

surprised as, apparently, women in technical positions are not uncommon in Indian studios. So much for Western emancipation.

The main recording studio is the only government-owned multitrack facility in the country and home to a 16 channel Soundcraft TS12, a Studer A810 and Saturn 824. After being



Dubbing Colonel Hathi with the instructions from a Roland Octapad

used only for government work in its first year, the studio is now available for commercial projects. A core group of seven musicians work for the studio and others are hired as required. On the day of my visit I was shown into the large recording area where some of the house musicians were in the middle of recording a documentary score. The instruments they played were part of a beautiful and traditional collection including ►



Western Outdoors' DDA D-series desk

tablas, sitars, the santor which is plucked like a harp, tribal drums and flutes. Also being played was a huge vibraphone. But the most interesting was a collection of matakas or earthenware pots owned by one of the house musicians and used ingeniously as percussion instruments. This included his own invention, the pedal mataka. An inverted mataka had been placed in a frame with a piece of skin stretched over it. Strings attached to the edges of the skin ran down the sides of the pot and were tied together below the inverted neck. By placing a foot through the knot the strings could be tightened and slackened, modulating the sound created by beating on the skin, which was lent an eerie resonance by the mataka.

India has 14 main languages and around 200 minor languages and dialects and this creates much dubbing work for the Films Division which has to produce 15 versions of each programme. The dubbing suite, based around a 16-channel Soundcraft 6000, is equipped with four booths to facilitate the simultaneous dubbing of four languages. It is linked by remote control to the projection room which houses three banks of Magna-Tech Electronic high speed magnetic projection equipment with a further machine for making optical transfers.

The studio is planning to purchase Dolby SR in the near future. It is widely felt that SR will present great advantages to Indian studios due to the prevalence of older analogue tape machines, especially Studer machines which are assembled in India by the government-owned Maltron company.

Western Outdoor

Later that day we headed downtown to Western Outdoor in Colaba, the heart of Bombay. Once again I was ushered directly into the studio, this time the control room, and seated next to recording director Daman Sood who was recording some music for a feature length animated film. This Japanese project, a version of the Sanskrit epic poem the *Ramayana*, is nearing completion after six years and will be released worldwide at the end of the year. Once again musicians played traditional Indian instruments, accompanying dramatic sequences of the film, and between these short bursts of recording I was free to ask questions. Often the interview became two-way with the composer nipping into the control room for a chat between takes and everyone questioning me on my travels in their country.

Western Outdoor started life 25 years ago as a small video company and now offers analogue and digital recording, Betacam, high-band and low-band editing, computer graphics, A-V suites, telecine and equipment rental under one roof. It can also provide an outside video recording service and recently designed and constructed an underground auditorium or TV studio which can be hired for conferences and the shooting of

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programmes.

Mr Sood estimates that 60 to 70% of the recording studio bookings are for musical projects such as Ghazals, traditional folk-based music. Many of these are private projects for release on cassette but classical music, where only three or four instruments are used, is mastered straight onto Mitsubishi, transferred to DAT and sent to UK CD plants Nimbus or Disctronics for pressing. A further 30 to 40% of bookings is video postproduction work. The studio is always booked a minimum of two months in advance and the impressive client list includes Ravi Shanka, Zakir Hussain and Lata Mangeshkar. The latter, whose career spans 42 years, has been working on a double CD paying tribute to other Indian artists and the master tape recorded on Akai A-DAM was sent from Western Outpost to London where the vocals were laid down at Abbey Road. International clients include Channel 4 working on Indian documentaries and companies in Saudi Arabia, Dubai and Pakistan. The music for Richard Attenborough's *Gandhi* was recorded there, and a forthcoming project is the unprecedented dubbing of several Walt Disney films into Hindi.

The studio proudly claims to be the first in India with a completely digital recording chain. Mr Sood, who took a sound recording course at Surrey University and makes frequent trips to Europe and America to familiarise himself with technology updates, prefers to keep one of the two recording studios in the digital domain. Studio A is equipped with a DDA D series 24-channel, an Akai A-DAM, Mitsubishi X86 mastering machine and Sony Pro Dat although there is also an 8-track Otari and Studer A807 available. The Akai and the Otari can be locked to picture with an Adams-Smith Zeta Three synchroniser.

The smaller Studio B was being used to design a *son et lumiere* for installation at an ancient fort in Hyderabad. The music was recorded in Studio A and was being mixed in the smaller studio which has a TAC Bullet and a Soundcraft 200 console and two Otari 8-track tape machines which can be locked together using a Q Lock.

In a large office there was much activity around the

company's latest purchase, the Venice paintbox system manufactured by French company Getris. Mr Sood studies new technology for about a year before buying what he considers to be the best and most cost effective system. Due to the lack of technical backup in India he waits for second or third generation systems to be launched before buying and in this way plans one major purchase a year. The Venice is expected to attract much business from Western Outpost's advertising clients who currently have to travel to Hong Kong or the UK, and once staff have been trained on the system it is expected to be manned for 16 hours a day.

Other facilities include two Pinnacle 3D animation systems which work simultaneously, the first private sector Betacam suite in India, a video-graphics department, high-band and low-band editing suites, a video-rental department and an audio-visual laboratory. There is also a large maintenance unit equipped with a heavy supply of spares for all equipment, and the head of maintenance has attended seminars by manufacturers such as Ampex and Dolby.

The studio complex now employs around 50 people to cope with its different activities and the premises was so busy that every time we opened a door into another office or studio we hit someone in the back. Mr Sood sighed regretfully and said further expansion was impossible due to the physical constraints of the building but they were hoping to relocate some administrative staff to new offices.

Yet everything is relative. Bombay must be one of the most overpopulated cities on earth and back on the streets the air conditioned premises of Western Outdoor, though filled to capacity with productive people, soon began to seem like a haven of civilisation in the middle of the hot and crowded city. ■



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CHILL FACTOR

Keith Spencer-Allen looks at two valve mics from Sony, the C-800 and C-800G

The rumours started about two years past but it all sounded so unlikely; Sony making valve microphones again? Then about 12 months ago it was confirmed and stories abounded of famous musicians refusing to give prototypes back until they had finished their album.

Sony had played the complete operation close to their chests — or at least as close as you can when you are soliciting practical opinions about microphone performance. These two mics are loosely based upon successful Sony designs of the past, refined with modern materials and components and then adjusted to meet user comment.

The sole reason for using a valve mic is the sound character it provides and there are few measurement parameters which reflect this. In pure performance terms, even a modern valve design will not challenge the spec of most current mics but that is of no importance. If you want a valve sound you have to use a valve mic, and a modern design would appear to offer benefits over the widely variable performance of genuinely old models.

The microphones that eventually became available in small quantities earlier this year were the C-800 and the C-800G. Both are valve mics with a switchable polar pattern but the differences are greater than the simple 'G' postfix might

suggest as a side view of the mics will show.

C-800

The starting point for the C-800 was the mic that established Sony as a serious microphone manufacturer; the C-37A. As outlined elsewhere, the C-800 is not just a retooled version the C-37A but a complete redevelopment. Retained is the concept of the large capsule (26mm diameter diaphragm) with the switching between omnidirectional and cardioid polar response being a 90° mechanical adjustment on the rear of the capsule. Access to the capsule area is by the removal of a single screw and sliding off the grille top. Access to the electronics within the body is equally easy with clearly identified components and an assembly suggesting that should the need arise everything is screwed into place and possible to dismantle.

The valve is a 6AV6A mounted 'upside down' with the base at the capsule end. Isolated from vibration, the valve is almost fully enclosed in a rubber suspension that supports it lengthwise and transversely while the valve base is also isolated on long rubber mounts from the chassis. In all the tests carried out on the mic there was no sign of microphony present even under severe test conditions and this suspension arrangement clearly isolates and damps the mic well.

The grille area is very rigid and consists of two layers of mesh with a purely protective function, there being no foam or wind retardant materials.

