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VOLUME 12
ISSUE 2
DECEMBER 1996
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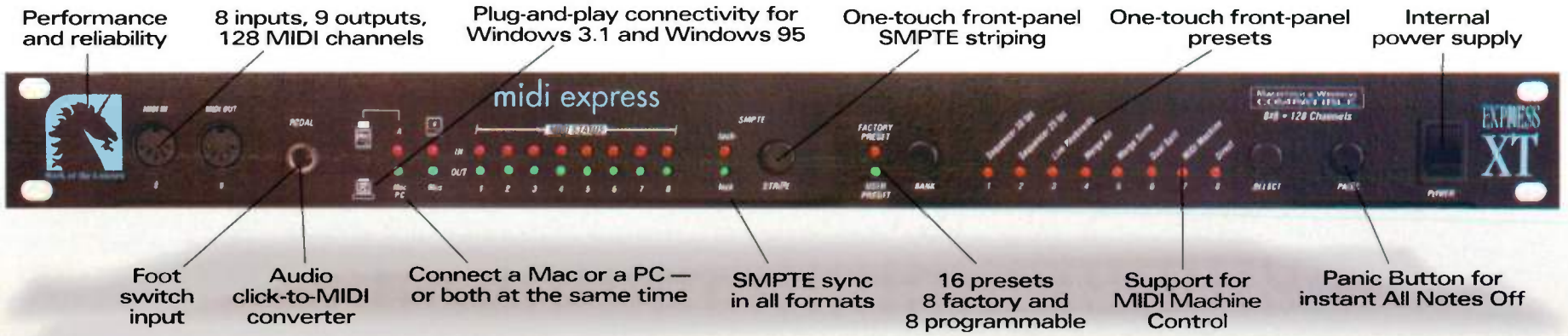

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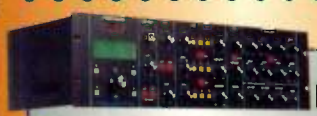

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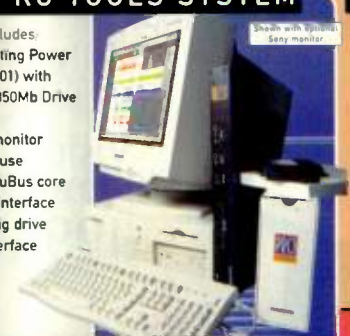

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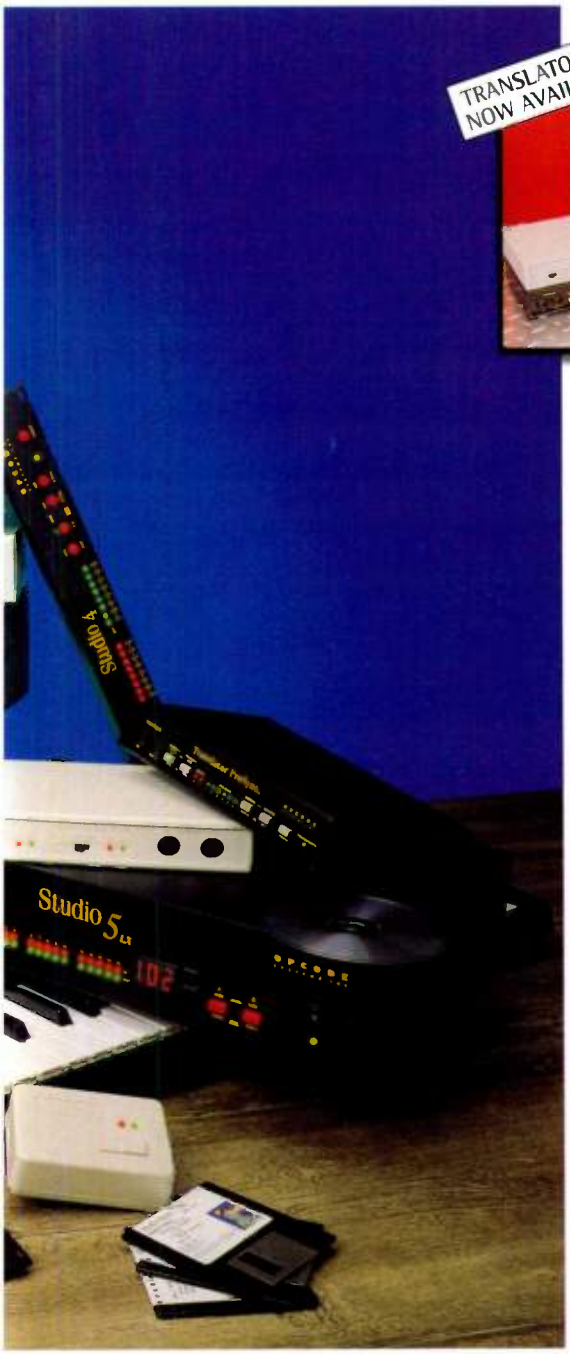

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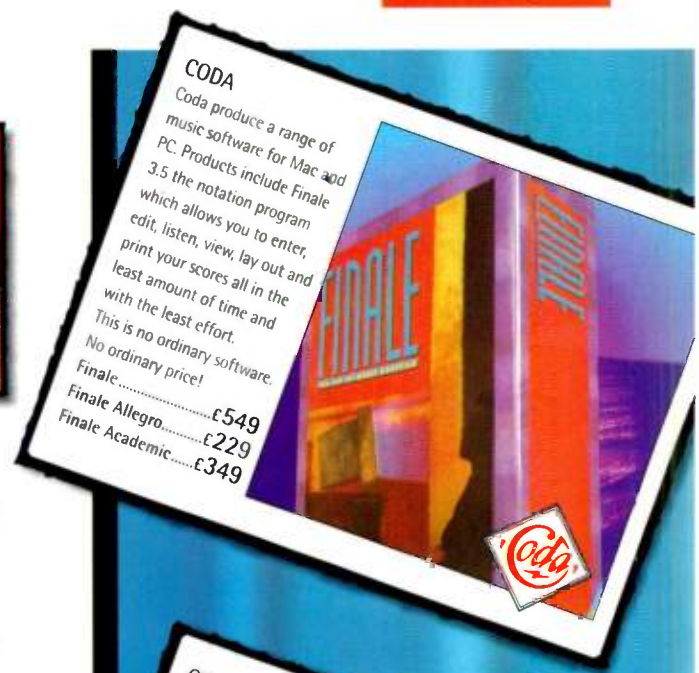

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We frequently complain about the unreliability of new recording technology, but should we be surprised? The pressure of commercial evolution, much like the evolution of life itself, guarantees that progress will generate countless blind alleys or non-viable concepts, and that only the best suited will survive. Take poor old Icarus, who's been held up as an example of leading edge technology on many previous occasions. Seeing the obvious advantages of flying, over travelling by ox cart, he set about designing the first ever hang glider, but was let down (quite literally) by a combination of uncharacteristically sunny weather and the non-availability of a suitably heat-resistant adhesive. Still, it didn't dissuade others from building flying machines, and after countless years of refinement, we have machines that fly more or less reliably.

The problem is that we all tend to be too easily won over by the purported advantages of new technology, but we fail to learn the lessons history has tried so hard (and so often) to deliver. We rarely stop to assess the negative aspects of switching over to an infant technology that's still at the bottom of its learning curve. That new hard disk recording system you're so keen to upgrade to, for example, is cheaper than its analogue tape ancestor, has the potential to produce cleaner sound, offers instant access, unbelievable editing facilities and doesn't take up much space. Yet you might find files disappearing or moving, glitches appearing for no apparent reason, disk crashes, computer crashes, backup problems, and a manual so complex that you're only halfway through it before the next update arrives.

When confronted with this scenario, we tend to view it as a kind of betrayal by technology, but that would mean ignoring the big picture. All new technologies take time to refine — the analogue tape recorder took almost half a century to get right, but now we have analogue machines running with Dolby SR that sound superb, are virtually bomb-proof and very easy to use. And what happens then? Do we rejoice that a technology has finally been optimised within a very whisker of perfection? No, we go along with the notion that it's old technology and abandon it in favour of something new. We rush to embrace the glittering, embryonic new technology with naive enthusiasm, then complain loudly when it all goes to hell in a bucket!

So why do we continue to be surprised when our new toys have problems? The first analogue tape machines sounded dreadful, first generation analogue synths were impossible to keep in tune, the first motor cars used to explode and shower their passengers with boiling water and bits of hot engine, and early digital mixers had laughably poor audio specs when compared with even a budget analogue counterpart. It's not as though it's anything new.

Despite this, digital technology (including disk-based recording) is quite obviously the future of audio, and over the next few years it will evolve into something rather more stable and more manageable than at present. Already some machines are emerging that almost live up to the dream, but there's one thing of which you can be absolutely certain: as soon as disk-based recording has evolved to the point where we can really rely on it, some new leading edge alternative will come along, and once again we'll abandon something that works perfectly well in favour of the unknown. Some things never change.

Paul White *Editor*

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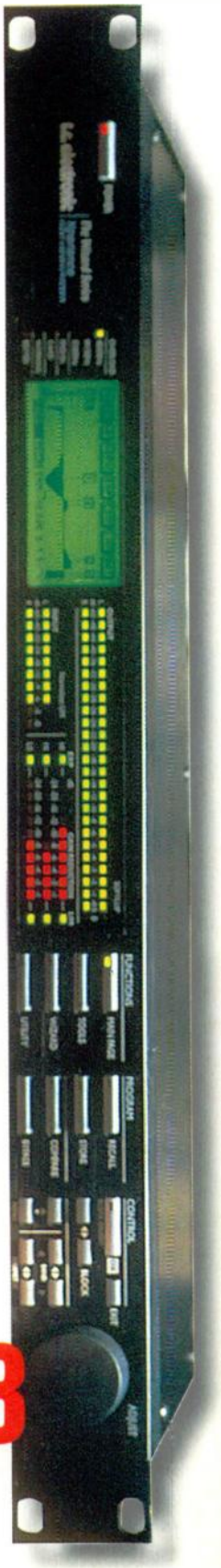

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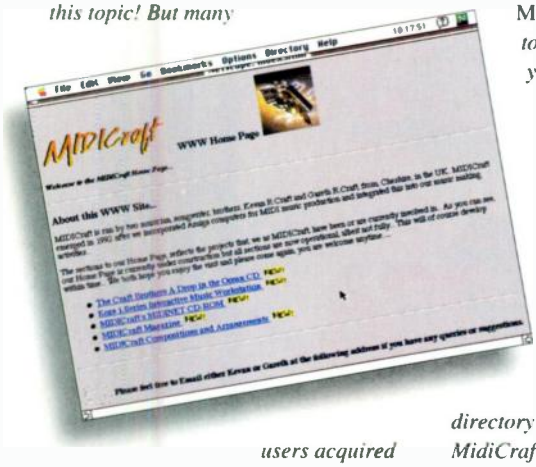
Amiga's Hidden Xtras

I'm wondering if you can help me with a small problem. I've been using *Music X* for the Amiga for about a year now, and have been unsuccessfully trying to find someone who can help me to create 'protocols' — the facility for *Music X* to send and receive MIDI bulk data. Could you possibly offer advice on how to create protocols, or point me in the right direction for someone who can?

Brian Adams
London

Amiga specialist Paul Overaa replies: *Protocol creation is a nightmare area which foxes a lot of people, despite the fact that there are around 30 pages in the main* Music X *manual related to this topic! But many users acquired* Music X *via one of the number of magazine cover disks on which it was released, and consequently didn't get a manual. One immediate suggestion, if you fall into this latter category, is to advertise locally for a user who does have the printed documentation.*



I should warn you, however, that protocol creation is not easy unless you're familiar with the technical issues of MIDI data transfer and System Exclusive control — protocols are essentially a series of SysEx messages written in hexadecimal, and a single bad value in any one message will cause the whole communication thing to go pear-shaped. In short, you need to know exactly what comms messaging arrangements your synth requires, and this means checking the manual, determining whether the synth requires handshaking messages, and so on.