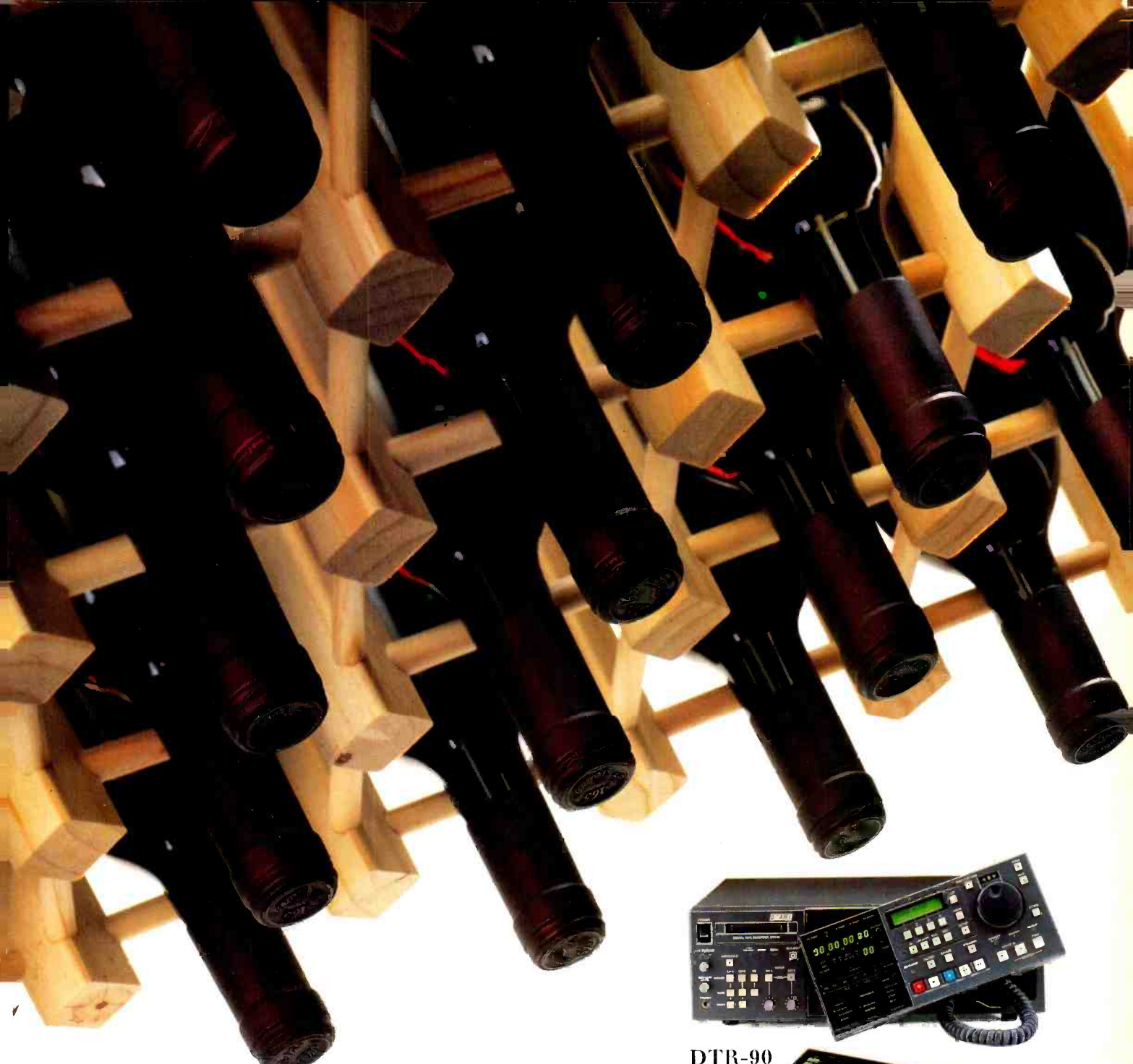
Not immediately obvious but pointed out in the manual is the fact that the 'sleeve' for the mic is in two pieces to reduce resonance in the microphone body. Where these sections meet they are machined to overlap but not touch. This casing is also almost entirely isolated from the internal structure with the intention of reducing mechanical vibration.

Power and output signals are carried via a 6-pin XLR-type Neutrik connector in the base. Aside from dangling the C-800 from its cable you are required to use the cradle suspension supplied as an accessory. Two little clips on the side of the cradle slacken off tension, the mic slides in and with the clips back on, the mic is firmly held. You have no qualms about suspending it upside down as it is very secure.

Other accessories supplied include an 8-metre power-signal cable (26ft), a windshield, two stand screw adaptors and a wooden-handled screwdriver to adjust the polar pattern. The complete kit comes in a plastic carrying case heavily fitted out with foam.

The C-800 requires the use of power supply AC-MC800 which is not one of the accessories. This a substantial unit and for those of you familiar with valve mics, about twice the size of a Neumann U67 power supply. On-off with green LED, mic in and out sockets are mounted on front panel while the power cable connector and mains voltage are at the rear.

Construction is substantial and the unit houses a pair of 6AV6A valves. Unlike the valve in the mic, however, these are not branded Sony which would appear to be a sign of individual valve ►



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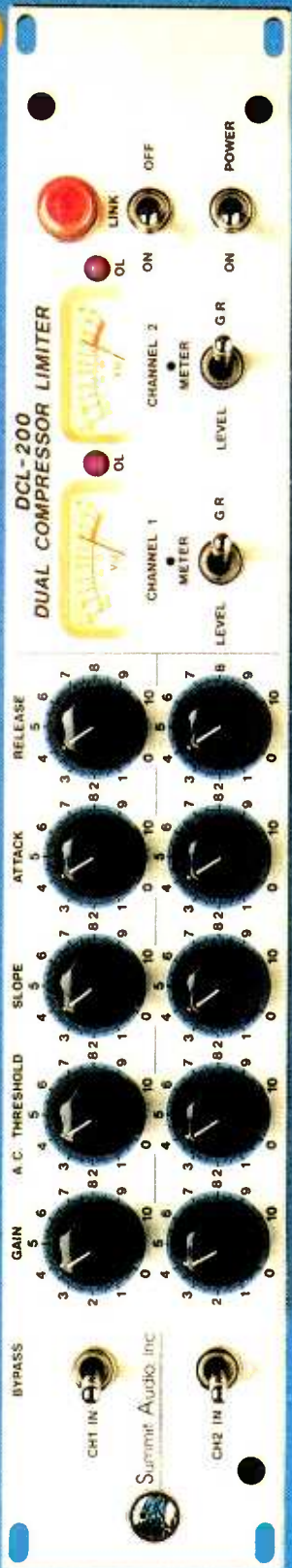


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selection for the mic rather than for the less demanding requirements of within the supply.

A note here about transporting the mics would be appropriate. Both mics require the use of a power supply but it cannot be contained within the mic carrying case supplied. While some users may not find this a problem, some ideas about a flightcase capable of carrying mic, accessories and power supply would be worthwhile.

C-800G

Viewed from the front, the C-800G looks very similar to the C-800 but at the rear, projecting at right angles from the mic body, sits a most un-microphone-like assembly. This consists of a housing for the valve and a further extension with cooling fins. Unlike the C-800, the valve is not within the mic body but externally mounted. The 6AV6A valve is completely encased in a metal assembly with a layer of copper foil under a cover on one side, while the other side of the assembly is directly connected to a heat valve at the other end of which are the cooling fins.

The Peltier device is a semiconductor junction that can be used to cool or heat when a DC voltage is applied. The top (copper foil) side of the valve is cooled while the heat from the other side of the valve is passed to the cooling array. The valve temperature is then stabilised at about 20°C and according to Sony this offers several benefits to performance and valve life (see sidebar).

The capsule is a large dual design based upon the original C-48 dual capsule but considerably reworked. This is also switchable omnidirectional and cardioid but electronically via a recessed switch on the front of the mic.

In circuitry it differs from the C-800 being a cathode-ground circuit as against plate-ground. The power-signal connector at the bottom of the mic is a 7-pin type that connects to the AC-MC800G power supply via the supplied 8-metre cable. This supply differs from the other only in the need to power the Peltier device with 3.9V at 1.2A.

All the same accessories are supplied as with the C-800 and it fits into the same suspension cradle except that you have to make sure that the cradle is the right way up when attached to the stand so that at the cutaway section fits round the rear valve housing.

Surprisingly, the G is not as heavy as it looks but has a quite different centre of gravity from the C-800. A little more care is needed mounting it in the cradle and tightening the fittings because of this. The manual says that the cooling elements should be either horizontal or higher than the mic, which makes sense, as otherwise the heat from the cooling fins will flow back over the valve.

In use

Both of these microphones were used over a period of a couple of months across a wide range of musical material. Only a single unit of each model was available so I am unable to comment on stereo performance other than by extrapolating from single-channel experience (which is not a reliable business at best).

The C-800 is a fairly large mic and so there are certain restrictions on where the mic and cradle can be placed but that being said, it proved a versatile performer. For a valve design it has a fairly high SPL handling capability and although I may have moved the mic away from a sound source for sonic reasons, it was not due to overload.

There is considerable similarity between the

on-axis performance in cardioid and omnidirectional modes. The sound character is noticeably warm and full, and for voice use sounds particularly good in cardioid mode where the proximity effect reinforces the natural warmth.

Off-axis the situation is rather different. In cardioid mode there is a good close-mic performance between $\pm 45^\circ$ off axis. By 90° the HF and overall level are beginning to fall quite rapidly but still sound natural and balanced. After 90° , and towards the rear, everything disappears very suddenly while at 180° the level is very low with LF being the predominant sound character.

In the omnidirectional mode the HF falls off rapidly by 45° off the axis and the sound character changes rapidly beyond 90° . I had to check that the selected pattern was omnidirectional and not cardioid. I do not know the performance characteristics of the original C-37A but the C-800 has a very narrow HF response in omnidirectional mode and would present me with problems if used with other sound sources in close proximity.

With the on-axis sound being full and the mic capable of high level handling, I found myself tending to use the C-800 as a close mic and only experimenting with the omnidirectional pattern when used for an overdu.

The mechanical switching between polar patterns is also something that takes some getting used to. The C-37A had a similar adjustment method but we have forgotten some of the idiosyncrasies of old design concepts such as having to mute the channel before carefully inserting the screwdriver in the rear of the grille to turn the screw 90° . If you forget to cut the level, the sound is loud and unpleasant. It is also difficult in subdued lighting to peer into the hole to see what setting the mic is currently on — even the polar pattern indication around the hole could be more distinct.

The C-800 is a good-sounding mic that would find best use as a close mic where its on-axis response would be heard to best advantage.

The C-800G is however something else entirely. Clearly much bigger due to the attached Peltier system, its very nature tends to suggest use in distant miking. And in some ways this might be a worthwhile direction, except that it also sounds very good when used close up.

When the G is first turned on, warmed up and you open the fader, there is a degree of surprise each time. The sound character is full, distinct with a quite remarkable impression of smoothness. I do not know if this is one of the results of cooling the valve and there is no easy way of disabling the Peltier device to compare performance without it.

Even after extended use the cooling array only becomes slightly warm while the top of the valve housing remains cool — well below ambient temperature.

The C-800G is also subjectively cleaner and quieter than the C-800 but there is no way that could be verified. The manufacturer's spec indicates a lower SPL handling but this was not found to be any problem during the review period.

The G sounds particularly good for voice. On the omnidirectional pattern the frequency response is held over all the front area of the mic until it approaches 90° where there is an area of unevenness possibly due to cancellations in the HF between the two capsules. The other side of the mic sounds good all round even if there is a slightly different tonality to the front capsule.

Changing between patterns is via a recessed switch on the front of the mic. You need to use a pencil or screwdriver, but there is no absolute need to mute the channel as changeover noise is quite

low. However, a slightly longer switch to enable finger adjustment would have been preferable.

The cardioid response is also good and is even all over the usable front area with the HF only falling off slightly by 90°. Rear attenuation is high but with a predominant LF and HF character. However, the sum of all off-axis response still sounds good.

This mic was tried on a wide range of instruments and voices, close and distant and although sometimes I preferred to use other mics in specific cases, it was difficult to fault the G. It was unfortunate that I was not able to try a pair for stereo use but I could imagine favourable application.

Summary

Products such as these mics cannot be examined entirely objectively. At the practical level, both microphones are well made, well presented and supplied with an essential range of accessories. The addition of a manual is something, I think, quite unique to any microphone.

The technology employed in the C-800G is an exciting departure for any form of valve product and Sony must be congratulated on this unique application which would appear to contribute considerably to the performance of the mic.

The C-800 is in some ways closer to traditional valve technology but shows particular development in the area of SPL handling. The C-37A-derived capsule design has a few oddities which have been mentioned and the potential user would be wise to consider these points in relation to any intended application.

As I mentioned earlier, the only reasons for the use of a valve mic over another mic of similar quality has to be an aspect of its sound that is more appealing. Valve mics present certain obstacles to easy use such as the need for separate power supplies rather than convenient phantom powering, the warm-up time, valve life, etc. The sound character gained must be strong enough to warrant the operational fiddliness.

By these criteria both these Sony mics are impressive but the C-800G would seem to offer far more potential and reward in sonic terms than the C-800 which only in comparison seems rather ordinary. If these comments all seems rather rarefied I make no apologies as when dealing with performance aspects that are simple matters of informed taste there is no measuring method. With the cost of these mics there is also not realistic discussion on value for money. They have to be judged solely on liking what you hear, and if you do then the price is justified. On the right material and paired with a sympathetic digital recorder the resulting sound could be stunning.

For me both of these Sony mics are good but it is just that one, the C-800G is rather special and deserves a wide hearing. Personally, I think it is one of the best-sounding mics I have ever used, and I am still surprised that it comes from Sony — valves and all. ■

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BACKGROUND

While the C-800 and C-800G are unusual products for Sony, they have a direct line of development from earlier models of microphones. The C-37A, introduced in the mid-to-late '50s was a large diaphragm condenser and was, of course, a valve design.

It proved very successful in Japan and US. However, along came the FET which offered considerable design advantages — and a new generation of FET mics emerged. Sony produced the first design in the C-38 which combine the C-37 capsule with an FET body and so started the move away from valves. Sony have said the decision of most of the vacuum valve manufacturers to stop producing valves was another factor in the demise of the C-37A.

It was about three years ago that Sony started experimenting with capsules and valves circulating prototypes to a wide variety of key users for their comments. With this information and accompanying research from Sony, the 800 series emerged.

The capsule for the C-800 is derived directly from the C-37A. The valve used was the 6AV6 (now the 6AV6A) as this was the one that the C-37A had used and, perhaps more importantly, there were still some reliable sources from which it could be obtained. All aspects of the original microphone were examined, in particular the diaphragm ring, the back plate and the insulation. Many aspects of the microphone were re-engineered using materials developed in the 30-odd years since the original design such as better insulators. The capsule for the C-800G was derived from the C-48 but considerably reworked.

Kazumasa Takahashi, manager of the audio products division within the communications products group at Sony is responsible for the design of all Sony microphones — wired and wireless. The development of the C-800/G was something that he was very keen on and it was handled as a normal design project.

'A vacuum valve is a new device for young design engineers. They have no lectures about valves in college and so we have to teach them.'

It was Takahashi who had the idea for the use of the Peltier device about ten years ago, but at that time there was no application on a Sony product and it came to light again on these mics after the other design points had been almost completed.

The Peltier device encapsulates the valve and cools the surface when a DC voltage is applied. The operating temperature at the valve surface is between 70–80°C. With cooling this goes down to less than 20°—about 50–60° difference.

Takahashi outlined the benefits achieved by the cooling. 'It will probably extend the life of the valve. More important maybe is the reduction of noise in the high-frequency range.'

Sony have plots that demonstrate the difference between passive and Peltier cooling, with the latter showing a very gentle reduction in noise from 1kHz upwards leading to about 2dB improvement at 20kHz.

There is also a feeling that there are improvements in distortion and other performance aspects but the difficulty of measuring these aspects accurately due to variables in the valve itself means that they are not easy to quantify.

Takahashi: 'The measured effect is small but the benefit in sound quality is much more.' ■

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The saga of CD-R write-once pricing rumbles on. So far there has been a conspiracy of silence on the vital question of whether the *Photo CD* blanks which Kodak sells for under five pounds retail (UK price including VAT at 17.5%) really are the same as the Taiyo Yuden blanks used by the Philips-Marantz-Meridian recorder. Even the people selling the recorders do not know. And Taiyo has hinted to me that there is some subtle difference.

Well if there is a difference, which I very much doubt, it is of no financial consequence. Indeed a guarded statement from Taiyo Yuden's European office in Germany inadvertently confirms that the discs are, as near as makes no difference, the same.

I had asked Taiyo (manufacturer of That's tape) how the company justified its trade price of nearly £15 per disc.

Now Atsushi Ishizaka, MD of Taiyo in Europe comments: 'Kodak's price of less than £5 is hard for us to believe. We have sold substantial quantities to Kodak for their experimental purpose quite a long time ago. The price was similar to our current wholesale price. We must believe that Kodak have a supplier which enables them to sell at £5, or Kodak in Rochester is able to manufacture discs using their own know-how and technology. We have been trying to reduce our price, but it will come together with market growth'.

If Kodak bought 'substantial quantities' of CD-R blanks from Taiyo, and used them for *Photo CD* demonstrations (which I know, from first-hand sightings, that Kodak did), how on Earth can the *Photo CD* and CD-R disc types be anything other than the same?

Write-once discs of the Taiyo-*Photo CD* type are made by coating a blank disc with metal, dye and plastic layers. Metal coating is easy, because CD pressing plants do it for every disc. Kodak have more experience than any company in the world when it comes to dye and plastics coating. Photographic film is coated with many different layers of these chemicals, several at the same time using a technique called laminar flow. The production line is horrendously difficult to get working, but is then easy to keep running. Kodak film is often given away free as promotion to seed processing.

I think it very likely that Kodak is now coating its own *Photo CD* blanks, in large volumes. If I were in the CD-R business I would now be talking to Kodak about supplies of blanks...

How can the hardware companies, notably Philips-Marantz, justify a professional price of several thousand pounds for a write-once CD Recorder, when the drives are leaving the factory for only £250 a time, even in small numbers?

Yes, the full unit, with electronics, costs around £1,000. But that is still a long way short of the prices being asked for CD-R machines.

Meridian charge around £4,500. But Meridian always have been at the top end of the audio range, adding their own electronic twists which the audio fraternity seems to like and be willing to pay for.

Engineers say that the inside of the CD-R drive is a lot more complicated even than early CD players, but agree this can be simplified if mass production of a consumer model began.

Meridian charge around £19 per disc, which is

Barry Fox

Could CD-R win the MD-DCC war?

only around 10% mark-up on the price paid to Taiyo Yuden, via Philips. Needless to say Meridian are very curious to know how Kodak can sell discs for under £5 retail.

Meanwhile, the war of words between Digital Compact Cassette and MiniDisc is well under way. Concern is growing that DCC will always be more expensive to duplicate than CD, with the price of magazine-cover-mounted giveaway discs (without jewel box or sleeve note) now down to around 52p for a run of 60,000. MiniDiscs can be pressed on CD presses, even more cheaply. If the public can get full playing time and CD quality from a 2.5-inch disc, why will they want a 5-inch disc? Philips' fear that MiniDisc will, in the long term, kill CD is well-founded.

One rumour now circulating is that if Philips see MiniDisc succeeding in the fight with DCC, the company will launch a consumer CD-R, priced at between £500 and £750. The same thing could happen if both MiniDisc and DCC fail. They could fail if the public decides to wait and see which format wins. They could also fail if the record companies are soft on support or if the artists rebel against the lower royalties which the record companies want to pay on the new formats.

It would be poetic irony if the artists did manage to kill DCC and MiniDisc, and trigger the launch of low cost CD-R. They would then get no extra royalties at all. I wonder how carefully Dire Straits and manager Ed Bicknell have thought this one through.