Most users steer clear of this 'do it yourself' path and rely on protocols created by others. There are various sources, but in the UK, MidiCraft are particularly active and have produced protocols for many popular synths. Collections of these have appeared on Weird Science's MultiMedia Tool Kit II *CD-ROM, on the cover disks of various magazines, and I believe on* PD IV, *a CD-ROM available from Almathera (Tel: 0181 687 0040). If you haven't got a CD-ROM drive you should contact Seasoft Computing (Tel: 01903 850378): they have the equivalent collections of* Music X *protocols available on floppy disk. Such examples may also help you make a little more sense of the* Music X *manual if you do decide to have a go at protocol creation yourself.*

If you're 'connected', you'll also be able find quite a bit of Music X *support on the internet. The Aminet archive, whose UK mirror is at London's Imperial College, is the place to look for software itself;* ***sunsite.doc.ic.ac.uk*** *is the ftp location, and* ***pub/aminet*** *is the directory location. Incidentally, MidiCraft have also recently set up a web site (****http://www.midicraft.demon.co.uk****). This contains info about their various projects, allows you to download MIDI files, and so on. Although, unfortunately, there is no direct access to* Music X *protocols at the MidiCraft site at present, it's worth remembering that Midicraft are very* Music X *oriented. Because of this, I suspect that the site may well grow to include some level of* Music X *protocol support, so it'll be worth keeping a check on this.*

Derek Johnson adds: *If you have internet access, you can find an article on writing protocols for* Music X *at:* **http://www-ccsl.cs.umass.edu/~barrett/articles/mx/article.html** *A search engine dedicated to the amiga platform can be found at:* ***http://www.amicrawler.com/*** ❑

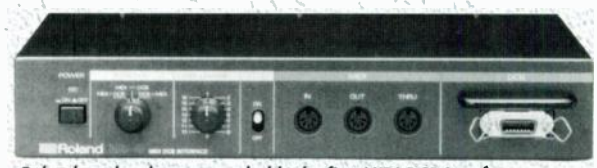
Juno The Answer?

You may have answered this question at some point in the past, but as a new reader, I'll ask it anyway. I want to control my Roland Juno 60 from my PC, running Steinberg's *Cubase* v3.0. Does anyone make a MIDI-to-DCB interface? If so, how much does it cost, and what parameters can be controlled?

Rick Sprinkle
London

Derek Johnson replies: *We haven't actually dealt with this particular query as such, although solutions have presented themselves in a variety of forms over the years. Roland manufactured an interface of the type you're looking for, called the MD8, at the dawn of MIDI. Coming right up to date, though, and entirely coincidentally, MIDI interface and retrofit specialists Kenton Electronics have just started to release a range of single-feature interfaces spun off from the powerful Pro 4 MIDI-CV interface — see this issue's news pages. As luck would have it, a MIDI-DCB interface just happens to be one of the first; priced at £124.90, the Pro DCB offers the usual sturdy Kenton build quality, plus a varied feature set.*

Apart from converting MIDI note data, the Pro DCB offers an auxiliary control that can be routed to the synth's VCF and a clock out for sync'ing the arpeggiator. The unit also has a programmable LFO, which can be applied to the VCF, and comes with a free cable to connect directly with your instrument's DCB port. Interestingly, the Pro DCB is actually bi-directional — so if you want to drive a MIDI synth (notes only) from your Juno 60, this will be possible. There are also Jupiter 8s out there with DCB ports, and apparently, if you're using the Jupiter 8 to play a MIDI instrument via the Pro DCB, the Jupiter will actually be able to transmit program changes to the connected MIDI instrument. Kenton report that this facility works with all Jupiter 8s tested, and with some Jupiter 6s; there are so many variations in operating system, though, that this feature can't be guaranteed for all DCB-equipped instruments.



Roland made what was probably the first MIDI-DCB interface, many moons ago...

Of course, if you have any other analogue gear in addition to the Juno 60, Kenton's top-of-the-range Pro 4 includes four channels of sophisticated MIDI-CV conversion, plus a DCB output and a host of other features, for a few pence under £500. Contact Kenton on 0181 337 0333, or have a look at their web site (http://www.kenton.co.uk/). ❑

ALESIS

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ALESIS

Crosstalk

Portable Problem

I noticed your reply this month to a letter from Philip Logan, who wanted to know if a Toshiba 486DX 75MHz would be OK with Yamaha's TG100. There is a problem with this setup, as I found out to my cost. I was happily using a fairly old Toshiba 4400 running Steinberg's *Cubase*, with a Yamaha TG300 connected via a serial cable. This all worked fine for over a year. After dropping the Tosh and smashing the screen, I replaced it with a Toshiba 2150. The remainder of the kit was unchanged, but I started getting timing problems with *Cubase*: sequenced parts were very erratic, and lost all their tightness. After many calls to Harman UK (Steinberg's UK distributors), and numerous Yamaha drivers later, I (and Harman) concluded that it was the serial interface on the newer laptop. I blew the dust off my old Midiman parallel interface, connected it up, and all my timing problems immediately disappeared. All the tracks were rock steady. A Steinberg product specialist advised me to never use serial comms with *Cubase*, as it always causes problems. My old Tosh probably worked because it used an old 8250 serial interface and not the more modern high-speed type. I mention all this because Philip may hit the same problems even if he is using *Cakewalk*.

John Edmonds
via the internet

Derek Johnson replies: *Thanks a lot for that, John. We really appreciate it when readers contact us to help sort out a fellow reader's problem — and we're sure Philip will be glad of the tip if he does encounter any problems.* ❑

Theory Of Evolution

I have an Evolution Synthesis EVS1 sound module (reviewed way back in August 1990's *Sound on Sound*!) which was originally supplied with editing software for the Atari and DOS-equipped PC ones. Until recently, I used a PC with an MPU401 card and would next Windows to run the *EVS1EDIT* program. Having switched to a notebook with a parallel interface, I was left without editing or librarian facilities for the EVS1. I use SoundQuest's *MidiQuest* universal editor/librarian for the rest of my setup, so I contacted SoundQuest and Evolution and was supplied with a copy of *Tech Quest*, the template creation software that is now shipped on the new *MIDIQuest* CD-ROM, and the EVS1 SysEx documentation. To date I have created: Librarian Support for EVS1 Sounds; Librarian Support for EVS1 Groups; Editing Support for EVS1 Groups; Editing Support for the EVS1 Program Map; and Editing Support for the EVS1 Utility Data. I have also created the EVS1 Dump Request Macros for *Cakewalk* and supplied them to Evolution for their web site. I'm now starting to work on the Sound Editor, which is slightly more complex than the others. When I've finished, I intend to make everything freely available to *MIDIQuest* users with EVS1s, but initially I'd like to locate two or three people who could test the work that I've done.

Currently, all of the above works for me, but I've been working with computers for a while and I know that what works for me may not always work for others.

What I'm trying to do is ensure that a piece of equipment that I have invested time in can continue to be a full part of my setup. This is an exercise in self-help but if anyone else out there can benefit from what I've done, I'd like to help them too. I've been pleasantly suprised by the support and encouragement that I have received from both Evolution and SoundQuest.

Graham Owen
via the internet
100334.2150@compuserve.com

Derek Johnson replies: *Thanks Graham: glad to oblige. For the record, as Graham intimates,* MIDIQuest *is now up to v6, and comes on a CD-ROM for Windows 95. The software is distributed by Turnkey in the UK (0171 379 5148), and costs £199. If it's got MIDI, then it's probably supported by* MIDIQuest*! The EVS1 itself can be bought second-hand for exceedingly small amounts of money, and really does offer something different — it even got an honourable mention in the part two of our cheap second-hand gear series, back in August 1995. Evolution have ceased manufacturing the EVS1, but there is support on their web site, as Graham says: point your browser at* **http://www.evolution.co.uk** ❑

Jupiter Upgrade Still In Orbit

I'd like to inform readers that the Synthcomm PROM upgrade for the Jupiter 6, mentioned in Stephen Bennett's retro review back in September's *SOS*, isn't actually available. I've been trying to get hold of the upgrade for 10 months, and keep hearing that it's 'work in progress'. I went for the £15 job from Roland instead.

Kevin Nolan
via the internet.

Derek Johnson replies: *This communication is typical of several that we've received since Stephen's retro, which did indeed give passing mention to Synthcomm's Europa upgrade — it looks as though there's a lot of Jupiter 6s out there! There is a simple answer, however; we'll let Synthcomm's Neil Bradley take over: "We've been working on Europa on and off for around two years. Several times we reversed our direction to the 'correct' course — we'd much rather spend time doing it right than doing it over. Synthcomm is currently a company that is a 'free time' operation, which means that the employees work on Europa when they can. Like anything in life, there are lengthy distractions where no work gets done for a while. At present, we are working on the manuals, ramping up to ship a beta, and are working steadily on the code. We really need feedback from the latest beta before continuing — we've made significant changes and improvements to the code and need some down-and-dirty testing to take place."*

That's it for now — thanks Neil! Watch this space: when Europa is ready (which we hope will be soon), SOS readers will be the first to hear about it. In the meantime, the web-aware amongst you can keep up with developments on **http://www.synthcom.com/** ❑

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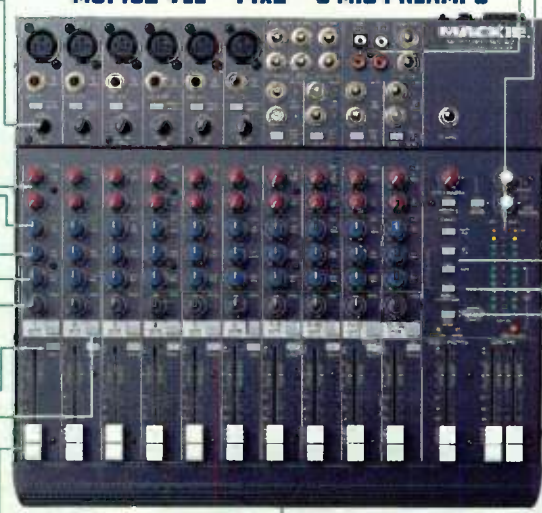

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Crosstalk

Hearing Aid

I would like some advice on monitors. My studio is in a converted loft, measuring approximately 17 x 12 feet, with one sloping wall. It's carpeted, with curtains and a sofa, which may give you some idea of the acoustics. I have a Studiomaster P7 mixing desk, and Peavey PMA70 amplifier. At the moment I monitor with Yamaha NS10Ms, because they were recommended as being the best for getting a good general mix. However, they don't actually sound very nice! Even when I play my favourite CDs through them, they are a bit 'tinny' and thin, and I find them tiring to listen to for long periods. Consequently, I do most of my work on headphones, which sounds much better.

The new Genelec nearfield monitoring system.

As my mixing desk will allow the use of another amplifier and speakers, I was thinking of buying something which would enhance my music, while still retaining the NS10s for mixing.

I wonder if you would suggest appropriate amp/speaker combinations which might improve my listening pleasure.

I have a budget of around £1000.

I have seen Alesis Monitor 2s advertised, and wondered if these would give me a better sound. I don't play my music very loud, and as it's essentially 'pop', I don't particularly need a lot of bass. Thanks for the magazine.

Ghislaine Bradley
via the internet

Paul White replies: *Because of the size of your room, and the lack of acoustic treatment, nearfield monitors are the best bet, but at the same time, I can appreciate why you might want something more natural-sounding than your NS10s. You say you'd like something that would enhance the music, but for monitoring, honesty is a more useful criterion. There are several models that would suit your needs. As you're also looking for a new amplifier, consider active speakers, as they invariably sound tighter and more accurate than passive models. The Event 20/20 actives are good value at under £1000 (Key Audio, 01245 344002), but if you can afford more, consider the forthcoming Mackies or the Spendor SA200s as reviewed in this issue of SOS (£1404, from Tony Larking Audio, 01462 490600). Genelec, makers of well-respected active monitors, have also just released a pair of powered nearfields for under £800 including VAT. More details on the 1029As, and the matching 1091A active sub-woofer (£522) in next months' news pages; for now, contact Project Audio on 0171 428 9700.*

Lower-budget choices include the Spirit Absolute 2s (01707 665000) or Alesis Monitor 1s (01462 480000), which are both good value, as are the excellent B&W CDM1s reviewed in the December 1995 issue of SOS *(B&W, 01903 524801). The smaller models from Dynaudio Acoustics (on 0171 403 3808) may also be within your reach. If you're uncertain as to which one to get, try to hear two or three alternatives, side by side and take along your own CDs so you know what to listen for. I listen for a natural speech quality, lack of upper-mid peakiness, and a tight, well-controlled bass end. You don't need a lot of bass in a small, untreated studio, but what there is should be honest.*

Spirit Absolute 2s.