CD-R sceptics say write-once CD-R will never become a consumer product, not so much because of what happens when they make a mistake while recording. Although the CD-R recorder 'fixes up' the table of contents at the end of a multisession recording, only a new generation Orange Book CD player will skip unwanted — that is, mistake — passages. A conventional Red Book CD player will just play through the disc — the user will have to program track selection to skip mistake passages.

But there is a counter argument. To play new DCCs or MiniDiscs, you need to buy a completely new machine. To play multisession CD-R discs you will need only to buy another CD player, which will

If recording artists did kill DCC and MD, it might trigger the launch of low-cost CD-R

play existing CDs too. And the multisession CD-Rs will play on existing players, with mistake tracks easily skipped by player programming.

A lot of people in the BBC went to a lot of trouble, and the BBC went to a lot of expense, putting on 'the greatest show on air' at Broadcasting House, to commemorate 70 years of radio. The organisers staged a press preview and invited platoons of ex-BBC staff, most with an interesting story to tell. Unfortunately, exactly as happened four years ago when the BBC staged the ill-fated Radio Show at Earls Court, the BBC radio publicity department made a hit-and-miss mess of the invitation list.

Only a very few of the specialist press, who would have got good mileage out of the exhibition of old equipment and out of talking with the ex-BBC people, were invited. One hi-fi magazine, for instance, planned a three-page feature only because someone from the magazine phoned the BBC and asked about the exhibition, just in time to be invited. Another magazine planned a review only because an outside contributor had the initiative to do likewise. I got an advance press release which made me assume that I would get an invite. Wrong. By the time I realised I had not got an invite, and checked, it was too late. The quaint irony is that after I wrote rude things about the last publicity mess for Earl's Court, better things were promised for next time.

By the time I could get there, and enjoy exhibition, it was too late to write anything which would appear in print before the show had closed. But I did spot a couple of points that are timeless.

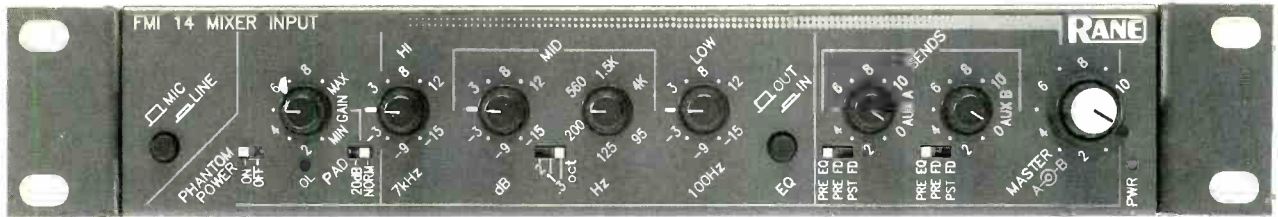
The excellent historical gallery had transmitter equipment dating back to the days of 2LO. There was also an STC 4038 ribbon. 'First introduced in 1953', read the notice, 'for 30 years the standard of microphone for announcers and newscasters'. Whoever wrote that obviously thinks that these wonderful old warhorses are no longer used. In fact they are still in studios throughout Broadcasting House. I was speaking into one only the other day.

Although it was not ready for the preview day, the exhibition area later had a terminal connected to the VAX computer which stores the new index system for the BBC record library. It has been a massive job transferring the data from index card to computer. It could not be scanned in, because many of the cards were handwritten. So the information had to be keyed in. Some people who use the new system complain that not all the information on the cards has been transferred to computer, for instance details of publishers are missing. But the system works very fast and very well — apart from one bizarre oddity.

If you are keying in a song title which includes the word 'and' you have to put the word in quote marks. So Stephen Bishop's On and On must be entered as On 'and' On.

Why? Because the word 'and' is a command word for the computer so it has to be fooled into ignoring it. Sorry, but if any software company offered me a database which imposed such an unnecessary restriction on users, I would tell them to go away and rewrite the software before I paid for it. ■

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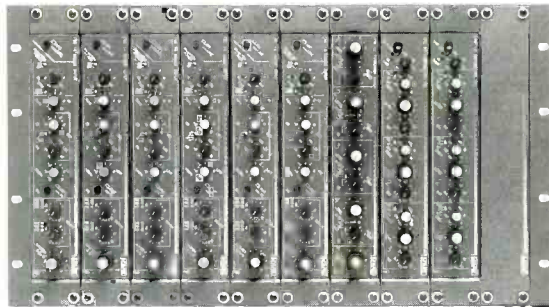


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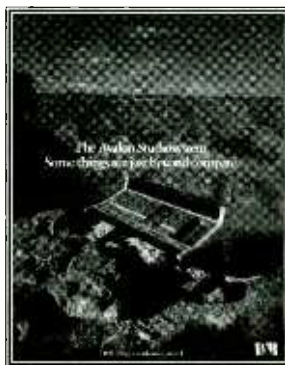
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We are all thrilled to be living in the age of the audio Aquarius; where the advent of the home-project studio and the studio in a box (Atari, Macintosh or PC), has given rise to a whole new generation of creative artistry. One particular problem facing these new audiocrats, however, is that they have not endured the sting of a live wire, the electrical charring of a finger, or being transported across a room by a large plate power supply and so on. In fact, it is unlikely that anyone under the age of 40 would even know what a plate supply is. This relic from the age of vacuum tubes has just about disappeared from the audio practitioner's lexicon in all cases except for specific tube-powered components not likely to be found in the average home or project studio — or even in many mainstream studios. But the fact remains electricity is not always kind to us.

Another problem is the popular perception that the use of plug-in low-voltage transformers, MOSFET and VLSIC chips and computers and-or computer circuitry eliminates the use of dangerous voltages. Any item that plugs into the wall or into something else can become dangerous electrically. Not to mention that a large and powerful 24V power supply can do things to human skin never imagined by the makers of Coppertone. It is important to realise that if a power cord carrying 110V-220V enters an audio component, there is always the possibility of fraying, misconnection or parts breakdown allowing the dangerous line voltage to migrate. And today's computers and workstations require very high voltages indeed in order to put a picture onto a screen.

Even if you are a voltage safety perfectionist using only the most up-to-date components powered only by battery or by isolated plug-in low-voltage step-down transformers, sooner or later you will come into contact with someone who is not as careful as you or, as is more likely, downright sloppy. A year ago, this 'retro' group went into a studio to cut a record. All of their instrument amplifiers were tube, and they carried an effect rack filled with tube gear that they wanted to use. Even their headphone amps were tubed. It all sounded very good and their get up with animal skins and the like made it all very '60s'. So far, so good — but they had lifted all of the grounds on just about every piece of equipment and defeated the safety aspects of equipment design. Nothing was individually dangerous, but the cumulative voltage and current exceeded 70V at 10mA. Supposedly it takes 73V and 11mA or better to create a potentially fatal scenario — but who's counting? We made them use our gear and compromise on the sound they produced. After a lot of tries, we were able to program equalisers — delays — DSP units to mimic their sound. And nobody died in the process.

Having little or no fear and frequently bearing the misconception of the safety of so-called low-voltage audio units and controllers, today's newer audio practitioners frequently do not recognise just how little electricity it takes to stop permanently a human heart. The old warning line is that 11mA is enough kill you, or '11 mills kills' in studio patois. Any pathway that provides electrical

Martin Polon

'Eleven mills kills' warns an old engineering adage but how many of us take heed?

access across the heart will do the job partially if not completely. And many old timers will tell you that a survivor of a serious electrical accident frequently would have been better off if the accident had been a fatal one. Generally, any situation where there is a current flow from one hand or arm across the body to the neck or to the feet will do the trick — and it is a trick that is virtually impossible to undo. Old timers will also tell you that its better to be hit by DC rather than AC because you are more likely to be thrown clear rather than fibrillated. But what is really best is avoiding the accident in the first place, at all costs.

The following suggestions are likely to prevent a fatal accident from happening. They may seem rather old hat, conceptually, in the '90s but the difference between electrical safety in the '60s and electronic safety today is zero. Precautions taken will prevent damage or worse. It goes without saying that conditions that may endanger people, can and will also burn out equipment.

First, read your electronic mail. If the hairs on your arm stand up when you graze a piece of equipment, it does not always mean that you are in the presence of a member of the opposite sex. This is an indicator of hazardous voltage and everything should be checked carefully.

Secondly, audio hum is frequently an indicator of dangerous current flow. Give significant attention to the presence of AC hum. It frequently indicates more than audio noise. Fixing a safety problem properly will usually remove the AC hum from a system.

Always use three-core power leads — never defeat them. There are no options here. If there is a hum or ground loop, fix it properly. Do not lift the very feature designed into AC connections to protect from serious injury!

Audio transformers may or may not affect frequency response but they always save lives. When connecting your equipment to an unknown sound system or taking a feed from a similarly unfamiliar source, use an audio transformer to provide isolation.

Do not assume audio expertise qualifies you for video work

Never open up a piece of live equipment outside a repair shop. Even if you know what you are doing, it is foolish to attempt 'hot' repairs away from the test equipment and AC isolation transformer you would be using in a workshop. Even on remote jobs, it is far better to substitute another unit than to attempt a repair in the field.

Make no assumptions about equipment that has been repaired or modified. Assume that anything that is not mint condition right out of the factory could be dangerous and proceed accordingly. Used equipment and studios that have been the prior preserve of a 'soldering iron jockey' are especially suspect. So is home-built equipment.

Wearing rubber-soled shoes and keeping one hand in your pocket may not make you fashionable, but it could save your life. A hand kept in a pocket cannot provide a heart path — neither can soles made of an insulating material. This is the oldest electricians' tricks in the book to stay alive around hazardous voltages of any kind.

Unless you are absolutely qualified, leave equipment construction and maintenance to someone who is. Ditto the construction and repair of cables, wiring and electronic harness assemblies. Ditto the construction of projects from magazines or books.

The presence of a low-voltage power transformer is not always an indicator of electrical safety. The presence of other components or external systems can place hazardous voltages on the chassis or connections of a supposedly safe unit or system.

Even if something is battery powered, it may be connected to something which isn't. Same as above.

Spilling beverages into the mixer was a stupid stunt in 1952, and it still is. Not to mention that it has the potential to be very dangerous. Needless to say, mixing any kind of electronic or electrical devices with liquids is absolutely reckless. Yet in conversation with a repair specialist working the MIDI and home studio trade, it seemed that the obvious was anything but.

Connect pieces of equipment together with everything unplugged from the AC power supply. This simplest of all suggestions will not only preserve life and sanity, but can frequently save equipment. Do all your setup work 'dry'. Connect power only after the entire system is completely wired, mounted and organised.

Do not assume that audio expertise qualifies you for video work. Knowledge of video equipment, the voltages present, grounding practices and operating parameters is mandatory before undertaking even the most rudimentary repairs or modifications, or interconnection of a complex equipment arrangement. It is also important to remember that it is almost easier to burn out video equipment than to kill yourself, but the determined 'gearhead' can frequently accomplish both at the same time.

Finally, if you do not understand a piece of equipment, ask someone to help you. If everyone who worked in audio were to ask a knowledgeable party before plunging in 'where angels fear to tread', there would be virtually no electrical accidents in audio. Observing these few simple guidelines will keep you alive for the next session. Ignoring them may cost pro audio a genius. ■

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TASCAM MSR-24S

Sam Wise reviews a Dolby S enhanced 24-track recorder from Tascam that is moving into the mainstream market

The Tascam MSR-24S is the latest in a long line of Teac-Tascam multitracks which first appeared during the early 1970s. Early on, these machines were honed to a successful price-performance level, building an increasing reputation for reliability and for long term parts support. Only recently, I had the privilege (?) of repairing a 15-year-old Tascam 8-track. A replacement capstan was in stock, the heads were lapped, an electronic components distributor supplied two replacement relays (ordered from them to save cost), and performance was tweaked to once again meet the original quite reasonable specification. The design is basic and easy to repair, most parts are standard issue, and technical documentation can still be obtained — missing manual pages were sent within the hour by fax. All-in-all, a good start for any machine is good backup, and Tascam seem to take things seriously.

The MSR-24S builds on this past, but itself already has a tradition, having been originally sold in a dbx noise reduction version which is still

available. The MSR-24S substitutes Dolby S noise reduction, bringing the astounding benefits of this performance enhancing system. Like the recently reviewed Fostex multitrack, the Tascam MSR-24S does not prove wanting in basic performance, allowing the Dolby system to approach digital audio performance.

The MSR-24S along with the Fostex G24-S have a substantial hold on the 1-inch 24-track market in the UK and probably the world.

First impressions

The MSR-24S is packaged in two boxes, one containing the transport and audio electronics, the other the power supply. Both units are supplied with rubber feet on the bottom for tabletop or portable operation, and with rackmount flanges to allow installation into a 19-inch rack enclosure. The power supply cable is sufficiently long to enable it to be put into the bottom of a wheeled trolley or on the floor. Tascam can provide such a

trolley, their model CS-608. The power supply seems large, certainly compared to the Fostex G24-S which was all contained within one housing, but the G24-S used various power saving techniques, particularly on the mechanical side of things which are not evident within the more conventional MSR-24S design.

The enclosure is mainly steel, with some aluminium extrusions, finished in an attractive deep grey with clear white labelling. Internal parts are also mainly of pressed steel, finished to a good standard. The tape path each side is controlled by large rotating tension-arm guides on swinging arms, feeding onto fixed rotating guides either side of the head block assembly. The capstan is direct drive with a DC servo-controlled motor. Large identical reel motors also directly drive the tape spools. Brakes are traditional with bands activated by a single solenoid. The pinch roller is located inside the tape path and is also solenoid activated. All tape-path rollers are fitted with ball or needle roller bearings.

Access to the channel electronics is easy, since they lie directly beneath the transport control panel. This props open to provide access to card edge-mounted audio preset controls. Each track has its own plug-in PCB, and an extender card to aid servicing is provided with each machine. Replay tape alignment is easy, but since there is only one record-replay head, record alignment is rather a ▶

MANUFACTURER'S SPECIFICATION

PERFORMANCE

Frequency Response	15 ips: 40Hz–20kHz ± 3 dB (at 0VU) 7.5 ips: 40Hz–16kHz ± 3 dB (at -10VU)
Total Harmonic Distortion	<0.8% at 1kHz, 0VU (250nWb/m)
Signal-to-Noise Ratio	reference to 3% THD
15ips:	93dB (CCIR-ARM with Dolby S)
7.5ips:	68dB (CCIR-ARM without Dolby S) 91dB (CCIR-ARM with Dolby S) 65dB (CCIR-ARM without Dolby S)
Crosstalk	>70dB (1kHz, 0VU, with Dolby S) adjacent channel
Erasure	>70dB (1kHz, +10VU)
Headroom (Record Amp)	>28dB (1kHz, 0VU)

MECHANICAL

Tape	1-inch (25.4mm) low noise, high output, 10.5-inch NAB spool
Track Format	24-track
Head Configuration	1 Rec-Replay, 1 Erase
Speed Accuracy	$\pm 0.2\%$ at either speed
Pitch Control Range	$\pm 15\%$
Wow and Flutter	15ips: $\pm 0.06\%$ peak DIN weighted 7.5ips: $\pm 0.08\%$ peak DIN weighted
Start time	0.5s to stabilise
Weight	
MSR-24S	33kg (73lbs)
PS-24 power supply:	15kg (33lbs)
Dimensions	
MRS-24S	19-inch rackmount, 11 U high, 310mm from front panel to connector clearance. HxWxD (488 x 483 x 310 mm)
PS-24	19-inch rackmount, 3 U high, 310mm from front panel to connector clearance. HxWxD (132 x 483 x 310 mm)

protracted affair. Machines are currently provided pre-aligned for Ampex 456. Dolby S boards should not normally need adjustment, and must be accessed from the rear of the machine, with two encode-decode systems on each of the 12 PCBs.

Operation

The machine is quiet in operation, with acceptably low capstan engagement noise. All controls are logically laid out and labelled, with little need to look at the manual for basic machine operation.

Across the front of the machine each track has a LED level meter, with RECORD READY button and LED directly beneath. As expected, these flash when REC RDY is activated and steady when record mode is entered. Meter level indication is accurate within better than 0.5dB, sufficiently accurate for both programme metering and machine alignment purposes.

Below the metering section on the right are the transport operational controls. The main fast forward, rewind, stop, play and record functions operate as expected, with an internal LED indicating record active. The tape-reel holders are well designed, automatically centralising the tape spools for least wow in operation. The tape path is also easy to tread, and safety switches prevent operation unless the tape is taut. After lacing the tape, pressing LOAD will run the tape slowly forward for about one minute, automatically setting this point as a beginning-of-tape reference position, and as a parking position following a rewind. Also, a point 30 or 60 minutes ahead (according to tape speed) is set as a stopping location for fast forward, to avoid the tape running off the spools unexpectedly. These two points are not affected by resetting the tape timer to zero, but can be edited if required. Here again, the G24-S scores over the MSR-24S, since the former has 10 locate memories compared to the latter's two.

However, the MSR is easier to operate.

Actually, these end points can control operation in two selectable ways. Normally, tape is stopped from spooling when they are reached (AUTO END STOP), but the machine can be programmed to just slow the tape at that point and then spool off (AUTO SPOOL). If you forget which is set, pressing the CHECK button displays 'Stop' or 'Spool' respectively in the tape-counter display.

Editing functions

EDIT and SPOOL latching push buttons are located to the left of the main transport controls. When in stop mode, EDIT will disengage the brakes and tension the reel motors to allow easy rocking of the tape to find an edit point. Pressing F FWD or REW will cause the tape to load the heads and slowly move in the required direction to get near the edit point. If the right tension arm is released, pressing EDIT unmutes the audio and turns off the right reel motor, allowing the tape to be manually pulled off of the reel while listening to the audio.

EDIT and PLAY pressed together engages play mode, but without the take-up spool active, allowing tape to be spilled from the right of the machine (DUMP EDIT). A spot erasure mode may be entered as well, allowing the tape to be erased on selected tracks while manually turning the reels — sounds dangerous to me, but perhaps less so than it seems if it is really necessary to clean a section of tape. This was not attempted during the review.

While editing 1-inch tape is not as common as with narrower tape formats, these editing functions can be useful, and are easier on this machine than on the Fostex G24-S.

SPOOL performs the simple function of providing a uniform, low (a third of normal) tape-winding speed for spooling off the tape when an even wind is required. High speed spooling required 1m 40s end to end.