Most reputable amplifiers work fine for nearfield monitoring, providing you have enough power to run the speakers without driving the amp into clipping. Always buy slightly more power than you think you need, rather than less. Check out Yamaha, Alesis, Mass and the forthcoming Mackie power amps, for sensibly-priced, well-specified examples. ❑

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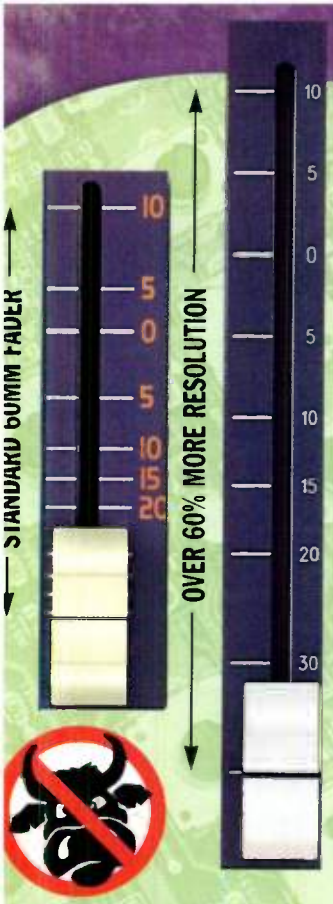

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Crosstalk

NEWS STOP PRESS: Tascam Digital Mixer

Just before this issue went to press, and after our Shape of Things to Come pages had been thoroughly put to bed, we received news of yet another significant digital mixer. Coming from highly-respected audio manufacturer Tascam, we thought this desk was worth invading Crosstalk for — we'll go into more detail next month, promise! For now, we can show you a picture and tell you that the new mixer will have automation, dual RISC processors and 24-bit DSPs. It also features a 'traditional'-style layout, with 48 faders, numerous dedicated and assignable function switches, and a large backlit LCD panel that can display all the parameters of an individual channel or any one parameter for all channels. The console has been designed to interface with the DA88 and new DA38 digital multitracks, and is bristling with digital connections. Its 4-band parametric EQ and assignable dynamics processors (up to eight) both allow users to store custom settings in libraries, for recall at any time.

A TEAC UK Ltd, 5 Marlin House, The Croxley Centre, Watford, Herts WD1 8YA.
T 01923 819699.
F 01923 236290.

Future Tense?

Here in Zambia, we are very cut off from any source of hi-tech information, and our choice of hardware and software depends almost totally on the information we get from *Sound On Sound*. I find particularly interesting the ongoing discussion about computer platforms for audio recording (Mac vs PC), hardware and software reviews, and project studio technique articles, as we are about to start a small recording studio, which we hope to expand to an FM community radio station in the near future.

Now to my question: it was a revelation to me to hear that DAT, and other digital storage media, may only have a shelf life of 10 years ('Media Revolution', Paul White's discussion with Pro Tape's Richard Symons, in July 1996 *SOS*). We are dealing with a lot of cultural material that can not be recorded again. What would you recommend as a long-term storage medium?

Andrew Lesniara
Zambia

Paul White replies: *It seems that no storage format is time-proof, but at least with DAT, you can digitally clone tapes every few years without losing quality — and always keep backups of important material. Storage conditions play a vital role in how long a recording will last, so always store tapes in a moderate, temperature-stable environment, away from dust or excessive humidity. Some people still like to archive on analogue, because analogue tapes deteriorate gradually, and they can be played even when they're well past their best, albeit with reduced sound quality. Digital tapes, on the other hand, either work perfectly or suffer drop-outs — there's no advance audible warning that the recording is deteriorating.*

The future of audio storage is liable to shift to high-capacity removable disks in the near future, so as long as you keep your recordings safe for the next few years, you may not have to worry. Some people think rewritable, high-definition video disks will provide the answer. We can only watch and wait. ❑

Distorted Reality

I'm experiencing a problem when I copy my masters on DAT to analogue cassette. Although my cassette deck (a Denon DRM 510) is not a high-spec or expensive machine, I seem to get good results when taping from CD. I can drive normal tapes hard (around +6dB on peaks with no distortion), and despite a slight drop of high-end response the playback off tape is pretty good.

However, when I copy my masters from Sony TCD D3 DAT machine, the results are virtually unuseable. I get what sounds like distortion even when the levels are dropped so that they peak around 0dB. (With tape levels, this low signal to noise is getting unacceptable as well.) This occurs with or without noise reduction and with any type of tape. It sounds as if the kick drum is doing the damage, but to my ears the kick does not sound unduly high in the mix. It may be that my monitors (Yamaha NS10) cannot reproduce a frequency that is causing the tape to distort, but I've tried everything and have not succeeded as yet. Any ideas?

Daniel Wiener
via the internet

Paul White replies: *No single likely cause springs to mind, but I have a couple of ideas. Firstly, check that your DAT machine isn't physically overloading the input stage to your cassette deck. Try going via a couple of channels on your mixer and reducing the gain, just to see if it cleans up. Ideally, your cassette deck input level control should be between half and three quarters up, so if you're having to leave it right at the bottom, that's a sure sign of level mismatching. If the DAT output is too high, you may need to buy or make an attenuator box to drop the signal level by 10dB or so.*

Having said all that, I've always found that DAT machines with phono outputs match cassette decks pretty well, and I've experienced no problems at all making copies — the TCD D3 uses a stereo mini-jack for its line out, but that's at about the same level as a CD player, so should be OK with the line ins of a cassette deck. A possible reason for CDs being easier to record is that they're often compressed — or at least, the more dynamic elements of the mix are compressed. This reduces the peak signal level, while increasing the average level, and that makes things easy to record. If your mixes have high levels of bass (and, as you acknowledge, the frequencies may be too low to hear properly on your own monitors), you could be overloading the cassette tape that way. If you have a compressor, try reducing the dynamic range of the drums and bass, then try again. If you're using TR909 bass drum sounds or similar, you could also try using a sub-bass filter to remove everything below 50 or 60Hz. ❑

Find it in the mix

Phil Kelsey's discography reads like a lexicon of '90s dance hits. Responsible for dozens of chart topping remixes, including Ce Ce Peniston's "Finally" and Gloria Gaynor's "I Will Survive", Phil's remixing skills are in constant demand.

About Ghost he is unequivocal. "The EQ sparkles and the clarity is flawless. But more than that, Ghost gives me the freedom to work where I work best - in the comfort of my own home. And the final mixes I produce with Ghost give me more satisfaction than those from the most expensive studios."

To find out more, call +44 (0)1707 665000.

Ghost

Soundcraft

A Harman International Company

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POTTERS BAR, HERTFORDSHIRE, EN6 3JN, UK. TEL: +44 (0)1707 665000 FAX: +44 (0)1707 660742
EMAIL: **info@soundcraft.co.uk** or visit our web site at **http://www.soundcraft.com**
SOUNDCRAFT US, HARMAN PRO NORTH AMERICA, INC., AIR PARK BUSINESS CENTER 12, 1449 DONELSON PIKE,
NASHVILLE, TN 37217, USA. TEL: 1-615-399-2199 FAX: 1-615-367-9046 TEL: 800#: 888-251-8352

shape of things to come

by Derek Johnson

PC Soundcard flies high

Guillemot International's *Maxi Sound 64*, distributed in the UK by Ubi Soft, is the latest in the current wave of 64-note polyphonic PC sound cards: it offers full duplex operation, real time multi-effects, and four tracks of direct to disk recording (expandable to eight) for just £149.99. The card also features 4Mb of waveform ROM, organised as 425 instrument sounds, 128 General MIDI sounds (plus 97 variation sounds) and 200 drum sounds; 3D processing; 4-band EQ; and 4Mb of ROM wavetable samples. If that's not enough for you, how about a copy of the *Cakewalk Express* sequencer thrown in as part of the package? An enhanced bundle, called *Maxi Sound 64 Home Studio* (£189.99), is supplied with a MIDI cable and Quartz *Audio Master SE*, a multitrack audio editing system with integrated MIDI sequencer. Features include eight stereo audio playback tracks, one stereo audio or two mono audio record tracks, real-time effects, and 32 tracks of sequence recording, with SMPTE synchronisation.

A Ubi Soft, Vantage House, 1 Weir Road, London SW19 8UX.
T 0181 944 9000.
F 0181 944 9400.
E general@ubisoft.co.uk
W http://www.ubisoft.com

Pump Down the Volume!

In response to the requirements of safety at work legislation, Canford Audio have launched a Level Limited Headphone (high volumes being a particular hazard for musicians and engineers in studios and on stage). Developed in conjunction with Sennheiser, the headphones are based on the Sennheiser HD480II, and use a patented BBC in-line limiter, which is placed between the plug and the ear-pieces, to restrict volume levels. In terms of comfort and sound quality, these are identical to a pair of HD480IIs, until that limiter cuts in, when the preset sound limit of 93dB is reached. The 93db figure was arrived at after extensive research and, used properly, these headphones (and others due to be added to the range) should go a long way towards helping to prevent accidental ear damage.

A Canford Audio, Crowther Road, Washington, Tyne & Wear NE38 0BW.
T 0191 417 0057.
F 0191 416 0392.

caught in the net

MINISTRY OF SOUND

Dance club, label and way of life Ministry of Sound has launched one of its current singles (*Let the Sun Shine* by Theo Gerideau) to members of its internet club site a month before the track reaches general distibution. Although the vagaries of magazine production mean that this information won't be particularly hot by the time you're reading this issue, the Ministry plan to use this technique for other releases. Tracks to be 'pre-released' in this fashion include, at the time of writing, *Believe in Me* by Mankey and *Hold On* by YoJo Working.

W http://www.ministry-of-sound.com

UNIVERSITY OF WESTMINSTER

The University of Westminster, sponsored by the HMV Group, are launching the HMV Music Business Research Site in a move to provide what is believed to be the first detailed examination of the music business and the way in which it operates across national boundaries. The University have appointed a researcher, and the fruits of this research will form the core of the web site. A database will be assembled from company and trade association reports, business plans, profiles of individuals, market analysis and general media coverage of the industry. The site is currently under construction, but should be well worth a visit once it's up and running.

W http://www.x-static.co.uk/hmv/

OPCODE SYSTEMS

Opcode Systems' web site has been completely updated and redesigned. The site, which is now easier to navigate, offers eight main areas for exploration:

- News and Events contains late-breaking news, announcements, links to on-line product reviews, press releases, artist events, and Opcode demonstration and trade show information.
- Downloads, Opcode's FTP site, offers updaters (such as *Overture* V1.2.3), demos, librarians, utilities, *MAX* patches, and technical publications.
- Support provides technical info, FAQs, upgrade information, and tech support via email.
- Education, an electronic resource for music students and teachers, provides curriculum tips, product comparisons, contact information for educators, and information on academic versions and pricing (US only).
- OMS gives end users and OMS Developers information on the Open Music System.
- Products gives in-depth information on all Opcode's current and upcoming hardware and software.
- Sales offers contact information and links to domestic dealers and international distributors. Registered users can purchase upgrades through the Store.
- Fun Bytes features a variety of fun diversions, including links to music-related sites, product tips, and the monthly Opcode giveaway.

W http://www.opcode.com

GARWOOD ELECTRONICS

In-ear monitoring specialists Garwood Electronics are using their new web site for two purposes: firstly, to offer a comprehensive guide to their product range for newcomers to IEM; and secondly to provide full backup to pro users. The Radio Station's user manual is available on-line, and all Garwood's technical updates will be posted as they are released; an extensive engineer's forum features commentary by professionals from around the world.

W http://www.garwood.com

SOUNDTRACS

Mixer manufacturer Soundtracs have filled their new web site with company history, product info,

SOS EXCLUSIVE

New Moog in the flesh!

Little has generated as much reader (and potential reviewer!) interest as our announcement in October's Shape that Turnkey are to distribute the re-launched Moog modular synth and Minimoog in the UK. Moog Music, now run by one Don R Martin, may have no connection to Bob Moog, but the plan is to remain as faithful as possible to the original designs. The only problem was that, after several months of rumours, few outside Moog Music had actually seen any hardware. Until now: the lucky folks at the Columbus (Ohio) MIDI Users Group were recently host to representatives of the new Moog Music and witnessed demos of the fledgling modular system. It was hoped that a new Minimoog would be present, but this, unfortunately, didn't make it. Details of CMUG's activities can be found on their web site (http://ourworld.compuserve.com/homepages/cmug), but *SOS* asked Mitch Imhoff, one of CMUG's organisers, to give us his impressions.

"Three members of Moog Music visited CMUG to demo one of their 9500-series modular synths, making members amongst the the first people in many years to see a new Moog product. The Moog people brought a keyboard (Fatar, connecting to the modules via a 7-pin connector), a big ribbon controller, and a hand-built nine-module system. It sounded great! The designs and parts are as original as possible — ie. not deliberately 'improved' — although the use of modern components leads to an inevitable improvement in stability and tuning. Witnesses attest to the authenticity of the sound, yet the tuning stability and consistency between units is greatly improved. Moog Music Production manager Houston Haines took courses in physics and synthesis from Bob Moog at the University of North Carolina and served as Bob's assistant at Big Briar for three years. Houston, who gave most of the demo, is very knowledgeable about analogue synthesis, and has a real love for creating sounds with modules and patch cords.

"Moog Music president Don Martin, in spite of his background in music retail, doesn't come across as a salesman. He's a very serious, intense guy who seems totally dedicated to his work and to his role in recreating the American synth industry. He's more interested in quality than quantity: 'We may make only one system a day, but it will be perfect.' In terms of potential market, Don knows who will buy his instruments: techno musicians and people who 'wish they'd never sold their Minimoog'. I'd say that for anyone who wants the real item — the ultimate in flexibility and tweaking fun — Don has the right instrument. Future plans include a special version of the Minimoog that has two micro-processors: one to scan the keyboard and the other to scan the front panel. This version will offer a full MIDI implementation, with 256 patch memories."

We wait with bated breath!

A Turnkey Professional, 114-116 Charing Cross Road, London WC2H 0DT.
T 0171 240 4036.
F 0171 497 0690.
W Turnkey http://www.demon.co.uk/turnkey/
E martin@moogmusic.com

international distribution contacts and on-line product support, including new software downloads.

W http://www.soundcraft.com

BANDIT A&R NEWSLETTER

The Bandit A&R Newsletter, which every month profiles 20 music business companies looking for new acts or songwriters, has established a web presence. The Bandit web site — which founder John Waterman describes as "simple yet functional" — contains a sample feature, updated weekly, with subscribers' comments and subscription details.

W http://www.wightweb.dom.co.uk/bandit/index/htm

AMEK

Detailed information on AMEK's range of mixers, plus some downloadable JPEGs, are available on the company's new web site; users can also access software upgrades here.

W http://www.amek.com

Neumann mic goes on the Air

Neumann's new M149 valve mic recently made its debut at Air Lyndhurst studios. The mic was used during the recording of *Instrumental Voices*, a specially-recorded package of curriculum support material on listening, composition and improvisation for music teachers. The music ranges from orchestral and early music to jazz and latin percussion. Originally, engineer Kevin Herring had wanted to use three M149s in a Decca 'tree' formation for stereo recording, but only one was available. In the event, three Neumann TLM50s were used for stereo pick-up during the classical recordings, while the M149 was used as a spot mic — on double basses and marimba, for example. Herring was impressed: "I'm looking forward to spending more time with the M149. It's really very quiet and has that typical bright Neumann sound."

A Sennheiser UK, 3 Century Point, Halifax Road, High Wycombe, Bucks HP12 3SL.
T 01494 551551.
F 01494 551550.

IX-rated Music?

Following the recent launch of their N-series of workstations, Korg have revamped the style-orientated (auto-accompaniment) i-series. First off the production line is the IX300 (£1399), which incorporates Korg's AI2 synthesis system. The 61-note keyboard features 14Mb of PCM waveforms, dual digital effects processor (with real-time control), 384 patches, and 28 drum kits. Styles number 106, and 192 'arrangements' are on offer. Neat features include an expression joystick, an audio input, and Standard MIDI File playback.

A Korg UK, 9 Newmarket Court, Kingston, Milton Keynes MK10 0AU.
T 01908 857100.
F 01908 857199.

SOS can be reached on CompuServe; our email address is 100517,1113.

Our full Internet address is 100517.1113@compuserve.com.

shape of things to come

We omitted to credit Roland Craigie for the close-up pictures of the Alesis QS8 synth in our review last month. Sorry Roland!

What could be the largest record fair in the world takes place at Wembley on November 23 and 24. The Rock 'n' Pop Fair costs just £3 admission, and gives visitors access to a huge number of dealers, offering all sorts of records and memorabilia. Doors open at 10am at the Wembley Conference & Exhibition Centre, Hall 3. There's parking for 6000 cars, but a free courtesy bus will also be running between the venue and Wembley Park underground station.

T VIP Events
0116 271 1977.

The shareware-based *Music & MIDI for the Macintosh* CD-ROM which we mentioned in Crosstalk a couple of months ago, has been followed up by a second volume. The new disk isn't completely novel: some new material is mixed with more up to date versions of software that appeared on the first disk. Although software in common with the first volume appears in newer versions. It's still a very reasonable £29.95, and is available from Time & Space.

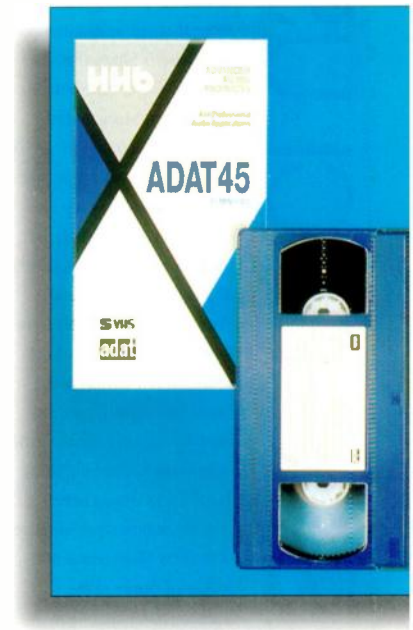
T 01442 870681.

HHB's Media Blitz

HHB's range of 'advanced media' products — blank tape and disks to the rest of us — has grown to such an extent that a catalogue is now needed to list all the possibilities. The 8-page, full-colour glossy brochure is full of useful information on the formats in the range, and is available from HHB or authorised HHB Media dealers.

The latest addition to the range is the ADAT45 S-VHS tape for use with Alesis' ADAT 8-track digital recorder (and machines which use the ADAT standard, such as Fostex's RD8). The tape has been designed with the constant high-speed shuttling and re-recording inherent in the recording studio in mind, and offers "enhanced high-frequency response, consistently low block error rates and increased output levels". The ADAT45 joins HHB's MD74 pro audio MiniDisc, MDD140 Data MiniDisc (for use with the latest 4-track MiniDisc recorders from Tascam, Yamaha and Sony), magneto-optical 1.3Gb and 2.6Gb disks, CDR74 recordable CD, and the company's highly-regarded range of DAT tapes (in lengths from 15 to 125 minutes).

On the hardware front, HHB have followed their successful launch of the Genex GX8000 8-track magneto-optical disk recorder into Europe with the acquisition of the worldwide distribution rights for this machine. The move has led to a price cut of £3000, to £6457 including VAT, plus the bundling of 10 free 2.6Gb HHB MO disks with the machine. The GX8000 offers tape-like operation, and up to 25 minutes recording per track per side (on 2.6Gb disks), or up to 35 minutes/track/side using a proprietary lossless data-packing algorithm (if you're not sure what this means, take a look at our feature on hard disk recording, starting on page 98, for an explanation of lossless data compression). Recording resolution is switchable between 24, 22, 20, 18 and 16-bit, and if you can live with just four tracks of exceptional-quality digital audio, the GX8000 will record at a sampling rate of 96kHz.



A HHB Communications Ltd,
73-75 Scrubs Lane,
London NW10 6QU.
T 0181 962 5000.
F 0181 962 5050.
E sales@hhb.co.uk
W http://www.hhb.co.uk

Kenton Korner

Kenton Electronics, specialists in MIDI retrofits for analogue instruments, have announced the release of a new range of stand-alone products, based on technology used for the Pro-series of MIDI-CV interfaces. The Pro-DCB allows you to play DCB-equipped Roland synths (certain of the Juno and Jupiter series) via MIDI, and the Pro-KADI allows you to synchronise and play individual sounds on instruments, such as the TR606, TR808 or CR78, which have been retrofitted with the KADI (Kenton Auxiliary Digital Interface). The units are priced at £124.90 including VAT each, and the range will soon include sync and Wasp boxes.

A Kenton Electronics,
12 Tolworth Rise South, Surbiton,
Surrey KT5 9NN.
T 0181 337 0333.
W http://www.kenton.co.uk/

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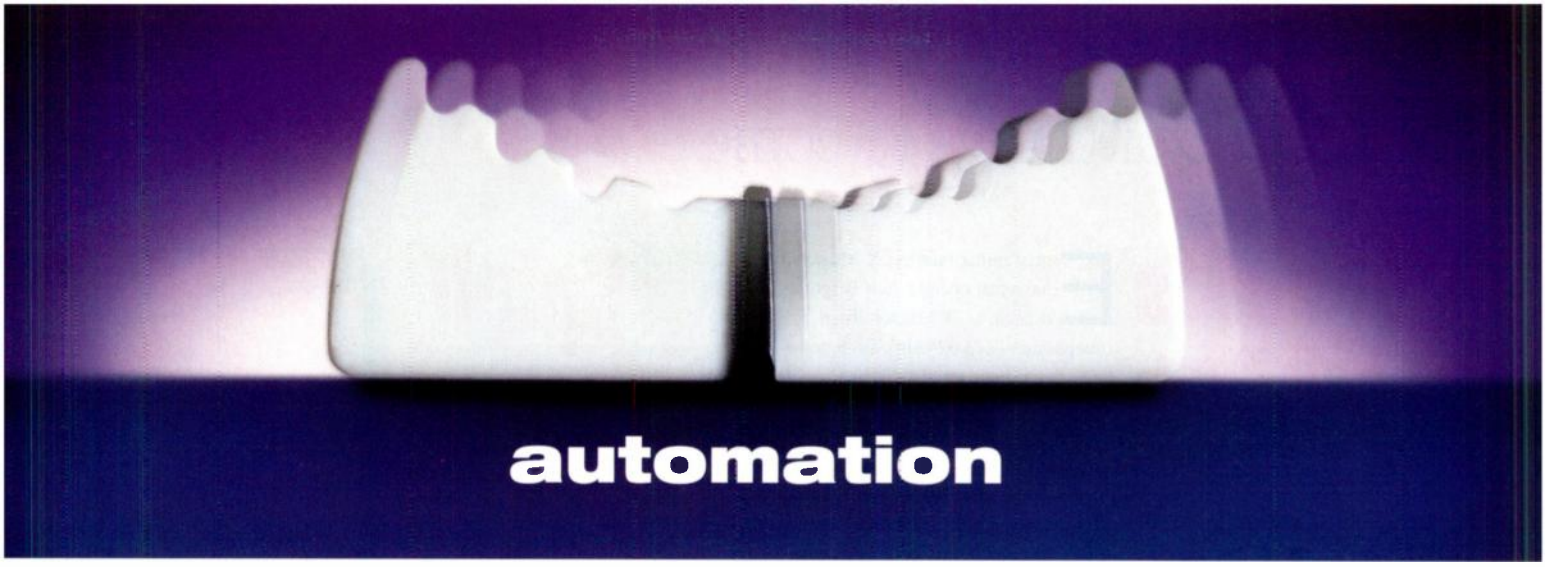
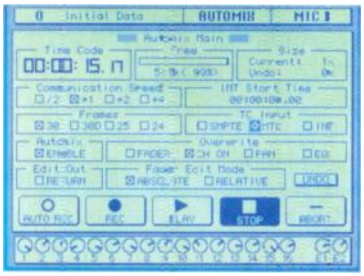
Our full Internet address is 100517.1113@compuserve.com.



Moving fader and mute automation is a very fine thing.
But consider for a few moments the creative and practical possibilities of *total* automation and *total* recall.
The sweep and position of all eq functions for example.
Or the panning of all channels.
Imagine the capabilities of a snapshot memory embracing over 3,300 parameters.
And just think what you could do with 50 individual dynamics processors, each changing under your frame accurate command.



The Yamaha 02R makes all this and a whole lot more possible.
That's why it's the most advanced mixing console in the world.
To find out more call our brochure line on 01908 369269 or simply fax your letterhead to 01908 369229.
And discover the power of total automation.