Functions

Directly above the transport controls are the locate functions, with associated buttons in the next row up. MEMO1 and MEMO2 are used to load the locate memories with tape position information. Pressing these at any time loads the tape counter position into the locate memory. Pressing LOC1 or LOC2 will spool the tape to the required position, entering play automatically if AUTO PLAY is active. RTZ will go back to counter zero as a locate position. Pressing CHECK then MEMO1 or MEMO2 will display the memory contents in the tape counter display.

REPEAT 1-2 is intended to provide a loop between the two locate points for rehearsal. The tape will spool to the lower of the two points, play to the upper point, and then repeat. Pressing REPEAT again stops this action, as do a number of other transport functions.

A little to the left of these controls are RHSL, AUTO IN-OUT, and CLEAR. RHSL enters rehearsal mode, allowing the musician to practice an overdubbing sequence before committing to a take. The tape will rewind to a preset preroll point and play forward until the punch-in point. The monitor signal will then switch from playback to input at the punch-in point, then continue to punch-out, where the monitor will return to off-tape. The transport operates in play mode for a further three seconds. AUTO IN-OUT operates in the same manner, but enters record mode automatically at the punch-in position, punching out again at the end point. CLEAR cancels these and the load function.

A foot-switch connector on the rear panel allows a musician with his hands full to activate a punch-in to record.

A set of monitor related functions are positioned at the far left of the machine. ALL INPUT will monitor the track input signals no matter what operational mode the machine is in. AUTO INPUT connects the machine monitors to tape during play operations, and to input during record operations. Tracks in REC READY are switched to input during rewind, fast forward and stop to allow the control room to hear the studio without having to change the mixer setup. INSERT selects the monitor source for tracks selected to REC READY. If on, these tracks will be monitored off tape; if off, they will be monitored from LINE IN regardless of whether a recording is being made or not.

Below these are switches which control the tape speed. PITCH CONTROL can be used to vary the tape speed $\pm 15\%$ when VARI is indicated. Any external speed control signal appearing on the rear-panel remote-control connectors will force the machine into EXT speed mode, illuminating the associated indicator. TAPE SPEED selects 19 or 38 cm/sec speeds on the standard machine. DISPLAY is used to change the tape counter indication to show the speed variation from the normal fixed speed. This can certainly be useful when attempting to bring the machine from a varispeed condition, back into its standard speed setting.

Dolby S control

Three adjacent selectors with LED illumination allow track banks 1–8, 9–16 and/or 17–24 to be

SCHOEPS

switched into Dolby S processing mode. Finally, SYNC LOCK forces track 24 into non-Dolby condition, allowing it to be safely used for time code recording and playback. When activated with REC READY OFF, it also puts track 24 into a safety condition, preventing accidental erasure of the time code data.

The separate PS-24 power supply has only one control, that being the POWER ON-OFF switch. Beneath a smoked plastic window a number of LED indicators reveal the health of the power supply. A multicore power connector supplied with the machine connects via a D-type connector to the main transport chassis rear panel.

Connections

Rear panel multipin connectors provide for serial and parallel synchronisers-controllers. In addition, a remote control socket allows for connection of a Tascam RC-424 full-function remote control unit.

Unbalanced phono-type connectors for each of the 24 inputs and outputs are located on the rear panel. The nominal operating level is the standard semiprofessional level of -10dBV. This is the level obtained when replaying a properly calibrated tape with a recorded level of 250nWb/m. The manufacturer's specified performance of +18dBV clipping level is achieved into the specified impedances, but attempting to drive a 600Ω load will result in reduced level and increased distortion. On the rear of the unit, switches allow the signals on inputs 1 - 8 to be internally routed to tracks 9 -16 and/or 17 - 24, useful for the smaller operation with a limited number of mixer group outputs.

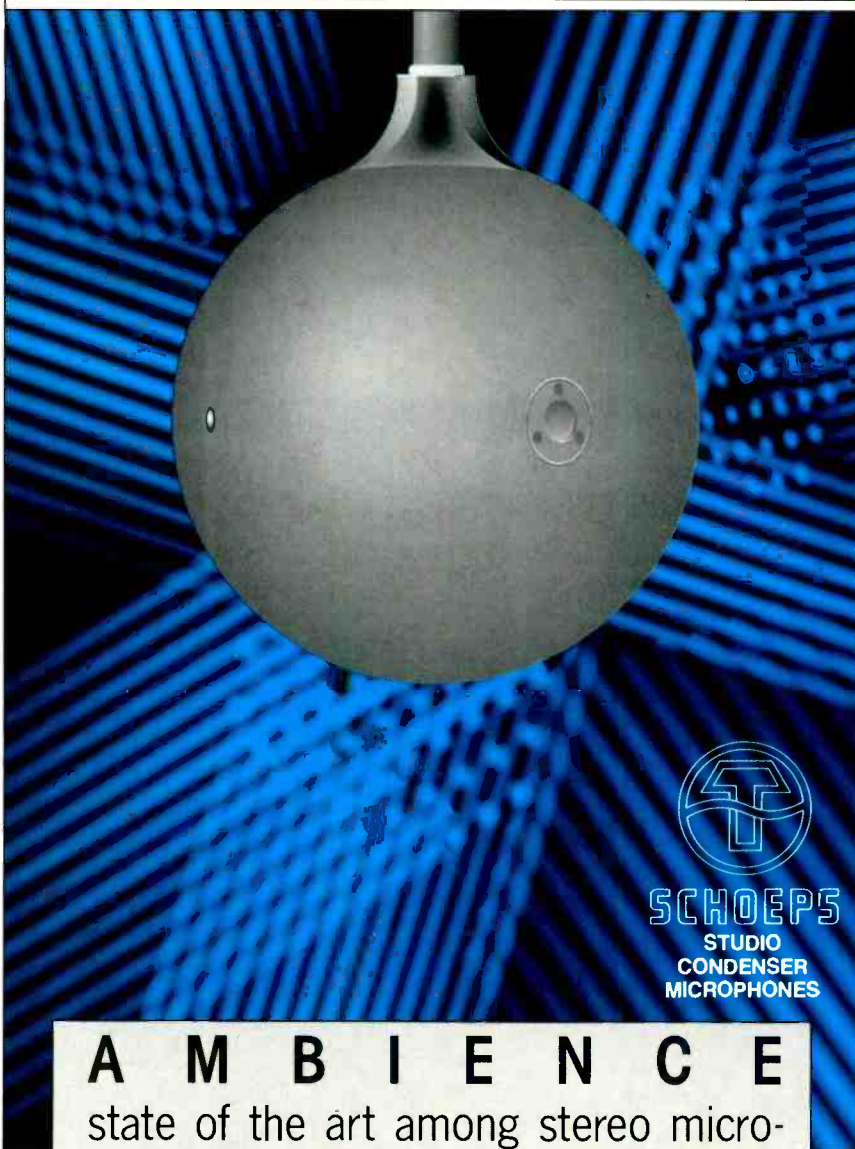
Frequency response

Replay only frequency response at 15ips and 320nWb/m recorded level for tracks 1, 2, 8, 16, 23 and 24 is shown in Fig. 1, which shows an error of +0.2 to -0.6dB maximum above 125Hz. Fig. 2 shows the same tracks for record to replay response at meter 0dB (-10dBV). Typical bass bumps are evident, a feature of most analogue recorders, but not usually audible. Both of these figures are with Dolby S off.

Fig.3 shows the record to replay frequency response with Dolby out at amplitudes from -30dBV to 0dBV — the latter being 10dB above meter zero. At lower frequencies, the recorded level on tape increases at the same rate as the input signal, while at 10kHz the level has dropped by 3dB at the highest recorded levels.

In Fig. 4, Dolby S is switched in, which has the result of increasing the midfrequency error while improving flatness at higher levels. This mid dip seems to lessen as level is increased, but in my experience is not a normal effect of Dolby S, so is probably caused by MSR-24S design limitations.

Checking the response at 7.5ips gives a similar result, which is in fact smoother over most of the band, but with a -3dB point at about 14kHz with Dolby off, moving up to 17kHz with Dolby on. The record equaliser adjustment gives a range of ±3dB at 16kHz and 15ips, acceptable for most recording tapes, while the replay equaliser ►



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gives +8 to -6dB adjustment at the same frequency, sufficient for any modern tape.

Punch-in quality

Tests were run using music of various styles, and a test signal which shifts from 1kHz to 500Hz at the punch-in point. In all cases, though there is obviously a gap created in the signal of about 30ms between -6dB points, the result is not audible. The usual cause of apparent punch-in disturbance is not the recorder, but rather that the background noise beneath the changing input signal also alters, producing an audible change in noise texture.

Fig. 5 shows the measured result of a punch-in on

the MSR-24S.

Noise and crosstalk

The $\frac{1}{3}$ -octave noise spectrum of replay-only noise at 15ips is shown in Fig. 6 with and without noise reduction. The radical improvement resulting from Dolby S is very obvious. Electronics-only noise is shown by the bottom curve of Fig. 6, indicating that these are well below the tape system noise as they should be.