TOTAL AUTOMATION

Yamaha-Kemble Music (UK) Ltd. Professional Music Division. Sherbourne Drive, Tilbrook, Milton Keynes MK7 8BL UK. Tel: 01908 366700 Fax: 01908 368872
Visit the Yamaha Pro Audio Web site at http://www.yamaha.co.jp/product/proaudio/homeenglish/index.html

YAMAHA

X Music's Brighton Rock

Entertaining retailers X Music have just opened their Brighton branch, at 78 London Road (telephone 01273 624240). Both new and second-hand goods will be in stock, and X Music promise silly deals and exclusive prices. X Music are also currently running a competition (which you'll know about if you check their double-page ad in this issue). All you have to do in order to get a chance to win a pair of JPW mini monitors is record the most unusual sound you can think of onto an ordinary cassette tape and send it in. X Music warn that in the event of a tie, you may be asked to reproduce your sound live at the shop!

X-Music's catalogue, available free on request.

A X Music, 20 Cotham Hill, Cotham, Bristol BS6 6LF.
T 0117 973 4734.
F 0117 973 4800.

Spirit Folio's Gold Standard

While the Spirit Folio range of mixers continues to offer great sound quality at affordable prices, there are now two Folio RacPacs which none of you will be able to own: they're specially-made gold units, which have been purchased by the Hyatt Carlton Towers hotel in Knightsbridge. The gold RacPacs will control the sound in the hotel's largest ballroom, and have actually been installed in the ballroom itself in order to make them more accessible. Hence the gold livery — the surroundings are pretty plush, after all. Chief engineer Julian Maddix comments: "We chose the RacPacs because you don't really have to be a sound engineer to operate them. The sound quality is excellent, the price is right, and in gold it looks really cool as well."

A Spirit accessible to the rest of us — the Folio F1, available in 16:2 (£452) or 14:2 (£382) versions — has just been launched, and you can check out our review, starting on page 76 of this issue.

A Soundcraft Electronics Ltd, Cranborne House, Cranborne Industrial Estate, Cranborne Road, Potters Bar, Herts, EN6 3JN.
T 0707 665000.
F 0707 660482.
W http://www.spirit-by-soundcraft.co.uk

Cross-platform Express from MOTU

The revamping of Mark of the Unicorn's range of MIDI interfaces continues with the launch of the MIDI Express XT, priced at £399 including VAT. This multi-port interface not only offers eight MIDI Ins, nine MIDI Outs, SMPTE synchronisation and MIDI Machine Control, but also supports both Mac and PC clones in the one unit — a feature introduced by the recently-launched MIDI Timepiece AV (£649). In fact, the MIDI Express XT can actually connect to a Mac *and* a PC at the same time, allowing software on both platforms to access all connected MIDI hardware simultaneously. Both computers can also be synchronised together with MIDI timecode generated by the interface itself. Included in the package is MOTU's 'software console', which provides graphical access to all the XT's MIDI routing and merging facilities, SMPTE sync, and foot-pedal input, as well as its user-programmable memory presets.

MOTU have also released V5.5 of their core sequencing software, *Performer*. The new version (£349) offers a range of additional features and enhancements, the most notable of which is 100% native PowerPC code, for Power Macs, as well as enhanced code for 030 and 040 machines. In addition:

- **The enhanced Tracks Overview window now shows actual MIDI data inside phrase blocks.**
- **The scrolling cursor can be dragged to scrub playback.**
- ***Performer*'s 'markers' are now integrated into the Tracks widow, and can be used to auto-locate to any marker position.**
- **The mixing board introduced for *Digital Performer* has been added, for easy-to-use mix automation of *Performer*'s MIDI sequence tracks.**
- **New features borrowed from other MOTU software have been added, namely QuickScribe notation and multiple takes, first seen in the 'musician's' sequencer, *FreeStyle*.**

A Music Track, PO Box 4, Arlesey, Bedfordshire, SG15 6AA.
T 01462 733310.
F 01462 733390.
W http://www.motu.com/

FATAR STUDIO SERIES
MASTER KEYBOARDS

"The closest to a real piano feel yet."
SOUND ON SOUND

Studio 610 Specifications
- 61 full size velocity-sensitive keys.
- Pitch Bend Wheel and Programmable Wheel
- Program change, MIDI channel change, Transpose

Studio 610+ Specifications
As Studio 610 except with aftertouch and semi-weighted keys

Studio 1176 Specifications
- 76 weighted keys, Hammer action
- Velocity Sensitive with Aftertouch
- Pitch/Mod. Wheels
- 4 Programmable Zones
- 32 Presets
- 2 control sliders
- Program and bank change

Studio 1100 Specifications
- As 1176 but with 88 keys
- Also available with integral flight-case

Studio 900 Specifications
- 88 weighted keys with hammer action
- Pitch Bend Wheel and Programmable Wheel
- Program change, MIDI channel change, Transpose
- Also available with integral flight-case

Studio 2001 Specifications
- Full-size 88 weighted keys with hammer action
- Four MIDI inputs may be used for additional keyboards, MIDI accessories, sequencers, etc.
- Four fully independent MIDI outputs,
- 64 MIDI output channels.
- Two programmable control wheels.
- Four programmable control slider.
- Preset increment and decrement input.
- Eight keyboard zones may be defined over local or external keyboard regions.
- Also available with integral flight-case

At an RRP of £649.95 **FATAR**'s Studio 900 makes the case for combining your favourite sound sources with a single, high-quality master keyboard even more persuasive.

With 88 piano hammer action keys at your disposal you simply won't want to play anything else, and a host of features means you won't need to either - like program change, MIDI channel change and transpose, plus the ability to assign parameters such as volume, pan and aftertouch to a programmable wheel.

All **FATAR** 88 note keyboards are equally at home, live and in the studio and each is available in standard or rugged, fully flight cased versions.

STAB, MASSAGE & BOUNCE...

The secret of the FATAR ACTION lies in the patented hammer. Whilst most 'piano action' instruments rely on damped or weighted keys, FATAR's hammer is thrown up and forward on its pivot as the key is depressed, mimicking exactly the action of a traditional acoustic piano.

The combination of more mass moving through an arc means greater acceleration of the key and a remarkably increased dynamic range. You'll find you can put great power into chord stabs and loud passages whilst the natural inertia of the hammer provides exactly the right kind of counter-balance that lets you massage real piano keys for expressive pianissimo.

Equally important is the tiny bounce a hammer gives the key as it comes to rest. It's this bounce that that lets you play those two-handed paradiddles - and while we are talking percussion it's worth remembering that keyboards are used for triggering all sorts of things these days.

FATAR STUDIO SERIES
MASTER KEYBOARDS

ARBITER GROUP PLC. Wilberforce Road, London, NW9 6AX Tel: 0181 202 1199 Fax: 0181 202 7076 Internet: http://www.demon.co.uk/arbiter

ARBITER
GROUP PLC

shape of things to come

Readers in East Sussex looking for an affordable way to access more upmarket equipment might like to give South Coast Studios a call. The studio is basically a 16-track, but has recently added a Fostex D80 digital 8-track hard disk recorder. An eight-hour day costs £790, including DAT and cassettes, while an eight-hour day in the MIDI/D80 studio is just £40. Other equipment includes a wide range of old and new analogue and digital synths.

T South Coast Studio 01424 838398.

Earlier in the year, Central Sounds, the Coventry-based service specialists featured in our two-part servicing article back in March and April 1996, ran a competition for *SOS* readers using their mail-order repair service. The prize, a full collection of Emu CDs and a CD-ROM drive donated by Emu UK, was won by Ian Macpherson, an Emu E64 owner who writes music for TV and video companies. Keep an eye on Central Sounds' ads: they plan more competitions in future.

T 01203 665665.

Beyerdynamic have launched limited-edition runs of a pair of their classic mics. The M88, designed in 1963, is to be revived in a run of 999 units, with engraved serial number and quality wooden case. The M500 ribbon mic, which became obsolete a couple of years ago, has been re-launched due to a resurgence of interest in ribbon mics. The M500s will also be individually numbered (in a run of 999), and presented in a wooden case. Both mics are chromium-plated in a satin finish, and come with a test certificate personally signed by Mr Fred R Beyer.

T 01444 258258.

Cut-price class from Music Lab

If you've ever wished for a cheap Neumann mic or wondered where all the sub-£400 DAT machines have gone, pro audio hire and sales company Music Lab may have some answers for you. Neumann's TLM193 studio mic, which offers the typical Neumann sound, as produced by classic mics such as the U87, normally retails for around the £1000 mark —and that's considered to be a good deal. Yet Music Lab have managed to negotiate a limited special price for this mic, of just £699 including VAT. In order to reassure potential customers, the press release takes great pains to emphasise that these are "brand new, A1-grade microphones that are identical in every respect to the units offered by other dealers at full list price." The mics come direct from the Neumann factory, via UK distributor Sennheiser UK.

If it's a cheap DAT recorder you're looking for, Music Lab can also help, again through a limited offer. Sony's TCD-D7 portable DAT recorder is currently available for £399 including VAT, which could very well make it the cheapest off-the-shelf DAT machine around. At about the size of a Walkman, the TCD-D7 records at 32kHz, 44.1kHz and 48kHz, can record via its analogue or digital inputs, and will run off batteries or an external supply. A vinyl carrying case is included.

Last of all from Music Lab is news of a new 'hire credits' scheme. Basically, this is a loyalty scheme, whereby anyone who buys equipment from the company will be entitled to free equipment hire. For every £1000 worth of equipment purchased, you get a £50 hire credit, and this can be used in addition to other professional user discounts.

A Music Lab, 72-74 Eversholt Street, London NW1 1BY.
T 0171 388 5392.
F 0171 388 1953.

Little things mean a lot...

Philip Rees, noted manufacturer of useful MIDI problem-solving gadgets, have made a major adjustment to their single-channel MIDI-to-CV convertor. The Little MCV, which used to retail for £89.95, is now a slim £75.95 including VAT, making it one of the cheapest ways to add modern MIDI capabilities to your old synth (providing it has the inputs, of course!). The Little MCV is a simple device, with a MIDI In socket, a big MIDI channel select knob, and analogue outputs. The CV output can be of the 1V-per-octave type preferred by the majority of synths, or the less common volts per hertz system favoured by Yamaha and most Korg analogue synths. The gate output is also switchable, between +5V, +10V and S-trig. The full 128-note MIDI note range is accurately tracked, and pitch-bend, modulation and portamento are also converted. And, as with most Philip Rees products, even though the Little MCV is compact, it features a built-in power supply.

A Philip Rees Music Technology, Unit 2, Clarendon Court, Park Street, Charlbury, Oxford OX7 3PT.
T 01608 811215.
F 01608 811227.