The machine was then placed into record mode with no input signal and the input terminated in 200Ω. The resulting noise is about 3dB worse in midband, a good result indicating low distortion in

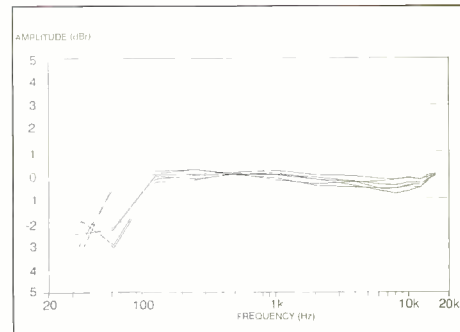


Fig.1: Replay only Frequency response after alignment. Levels referenced to -7.86 dBV output, (nominal output for a tape signal level of 320nWb/m)

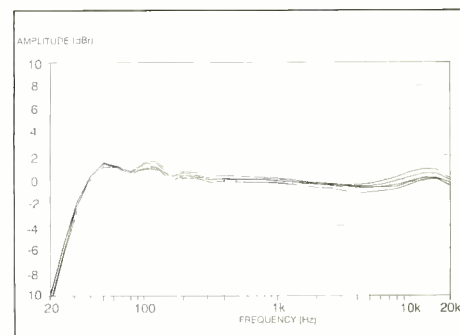


Fig.2: Record to replay frequency response after alignment of record and replay chain. Input level at -10dBV, equivalent to 250nWb/m. Output level referenced to -10dBV. NR out

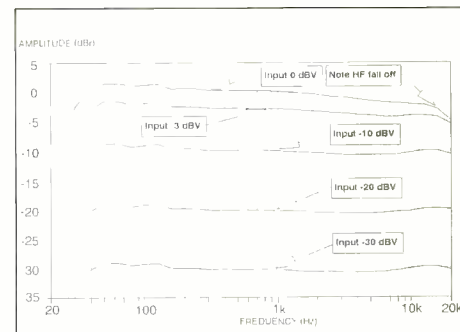


Fig.3: Record to replay frequency response after alignment of record and replay chain. Channel 8 measured. NR out.

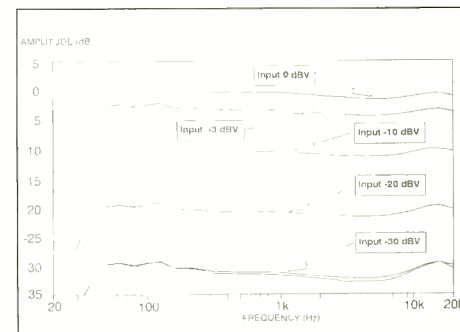


Fig.4: Record to replay frequency response of record and replay chain. Channel 8 measured. NR in



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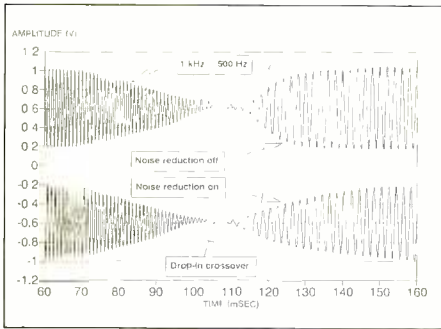


Fig.5: Time response showing punch-in from 1kHz to 500 Hz. Both at -10dBV input levels

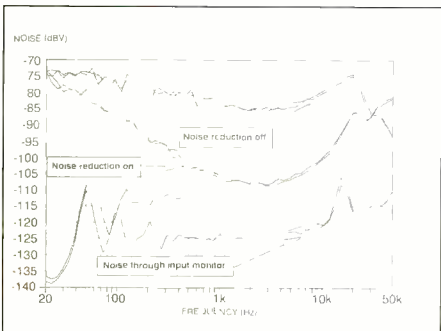


Fig.6: 1/3-octave noise spectrum via input monitor and for bulk-erased tape

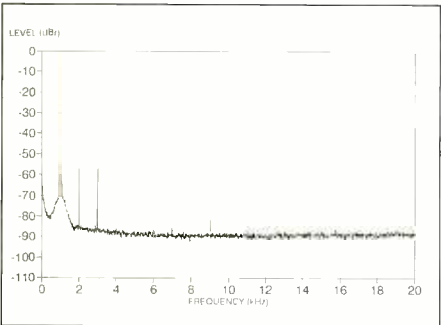


Fig.7: FFT noise spectrum of 1kHz tone, (record to replay). Input level -10dBV. NR out

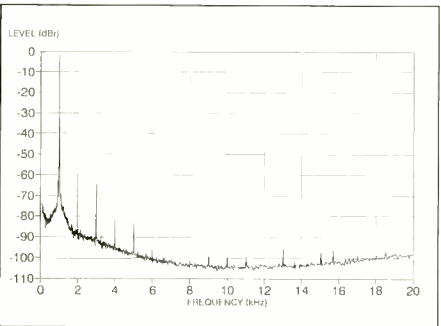


Fig.8: FFT noise spectrum of 1kHz tone, (record to replay). Input level -10dBV. NR in

the bias and erase oscillators. Table 1 gives wideband noise results.

An FFT spectrum of 1kHz tone recorded at a level of -10dBx is shown in Fig.7 without noise reduction. The third harmonic product is 57dB below the wanted signal level or about 0.2%, quite

a good result. With Dolby S in (Fig. 8) this is reduced by 6dB, but fourth and fifth harmonics actually increase, again a result we have not seen before. These are at very low levels below -80dB, so should not be audible above signal and noise.

In Fig. 9, a tone at 0dBV (+10 on meter) is swept across the audio frequency band with and without noise reduction, and the resulting total harmonic distortion is measured. The midband distortion with Dolby S active is very low at 0.3% is better than the Tascam specification, while the rising distortion with frequency is as expected, but controlled by Dolby S action. The equivalent result on the Fostex G24-S is 1.2%, making the MSR-24S

a significant winner here.

It was not possible to reach the standard 3% distortion level at 1kHz usually specified as peak recording level with or without noise reduction with inputs up to +10VU. At this level, most channels remained below 1% without Dolby, and below 0.5% with Dolby. A 3% THD was finally reached at +3dBV (+13VU). Taken together with the noise levels resulting after Dolby S, this recorder is giving excellent distortion and noise performance over all reasonable recorded levels. The signal-to-noise ratio resulting from Table 1 and the above THD measurements is 68.3 dB without Dolby and 92.6dB with Dolby, almost ▶

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TABLE 1: AUDIO BAND NOISE MEASUREMENTS

Measurement Conditions	CCIR ARM	CCIR-468 Q-Peak	22-22k Q-Peak	Filter and Rectifier A wtd RMS	22-22k RMS	400-22k RMS
Bulk Erased no NR	-71.0dBV	-59.5dBV	-57.8dBV	-70.7dBV	-62.8dBV	-68.5dBV
Bulk Erased with NR	-92.7dBV	-67.2dBV	-67.2dBV	-89.7dBV	-70.7dBV	-84.4dBV
Recorded no NR	-65.8dBV	-57.5dBV	-57.2dBV	-66.7dBV	-61.5dBV	-64.5dBV
Recorded with NR	-88.6dBV	-67.2dBV	-67.3dBV	-86.6dBV	-70.5dBV	-80.9dBV

TABLE 2: WOW AND FLUTTER PERFORMANCE

Measurement Method	Tape Position		
	Front	Middle	End
NAB 3kHz Wtd	0.027%	0.021%	0.020%
NAB 3kHz Unwtd	0.038%	0.028%	0.026%
IEC 3.15kHz Wtd	0.044%	0.036%	0.029%
IEC 3.15kHz Unwtd	0.063%	0.058%	0.026%
High Band 12.5kHz Unwtd	0.057%	0.045%	0.039%
High Band 12.5kHz Wtd	0.149%	0.150%	0.159%
High Band 12.5kHz Scrape	0.135%	0.142%	0.150%

matching the specified 68 to 93dB. This again beats the G24-S which gave a signal-to-noise ratio of 90dB under similar conditions.

Fig. 10 gives the results of track to track crosstalk with and without Dolby S. At 1kHz, the results are -63dB and -84dB respectively. This is much better than specified and is an excellent result. The rising crosstalk at lower frequencies is typical and results from tape fringing effects as the recorded wavelength increases.

Erasure was measured by recording at -10dBV in steps across the audio band, erasing, then measuring the remaining signal through a bandpass filter. The specification requires -70dB with Dolby in at 1kHz. The result at 1kHz exceeds the specification by 2dB. See Fig. 11 for measured performance across the audio band. Again, the benefits of Dolby S are evident in the lower curve.

Mechanics

Generally, mechanical operation is good, with a number of useful features such as the load function mentioned earlier which keeps the tape under

control and on the spools. I did, however, have a little trouble on fast wind, with the tape occasionally causing oscillation of the swinging arms sufficient to stop the machine. A studio I know, however, has one of these machines and has never encountered a problem, so it may be an adjustment problem with the test unit.

Wow and flutter is well within specification, with measured results at 15ips shown in Table 2. These are better than the G24-S, nearing the levels of the now defunct but excellent Saturn 2-inch machine except for scrape flutter which is a little worse.

Metering

The meters are LED types scaled from -20 to +8dB. The meter response time is almost instantaneous, reaching full metered level with a 5Hz input signal burst of only two milliseconds. A 1ms signal reads -3dB below the steady-state signal level. The peak hold LED triggers on any peak of more than 3ms duration and above zero on the meter, with a hold time of 1.4s.