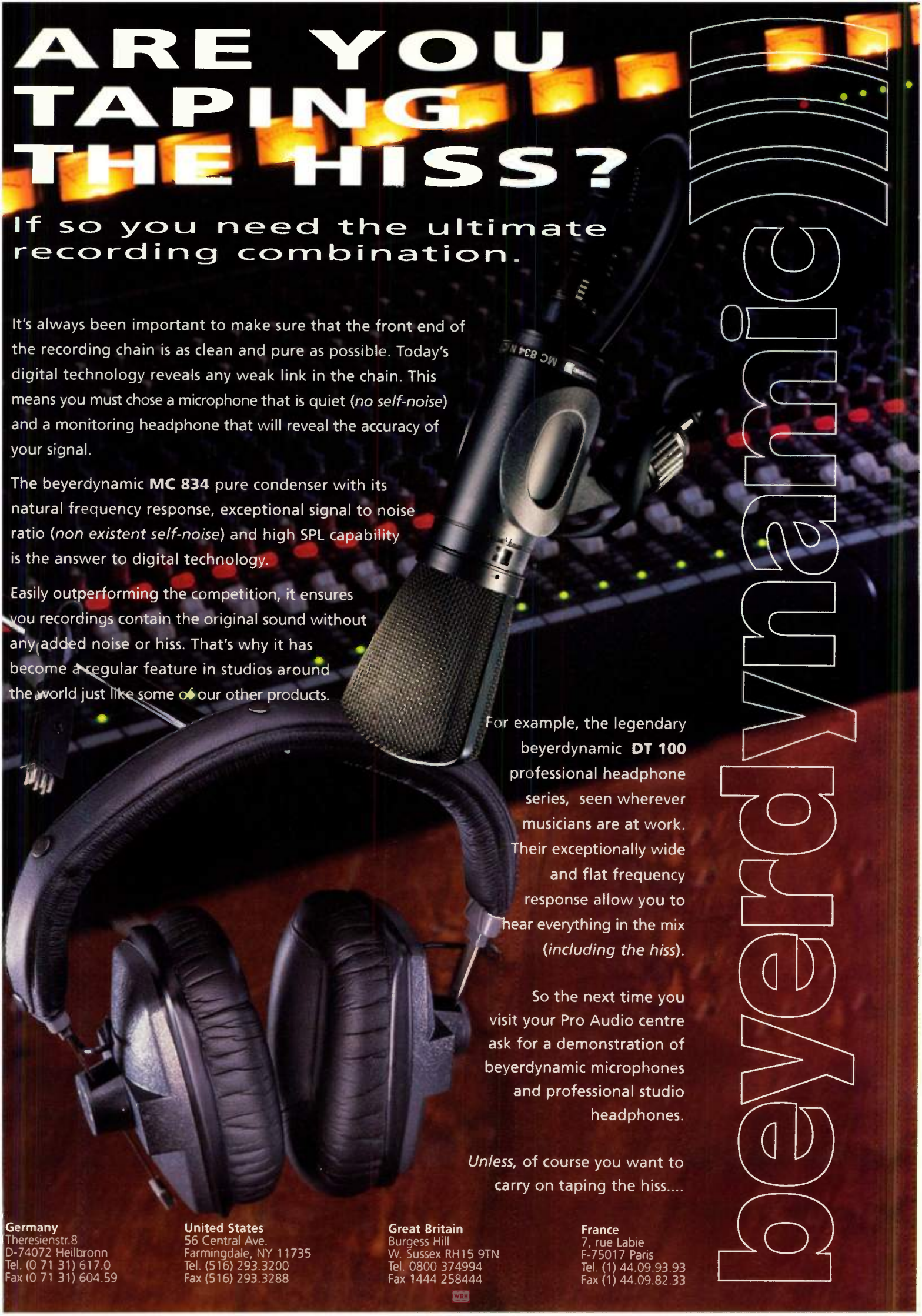
Larking run DMC!

Mega mix specialists DMC (see feature in November 1993's *SOS*) have opened their fourth studio, shown below with producer Steve Anderson: as with the previous three, it has been equipped by Don Larking Audio. The new studio, which has been built in a warehouse that has grown too small for the organisation's merchandising operation, is apparently DMC's first proper studio. The organisation was feeling the lack of a vocal or instrument recording area and mix automation: Larking Audio's package, based around a 48-channel Soundtracs Jade desk, solves this problem. The Jade is equipped with internal patchbay, VCA automation and assignable dynamics (providing fast gating, compression, limiting and expansion), and is joined by a Saturn 824 24-track recorder and a Fostex synchroniser. The rest of the package includes Dynaudio and Yamaha monitoring, HH and Yamaha amps, a Focusrite Red 2 dual parameteric EQ, TL Audio dual valve compressor/mic amp, Drawmer DS201 dual gates, a TC M5000 reverb processor, Roland's SDE330 dimensional delay, and an array of mics from Neumann, AKG and Shure.

A Larking Audio Ltd, 14/15 Cam Square, Hitchin, Herts SG4 0TZ.
T 01234 772244.
F 01234 772109.
E 100347.1046@compuserve.com

ARE YOU TAPING THE HISS?

If so you need the ultimate recording combination.



It's always been important to make sure that the front end of the recording chain is as clean and pure as possible. Today's digital technology reveals any weak link in the chain. This means you must chose a microphone that is quiet (*no self-noise*) and a monitoring headphone that will reveal the accuracy of your signal.

The beyerdynamic **MC 834** pure condenser with its natural frequency response, exceptional signal to noise ratio (*non existent self-noise*) and high SPL capability is the answer to digital technology.

Easily outperforming the competition, it ensures you recordings contain the original sound without any added noise or hiss. That's why it has become a regular feature in studios around the world just like some of our other products.

For example, the legendary beyerdynamic **DT 100** professional headphone series, seen wherever musicians are at work. Their exceptionally wide and flat frequency response allow you to hear everything in the mix (*including the hiss*).

So the next time you visit your Pro Audio centre ask for a demonstration of beyerdynamic microphones and professional studio headphones.

Unless, of course you want to carry on taping the hiss....

beyerdynamic

Germany
Theresienstr.8
D-74072 Heilbronn
Tel. (0 71 31) 617.0
Fax (0 71 31) 604.59

United States
56 Central Ave.
Farmingdale, NY 11735
Tel. (516) 293.3200
Fax (516) 293.3288

Great Britain
Burgess Hill
W. Sussex RH15 9TN
Tel. 0800 374994
Fax 1444 258444

France
7, rue Labie
F-75017 Paris
Tel. (1) 44.09.93.93
Fax (1) 44.09.82.33

shape of things to come

CD-Rock?

News now of an electronic music reference bargain: File Productions' *The Music File* is a CD-ROM UK rock and pop reference guide that has been launched for the price of an audio CD — around £14. The easily-searchable database has been 'published' as a giant Microsoft Media Viewer file, and includes information on 65,000 artists, 190,000 recordings and 900,000 tracks, from the 1950s to the present day. Currently, the CD-ROM is only available for Windows 3.11 or Windows 95 (in which case it is optimised for 32-bit operation), and needs a 486SX 25MHz computer or better, 8Mb of RAM (16Mb recommended for Windows 95 users), 8Mb of hard disk space, SVGA display with 26 colours, mouse and at least a double-speed CD-ROM drive. A collection function allows the user to set up a personal database, based on his or her own collection, and access the data in a number of ways.

In addition to performer and track listings, *The Music File*, available from CD-ROM stockists, also contains a directory of music shops and mail order companies, and a database of world wide web addresses. If you have access to the internet, your browser software can be automatically activated from within the database, taking you immediately to a chosen site. And if you haven't got internet access, File Productions will be tempting you with a free internet offer.

Quantegy acquire 3M

Audio and video recording tape supplier Quantegy have recently announced the acquisition of the assets, intellectual properties and remaining inventory of 3M Corporation's pro audio and video tape products. According to a joint announcement by Quantegy and 3M executives, Quantegy will now assume responsibility for supplying 3M customers with 3M brand tape for as long as inventories last, and customers will be able to order 3M products through the 3M customer service mechanism already in place. As 3M stock is depleted, Quantegy will manufacture a compatible product to replace it.

A Quantegy Europa Ltd, Unit 3 Commerce Park, Brunel Road, Theale, Berks RG7 4AB.
T 01734 302240.
F 01734 302235.
W http://www.quantegy.com/

education corner

A TALE OF TWO CITIES

New courses from the City of Westminster College include a part-time City & Guilds 182 course in sound engineering, and music technology short courses. The sound engineer course takes place in the evenings, and leads to a C&G certificate Part 1 (after one year of study) and Part 2 (after two years of study). Subjects covered include acoustics, digital applications, music technology, audio electronics, computer applications, and sound systems. The music technology course comprises six two-hour evening sessions over a six-week period, and offers a practical introduction to MIDI, sampling, sequencing, synthesis and multitrack recording. Lessons are based around practical demonstrations and hands-on assignments.

A Faculty of Visual and Performing Arts, City of Westminster College, 25 Paddington Green, London W2 1NB.
T 0171 258 2789.

WEEKEND AWAY FOR ABSOLUTE BEGINNERS

Absolute beginners with no prior knowledge of multitrack recording may like to take advantage of a residential course being run on the weekend of January 24-26, 1997, at Lancashire College, near Chorley. The course, 'Modern Sound Recording', runs from Friday evening to Sunday teatime, and costs just £100, including comfortable bedroom/study and all food; Lancashire residents in work pay just £92, and those claiming certain state benefits may be eligible for free tuition. Everyone on the course will get hands-on experience of Alesis' ADAT digital 8-track, mixers, effect processors and MIDI, and will take home a recording which they have helped to make. Further details can be obtained from the tutor, Simon Jones, on 01772 322642 (office hours).

A Lancashire College, Southport Road, Chorley PR7 1NB.
T 01257 276719.
F 01257 241370.

THE ARTEC AGENDA

Artec, the Arts Technology Centre, Islington, is offering a wide range of hands-on seminars and courses dealing with aspects of multimedia, digital/analogue video, and web design (via a four-part course). Places are limited on the courses, but tuition is intensive, with one computer per person. The *Sound for Multimedia* course, on February 8 and 9, is limited to four places, but most courses accommodate up to 16 people.

A Artec, Arts Technology Centre, 257-258 Upper Street, London N1 1RW.
T 0171 477 2775.
F 0171 477 2813.
W http://www.artec.org.uk/artec

X MUSIC GO BACK TO SCHOOL

Bristol-based hi-tech music dealers X Music have set up a music education division, especially to deal with education establishments nationwide. The first edition of the *X Music Education Catalogue* offers a wide range of products, from home keyboards, sound modules and sound cards, to mixers, PAs, guitars and more, at special education prices.

A X Music, 20 Cotham Hill, Cotham, Bristol BS6 6LF.
T 0117 973 5566.
F 0117 973 6649.

QUALITY IN COVENTRY

The Guild of Master Craftsmen has awarded Coventry's Glasshouse Productions a certificate of Quality and Service. Glasshouse, in conjunction with Coventry Technical College, provides accredited training in sound engineering. January 1997 sees the start of a 16-week introductory course in sound engineering and music production, and a range of women's courses in studio skills is being planned — a 16-week course along the lines of the January introductory course should be the first to become available.

A Glasshouse Productions, Upper York Street, Coventry CV1 3GQ.
T 01203 223892.
F 01203 223892.
E glasshouse@dial.pipex.com
W http://dspace.dial.pipex.com/glasshouse/

N364/N264

N POWER

N364 shown above in 61-key model.
Also available in 76-key (N264) version.

it's twice the POWER

TWICE THE *voices*

TWICE THE *outputs*

TWICE THE SOUNDS

Korg workstations are at the foundation of many home and professional studios. Now with the new N-series we have doubled the power of the best-selling X-series workstations. We doubled the polyphony to **64 voices, extended the PCM** memory with classic and new samples and expanded the memory to give you over **900 programmes and combinations.**

Then we added a **Real-Time Pattern Play and Record** function which enables you to get a groove straight away, plus a full function **Arpeggiator**, both of which can be recorded into the on-board sequencer in real time.

To add the final sparkle there is a **multi-digital effects** section with 47 Dynamic effect types with real-time control to give you that professional edge.

The new Korg N-Series *Full* RRP **£1,299**

KORG

KORG (UK) Ltd, 9 Newmarket Court, Kingston, Milton Keynes MK10 0AU.
For more information please call our brochure line on 01908 857150.

shape of things to come

Sounds like Heaven...

Award-winning TV and commercial music producers The Heavenly Music Corporation have opened a new recording studio in London's West End. The studio has been completely equipped by Syco Systems, and features a 32-track Otari Status console, with full moving fader automation, an Otari RADAR hard disk recorder, two Yamaha 02R digital mixers, DAT machines and a range of other gear. Among the recent projects, HMC has worked on are commercials for Nike, Adidas, Reebok, Gordon's Gin, Boddingtons beer, NatWest and Powergen, as well as a library of idents for Channel 4.

About the Otari desk, HMC songwriter Andy Carroll says: "We decided on Status because we liked the sound, it has the flexibility we demand and has the reliability of Otari behind it."

A Syco Systems, Kimberley Road, London NW6 7SF.
T 0171 625 6070.
F 0171 372 7660.
E sales@syco.com
W http://www.syco.com

QSound in the Round

QSound Labs have announced a major upgrade to their *QSYS/TDM* 3D audio plug-in for Digidesign Pro Tools III, with notable additions being automation and selectable speaker/binaural algorithms. New facilities have also been added to the software's programmable cyclic autopanners, and the mono compatibility of the process has been enhanced. *QSYS/TDM* is based on the QSystem II QSound 3D hardware processor, and has the ability to place up to four independent mono audio channels in specific static or dynamic positions within an enhanced stereo soundfield, which extends beyond the limits of a conventional stereo field. The enhancements to *QSYS/TDM* effectively turn the plug-in into the fully-functional equivalent of the QSystem.