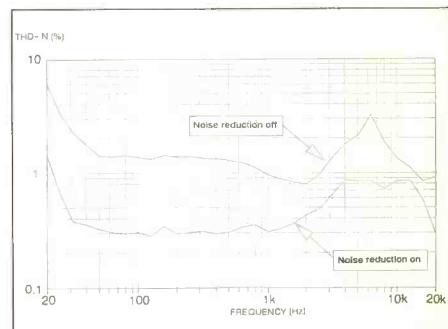


Fig.9: Record to replay THD+N(%) versus frequency. Input level at 0dBV on channel 16. 80kHz bandwidth

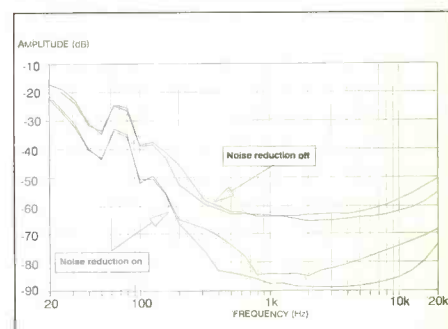


Fig.10: Record to replay crosstalk (dB). Channel 8 recorded, channels 7 and 9 measured. Input level on channel 8 at -10dBV, (250nWb/m)

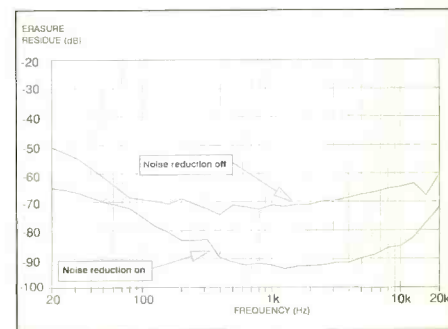


Fig.11: Erasure residue on channel 8. Channel 8 recorded with -10dBV (250mWb/m) and then erased. Residual level then measured with 1/3-octave bandpass filter

STEREO STABILIZER 5



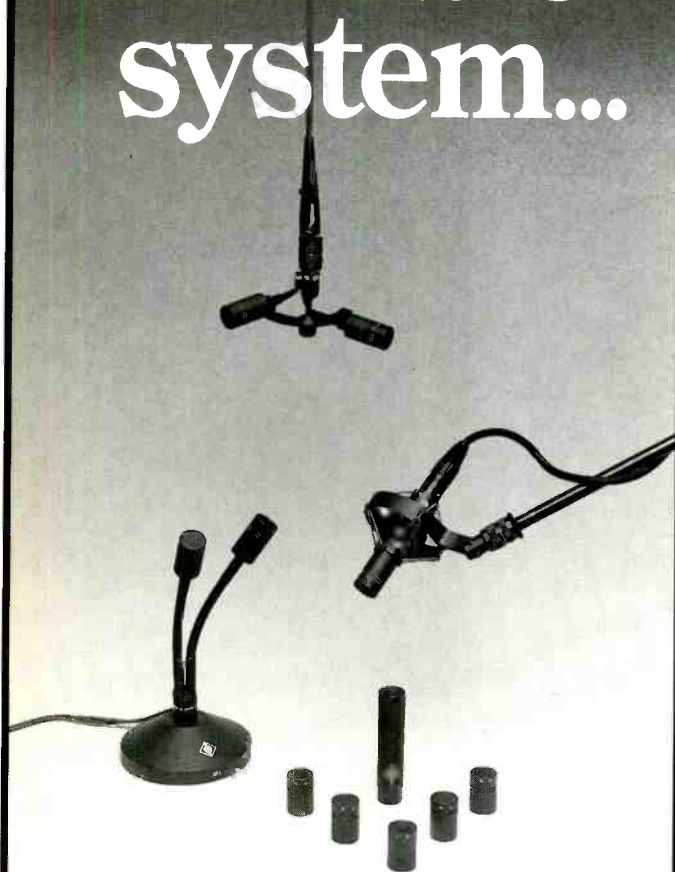
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Summary

Now, available in models with either Dolby S or dbx, the MSR-24S can provide a cost-effective solution to 1-inch 24-track needs which should suit the needs of a large number of small recording, production houses and home studios. The MSR-24S has wow and flutter, noise and THD advantages over the Fostex competitor; while Fostex provides a smaller machine, with 10 locate memories, and a front panel which can be removed to become a full-function remote. The MSR-24S must be considered on its performance merits as a viable alternative in the midpriced 1-inch multitrack market. ■

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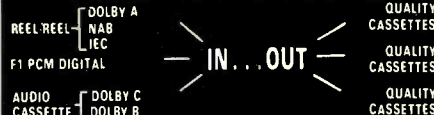
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It was in the July '92 column that I quoted a ex-colleague as saying that an engineer's job is 20% skill, 80% PR. Since it appeared I have received a great deal of comment about it and, although I once disagreed with it myself (and we can argue about percentages), it seems truer now than 20 years ago when I first heard it.

It may seem that most studio interaction between engineer, producer, client and artists is that of standard commercial relationships but there is no other job that I can think of where you may be required to sit next to, and work with, someone who you may never have met before, for 18 hours a day over a period of several months, while their reputation and-or future financial remuneration are on the line. It is also wrong to assume you will be working with mature and responsible people — some may be, but there will also be a fair number of fragile egos that will need protecting if the session is going to work.

Once life was much simpler. The engineer was under the control of the A&R man and his function was simply that of an 'engineer' — to facilitate the transfer of sound from microphone to tape with no concern for the musical content other than the technical parameters. When the recording studio became 'another musical instrument' the engineer found himself at the centre of the creative process.

When studio staff were trained in-house and there was the obligatory 'three-year apprenticeship', this was the type of experience that was picked up and it was possible for the studio to observe the trainees closely before letting them loose in sessions. Unfortunately, this is one of the very reasons that it is impossible to train as an engineer outside of a commercial studio environment — you will only have learnt that 20% of the job, the technical skill.

But what are studio manners? There is no easy answer — it depends on your character, the client and the situation. The difficult period is always those first few hours at the start of the session. It is no easier if the client knows the studio but has never worked with you; it may actually be worse. I have concluded that, aside from a few general points, most studio relationships are based upon a sensitivity to the client-artist and a degree of preparedness to cover a range of eventualities of all types.

It is this preparedness that can be



Keith Spencer-Allen

On entering studio politics

the making of a great engineer. However, gaining this insight can be painful. In an effort to reduce this pain and to speed the learning process I have drawn together a few situations (all from real life) that might prompt some thought about how you would handle them.

● You are laying tracks at the start of an album project. You sense that the band do not trust the ability of the producer selected by the record company, and he has not done much to prove them wrong. While the producer takes an urgent phone call, the musicians suggest to you major changes that they want in the sound aware that the producer has already said no. You know that the musicians are right but you also know that the producer would prefer to be working in his usual studio and that a 'difficult' engineer is all he needs to throw at the record company in order to move the session. What do you do?

● The inexperienced producer brings along his 'technical advisor' who comfortably fits the adage 'a little knowledge is a dangerous thing'. The advisor watches your every movement and then relays his 'concern' about your ability to the producer who then asks you why the meters on the desk do not all peak at zero all the time? By the way, the producer works for the A&R department of a major record company whose work the studio has

been courting for years. What do you do?

● A foreign client, for whom you have recorded two albums and a couple of singles quite successfully, had to complete a couple of tracks at another facility because you were busy when he needed to schedule the sessions. Because of language problems and the client's inexperience in the studio, you have always tried hard to meet their requirements by trying different miking techniques, but could not explain the process in English. While happy to be working back in your studio the client was very keen to educate you in the ways of the engineer at the other facility. 'He was fantastic. He didn't need to experiment like you. He says there is only one way to record drums and that is his way with the mics in his positions. Very simple and quick. Why don't you call him and ask him if he will show you how to do it?' Remember no physical violence!

● The producer who you have worked with regularly turns up for the early morning session straight from an all-night party with his portable cocktail cabinet. You are fresh from breakfast but the client should really be sleeping it off at home. He pours a couple of drinks for himself and the band who are immediately on his side. You have a studio full of musicians with whom you share total ignorance of what needs to be done

other than the facts that it is urgent, it is Saturday and his office is closed. What do you do?

● A new client has brought a multitrack tape in for mixdown. It has been loaded on the multitrack and is being played for the first time — five-and-a-half minutes of a major production. Fine except that the take-up motor stops and deposits 825 feet of tape down the side of the multitrack. It should be undamaged but will need manually winding back and then a replacement machine will need to be wheeled in. How do you gain the breathing space to rewind the tape? (You will need about twice the playing time to manually rewind and inspect the tape).

● The band were track laying and the producer found it very necessary to guide them musically but there was considerable tension and mounting pressure. Out came the drinks and then the joints in an effort to calm the musicians. Unfortunately the producer joins in and his critical faculties decrease. More 'relaxation' happens between each take and the playing increasingly deteriorates. The perception of the band and producer is, however, the opposite as they get more excited that they are 'really getting it good now.' You know that the inevitable is about to happen — you get asked for your opinion. What do you say?

● You are in the middle of a semi-orchestral session when a foldback amplifier in the studio area starts to smoke. Playing immediately stops and the musicians grab their instruments and leave. You call maintenance and they replace the faulty amp but you have to talk the musicians back into the studio and pacify the producer who only sees the need to call his lawyer. The studio could be liable for both musicians time and studio time probably at another facility. Can you save the day?

I have not used any situations that, in retrospect, seem implausible nor any of the real disasters that I would prefer to forget. All you can do is hope that from every situation you gain a little wisdom.

Having quoted the 80-20 statement twice, I must credit it to Dave Humphries, sound balancer extraordinary; an engineer with the ability to make his harmony balances sound better than anyone else's. He is also very good at the 80% himself. ■

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