A QSound Labs, Inc.
2748 37th Avenue NE,
Calgary, Alberta, Canada.
T 001 403 291 2492.
F 001 403 250 1521.
W http://www.qsound.ca

Emu Samples the Future

Emu have added some new samplers to their range: the E4X Turbo (£4409) and E4X (£3149). The E4X Turbo comes with an amazing 128-note polyphony, 16Mb of RAM, a 1Gb hard drive and three CD-ROMs, while the basic E4X (£3149) is no slouch, offering 64-note polyphony (expandable to 128), a 540Mb hard drive, and 4Mb of RAM. Features in common across the two machines include Emu's 'Digital Modular Synthesis', which offers 21 Z-Plane filter types, 32-voice layering and128-voice switching and crossfading. Both machines can be expanded to 128Mb of RAM, and both feature a 16-track sequencer with MIDI file playback, 18-bit dual effects, and a new enhanced graphic display. Both can accept an 8-output upgrade (to bring the total to 16) and an extra MIDI card (for 32 independent MIDI channels). Totally new for the E4X and E4X Turbo is the new EOS (Emulator Operating System) V2.5, which includes a new, enhanced SCSI sub-system and full System Exclusive implementation for remote control by either Mac or PC. Both samplers come ready-loaded with a whopping 400Mb of sound data. Using Emu's SoundSprint feature, presets can be auditioned and loaded in seconds.

Slightly lower on the price scale is Emu's new E6400, at £2519, which nevertheless still offers the same sampling and synth technology as the E4X Turbo. The base unit comes with 4Mb RAM, 400Mb of sound data on CD-ROM, 64-voice polyphony, Emu's Digital Modular Synthesis, and EOS V2.5. But you're not locked in: at any time, the E6400 can be upgraded to include all the features of an E4X Turbo, including 128Mb RAM, 128-voice polyphony, internal hard drive, two MIDI ports, 16 audio outs, digital out, and so on.

A Emu Systems, Suite 6,
Adam Ferguson House, Eskmills
Park, Musselburgh,
Scotland EH21 7PQ.
T 0131 653 6556.
F 0131 665 0473.
W http://www.emu.com

Skimble Skamble is the first official Chris & Cosey album to be released since 1992. The album is on the duo's own CTI label (CC1096), distributed by World Serpent. The release follows three entries into CTI's *Library of Sound* series, and the release last year of *Twist*, the remix album which features a variety of remixers doing their thing with their fave C&C tracks.

Nottingham-based computer music and pro audio specialists Multimedia Music are relocating their current Mansfield-based operation to a larger purpose-built showroom from Monday 14th October. The new showroom will include demonstration facilities for all aspects of digital recording, samplers and keyboards, plus the latest in digital video technology.

A Multimedia Music, CTS Professional Sales, Greenwood House, Unity Road, Lowmoor Road Industrial Estate, Kirkby in Ashfield, Nottinghamshire NG17 7LE.
T 01623 720777.
F 01623 656606.

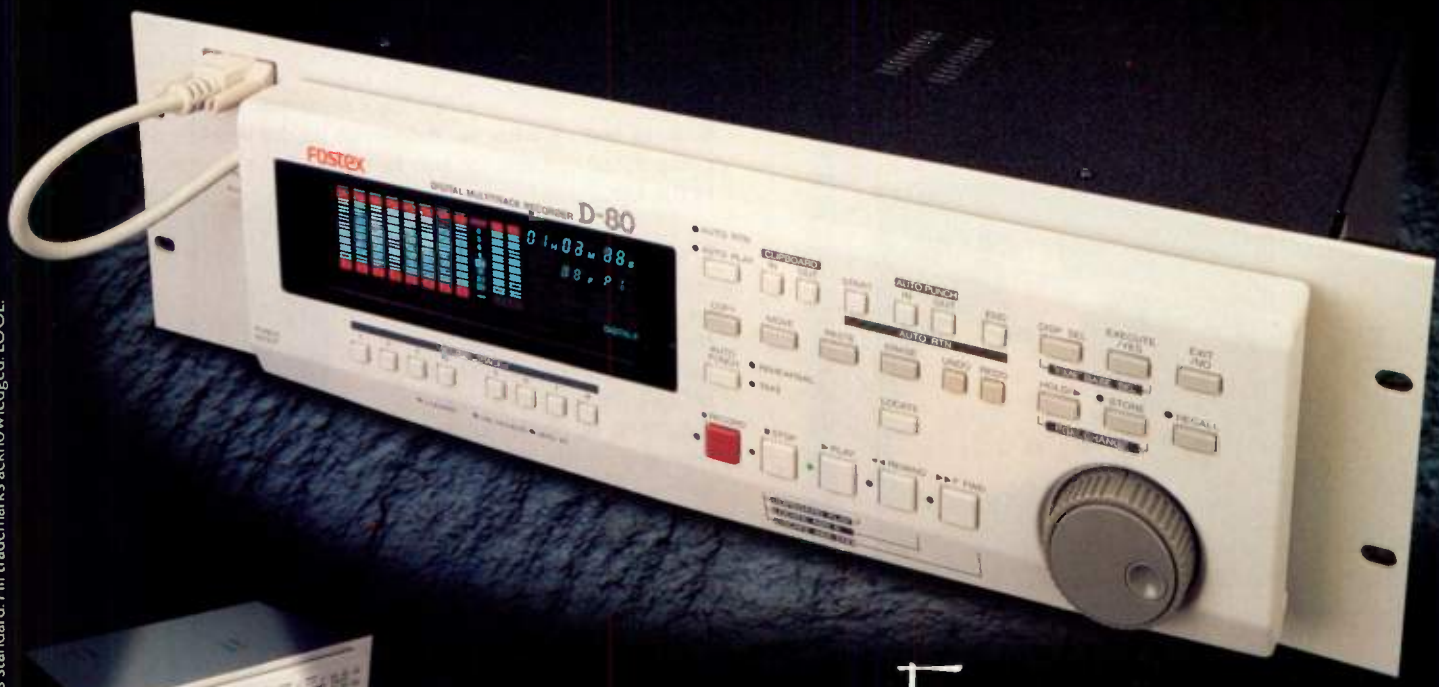
The first AMEK Galileo mixing console has been installed at the Cocteau Twins' September Sound studio in Richmond. The Cocteaus have long used AMEK desks, originally working with an Angela, then a Hendrix. Such is the group's confidence in the AMEK name that the new desk was bought, unseen and unheard, when the group knew they were going to be moving house. Their original studio was upstairs at Pete Townsend's Eel Pie Studios, and when Townsend vacated the downstairs portion of the building, the Twins decided to move in. The new studio also features a programming suite, which features an AMEK Big By Langley desk at its heart — so no surprises there!

T Amek Technology Group
0161 834 6747.
E amek@console-city.com.
W http://www.amek.com

TRUE MULTITRACK DIGITAL RECORDING

FOSTEX

It records 8 tracks simultaneously, at CD-quality, it does this without compression, ...and there's not a tape in sight!



SLAVE D-80s for 16 & 24 TRACK RECORDING

The D-80 can be slave or master to other D-80's / DMT-8's and the outside world via its standard in-built MTC, and is sample accurate with Word Clock (optical S/P-DIF).

Finally, someone has developed an expandable IDE-based digital removable hard disk system which offers up to 40 minutes* of true *multitrack* recording, non-destructive 'cut, copy, move & paste' editing, instant locate & search, five 'virtual reels', digital and analogue inputs/outputs along with a full function auto locating remote control. And all in a package which is as easy to use as your tape machine and costs no more than £1,499 inc VAT. Naturally, that someone is Fostex.

* Using optional 1.7IGB Hard Disk. 850Mb supplied as standard. All trademarks acknowledged. E&OE.

D-80 Digital Multitrack

SCV LONDON

Exclusively distributed by SCV London

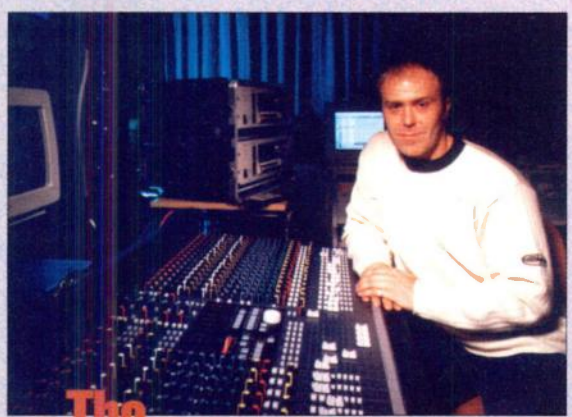
For further information contact SCV London. 6-24 Southgate Road London N1 3JJ. Tel: 0171 923 1892. Fax: 0171 241 3644

shape of things to come

Maiden flight for new cases

Midland Flight Case's new Vault range of flightcases are moulded in structural foam resin, and carry a lifetime guarantee (but whose lifetime?). Midland claim that the Vault range won't dent, crack or corrode, and they're also very light, with a case for a bass guitar or keyboard weighing between 8kg and 13kg. An integral sealing system ensures that the range is both dustproof and waterproof (to a depth of 30 feet), and the cases feature a manually-operated valve for pressure equalisation: pressure- or moisture-sensitive instruments can thus be safely transported in a de-pressurised aircraft hold whilst inside a Vault case, with internal pressure being matched to the new location on arrival. The cases are available in charcoal black, silver grey, orange, yellow and blue.

A Midland Flight Cases,
Unit 17, Enterprise Workshops,
76 Linden Street,
Leicester LE5 5EE.
T 0116 273 3035.
F 0116 249 0845.



The Ghost of Kelsey's present...

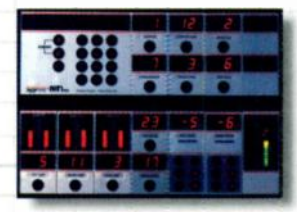
Remixer Phil Kelsey — who was featured in *Sound on Sound*'s November 1993 issue — has recently added a Soundcraft Ghost mixer (reviewed October 1996) to his studio. Phil says: "It sounds great and the EQ is very precise, which makes it very easy to pinpoint the frequencies I need to work on. Ghost enables me to do finished mixes on the console at home, without having to use any other studio." He also appreciates how MIDI sequences can be controlled from the desk, allowing him to remain in the listening field and not lose concentration.

A Soundcraft Electronics Ltd,
Cranborne House,
Cranborne Industrial
Estate, Cranborne Road,
Potters Bar, Herts,
EN6 3JN.
T 01707 665000.
F 01707 660482.
W http://www.soundcraft.com

dynaudio lexicon dbx

turnkey

If you want to look at equipment we'll send you some brochures...



If you'd prefer to listen and evaluate a wide range of products by strict A/B comparison there is currently only one option.

Turnkey's revamped and enlarged demo facilities feature what we believe to be the world's largest digital comparator systems for pro audio* and the only one of its type in the U.K.

Over 70 effects processors are available for instantaneous A/B via relay switching, eliminating the repatching time which makes good comparisons so difficult. 16 pairs of studio monitors, 10 power amps, 16 mixing consoles and around 30 sources and recorders from DATs, CDs, HDRs and Multitracks are on the same matrix so you can instantly configure complete systems.

Take 8 bus consoles - hundreds are bought each year on recommendation. Bearing in mind the sums involved it's hard to believe that the opportunity to properly compare the various brands for EQ and noise has not previously been offered.

We've taken the same innovative approach to demonstrating all our products from CD Rom samples to analog synthesizers.

Most dealers will tell you which products best suit your needs. Only one can show you.

One side of the switcher-equipped recording room.

Compare 6 mics. by recording simultaneously to ADAT.

Pro-Tools III and Soundcraft DC2020 in Studio 1.

Huge range across Mac, PC and Acorn platforms.

* The leading manufacturer of this equipment tells us that the Turnkey systems are the largest ever supplied worldwide.

soundhouse 0171 379 5148
Fax: 0171 379 0093 114, Charing Cross Road, London WC2H 0DT

Authorised Dealer | Soundcraft | DRAWMER | MACKIE | Roland | SONY | TASCAM | FOSTEX | digidesign

moog

THE SOUND RETURNS!

Original model shown - new version will also feature LCD screen, alpha dial and four soft buttons.

In synthesis there's no bigger name than Moog, and no-one's products have a bigger reputation. As their products went out of fashion with the digital fad in the early eighties, so the company disappeared - but now they are back with a vengeance, bringing you the classic synth sound, with all the advantages of modern MIDI control and top build quality. The MiniMoog is back!

3 VCO's, each with a choice of six waveforms, combined with the juiciest of filters give you the fattest sounds around. All the rest of the MiniMoog's original functions are still there for super flexible sound creation. All controls send out MIDI continuous controller data, so any edits you make can be recorded into your sequencer and played back. There's even an external input for processing any other sounds with the Mini's comprehensive synthesis.

Like the original, the new model will be built from real wood, finished in either birch, or for a small premium, walnut. For the die hard purists amongst you, you can even order the Mini to the exact original spec with no MIDI!

If you just have to have the ultimate in control, also available are fully customisable modular systems, starting from only £3695 - try buying an original Moog Modular for that!

- **Unmistakable and Inimitable Sound of the Classic Synth**
- **Modern Build Quality for Superb Reliability**
- **All Knobs and Switches Send MIDI Controllers for Unrivalled Realtime Control**
- **100 ROM Presets and 100 User Programmable Slots**
- **No More Expensive than a Second Hand Original**
- **A Modern Classic that no Studio Should be Without!**

MINI MOOG £999 turnkey Tel 0171 240 4036

digidesign

NEW

ProTools IV Package

- *8200/120 24/1.2/CD c/w keyboard*
- *17" MultiSync Display*
- *ProTools Core & 882 Interface*
- *2Gbyte Hard Disk*
- *Any Audio Sequencer*

BUNDLE PRICE £9725 INCLUDING INSTALLATION turnkey Tel 0171 240 4036

ProTools Plug-ins

To add to the collection of burgeoning TDM plug-ins is the new Waves Truverb reverb processor, Syncro Arts Tool Belt processor & Q-Sounds QX/TDM 3D spacial enhancer using the Qsound patented expansion algorithm.

Truverb Q-sound ToolBelt

Audio Media III Package

- *8200/120 24/1.2/CD & Keyboard*
- *15" Colour Monitor*
- *AudioMedia III card*
- *Any Audio Sequencer*

FREE MIDI INTERFACE & MICROSOFT OFFICE

ProTools Project Package

FREE MIDI INTERFACE & MICROSOFT OFFICE

- *8200/120 24/1.2/CD & Keyboard*
- *17" Colour Monitor*
- *2 Gbyte Hard Disk*
- *ProTools Project Core*
- *882 I/O interface*
- *Any Audio Sequencer*

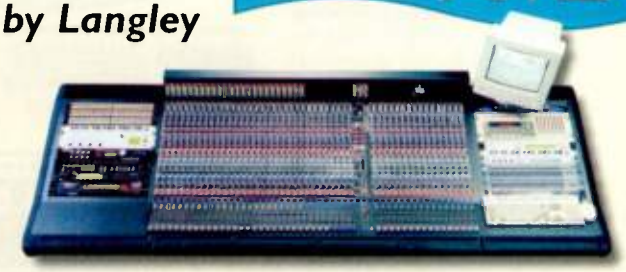
AUDIOMEDIA III

BUNDLE PRICE £3285 INCLUDING INSTALLATION turnkey Tel 0171 240 4036

BUNDLE PRICE £5750 INCLUDING INSTALLATION turnkey Tel 0171 240 4036

AMEK

BIG by Langley



As newly appointed Amek dealers we now have on demonstration a fortyfour input Big by Langley console. The Big's SuperTrue Version 3.1 VCA automation compatible with all other Amek desks up to the flagship Neve 9098 series console. With the Virtual Dynamics on-screen processing plus Rupert Neve voice recall, this is a console that is packed with facilities, over and above what it offers as a fully featured inline console: 4 band EQ, 8 auxiliaries, 12 bus, 24 outputs available in frame sizes from 28 to 44 with or without bantam patchbay.

Call for an appointment.

- *4 band EQ, 8 Auxiliaries*
- *SuperTrue V3.1 VCA Automation*
- *Virtual Dynamics on-screen editing*
- *Unique Rupert Neve Voice Recall*
- *12 bus, 24 output*
- *Frame sizes from 28 to 44 inputs*

INCREDIBLE VALUE £POA CALL FOR A DEMONSTRATION turnkey Tel 0171 240 4036

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ALESIS

The World's Best Selling Outboard Range!

After completely redefining the budget reverb market with the original MIDIVerb - Alesis went on to dominate the mid-priced reverb market with the now legendary Quadraverb series. Alesis are best known for the clarity and realism of their reverb algorithms - there are many imitations. On top of this, you get one of the most straight-forward operating systems so that you can actually use their best features.

NANOVERB
The most recent addition to the range - 18 bit true stereo reverbs + no fuss !

RRP £169 **£169** NEW BOXED

3630 COMPRESSOR
The standard budget compressor - RMS/peak detection, soft/hard knee + gate

RRP £225 **£199** NEW BOXED

M-EQ 230
The only 2 x 30 bands graphic EQ in 1U, but not at the expense of excellent sound quality

RRP £269 **£229** NEW BOXED

MICROVERB 4
18 bit true stereo reverb + FX, basic programmability in a 1U rack

RRP £229 **£215** NEW BOXED

MIDIVERB 4
As the microverb 4, but with added programmability, large LCD and MIDI control

RRP £329 **£299** NEW BOXED

Q2
The ultimate in FX programmability - up to 8 effects blocks arrangable in any order + ADAT digi I/O

RRP £699 **£649** NEW BOXED

ADAT XT

ALESIS

Alesis pioneered low cost digital multitrack recording with the introduction of the ADAT, and changed the face of home and professional recording. The new XT version is totally compatible with the old machines, but has numerous improvements.

The design features a die-cast chassis and has a completely redesigned transport, which rewinds and fast-forwards four times as quickly as the old machines. Also BRC style editing can be performed from the front panel with two machines, and an all new display further simplifies operation.

Turnkey are probably the most experienced suppliers of ADAT's, which coupled with our unbeatable pricing makes us the first choice for the new XT.

RRP £3199 **£POA** PACKAGE DEALS AVAILABLE turnkey Tel 0171 240 4036

Green range

Focusrite

FOCUSRITE GREENS FROM **£819** CALL FOR A DEMONSTRATION turnkey Tel 0171 240 4036

Focusrite have long represented the pinnacle of audio achievement, but sadly their products have always been out of reach for most of us. Now, specifically with the high quality project studio in mind, they have designed the Green range of processors. The first 3 products are the Dual Mic Pre, the Focus 4 band EQ with filters, and the Voicebox - this combines a mic/instrument preamp, compressor, de-esser and parametric EQ in a single unit - the ultimate signal path for digital recording! All 3 are on permanent demo at Turnkey.

Yamaha 02R Digital Console

YAMAHA

The fully digital 40 input 8 bus console with total automation and moving faders. 4 band parametric eq and dynamics for every input and 2 comprehensive on-board fx processors with a range of reverbs, delays and other standard fx. Optional interface cards allow full digital connection of ADAT, T-DIF and AES/EBU formats for integration of MTR and hard disk systems.

RRP £6999 **£POA** turnkey Tel 0171 240 4036

NEW Indigo Range

TL Audio

In the production of modern valve audio equipment, the success of TLA equipment has been unrivalled, from the best selling compressor, to the full blown valve mixer. For those of you who don't quite need the full functionality of the existing range, the new 1U high Indigo range has been designed specifically for your needs. Superb warm and fat valve signal processors at an affordable price. Models include a compressor, EQ, mic amp and overdrive unit. Entire range on demo at Turnkey for direct A/B comparison.

PRICES FROM **£699** CALL FOR DETAILS turnkey Tel 0171 240 4036

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KORG | ensoniq | ALESIS | Steinberg | Studiomaster | Technics | Vestax | MUSSWILL | FATAR

BBE

- Full Range Process Covering High & Low Frequencies
- Large Range of Models for all Applications
- Suitable for Studio & Live Use
- Killer Sound!

MAXIMISE YOUR MIX!

No mix is complete without some sort of psychoacoustic processing these days, and the BBE sonic maximizers have a unique angle in this department, with a process quite unlike any other unit. Rather than using harmonic regeneration, the audio spectrum is split into various regions and phase shifted apart, which can have devastating results - particularly at the bottom end. Unlike harmonic regeneration, phase shifting doesn't generate feedback, so they're also great for live use. Check out the full range below - there's sure to be a model to suit you!

362 Sonic Maximizer

The 362 series delivers the sound-improving benefits of "Sonic Maximizer" technology with the convenience of ganged-stereo operation.

362 £199 NEW BOXED

362NR Sonic Maximizer + Noise Reduction

The 362NR combines a full-featured sonic maximizer with an independent, single-ended noise reduction system in a single rack-space unit.

362NR £269 NEW BOXED

362SW Sonic Maximizer + Sub Woofer Control

The 362SW combines a full-featured sonic maximizer and an independent subwoofer control with a variable low-pass filter and output level control.

362SW £269 NEW BOXED

462 Sonic Maximizer

The 462 is perfect for semi-pro applications not requiring balanced jacks. With true dual-mono operation, the 462 is two independent sonic maximizers in one chassis.

462 £269 NEW BOXED

862 Sonic Maximizer

The 862 unit features dual-mono operation with balanced XLR inputs and outputs. It is designed for applications requiring low noise, high headroom and +4dBu input levels.

862 £469 NEW BOXED

HR-GP5
MULTI FX PROCESSOR

SONY

Acclaimed quality multi-effects unit from Sony, brother of the HR-MP5. The same processing split further allows up to 7 effects at once with a fantastic range of reverbs, delays and more "off the wall" effects, plus a superb pre-amp section making it ideal for both studio use and guitarists. It features the same display and operating system as the MP5, so nothing could be easier to use! With our massive discount stocks won't last long, get your order in now!

- Top Quality Effects Processor
- Exclusive End of Line Clearance Deal

RRP £586 £249 NEW BOXED

SPIRIT Folio RacPac

Soundcraft

- 28 Inputs at Mixdown.
- 6 Auxiliary Sends.
- 4 True Subgroups.
- 3 Band EQ with Mid Sweep.

This excellent member of the Folio range is a sure-fire winner combining superb sound quality with a fantastic list of features : 3 Band EQ with Mid sweep, 6 auxiliary sends, high-pass filters, rackmountable (includes swivelling connector field) up to 28 inputs on mixdown, 4 true sub-groups plus separate mix bus, insert points and direct outs on every channel.

Mega deal only at Turnkey!

RRP £899 £POA NEW BOXED

IT'S BACK! Vortex

lexicon

Despite the first digital effects units being developed almost 20 years ago, they have all followed a familiar path ever since, offering a conventional series of effects. The Lexicon Vortex breaks the mould in allowing effects to be morphed between in real time and in the process, creating new and previously unheard of effects. (This actually changes the effect algorithm continuously - it is not a simple cross-fade between effects) This unit is ideal for dance music, and anybody requiring out of the oridinary effects, and its real time nature make it an excellent choice for live performers such as guitarists. Effects are also affected by the input signal, so that dynamics can control various different paramters within an effect algorithm. Tempo can be tapped in to control delay times etc. Typical Lexicon quality can of course be taken for granted. Exclusive bulk purchase makes this huge reduction possible on the end of the line. First come first served!

- Unique morphing of effects
- Typical Lexicon quality
- Superb realtime control

RRP ~~£429~~ £199 EXCLUSIVE DEAL

SPIRIT Folio Lite

Soundcraft

- Up to 16 inputs to mix.
- 2 Aux sends, 1 switchable pre/post
- 4 mic amps with phantom power

Soundcraft's Spirit Folio must have more features per square inch than any other mixer. Ideal for any small recording setup, it has up to 16 inputs including 4 mono mic/line channels (with phantom power), 4 stereo channels and 2 returns, 2 band EQ and 2 aux. sends - 1 switchable pre or post fade. If you need to rack it, optional ears are available.

Mega deal only at Turnkey!

RRP £312 £POA NEW BOXED

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ROLAND VS-880 DIGITAL WORKSTATION

It's an 8 track recorder, each with an additional 8 virtual tracks, giving up to 64 in total! Variable levels of data compression can be applied to give unheard of amounts of recording time on a single hard drive (the VS880 supports an internal IDE but we recommend an external SCSI drive such as the Iomega Jaz, for better performance and value.)

Mixing is all digital for superb quality, and is also fully automatable. Built-in MIDI synchronisation allows quick and easy setup with any sequencer. An additional FX board can also be added which gives two simultaneous effects busses, featuring RSS and SE70 type effects. Want to know more? Call us or come down for a demo today!

BUNDLE PRICE £1599 INC 1 GIG INT. DRIVE

BUNDLE PRICE £1749 INC 1 GIG JAZ DRIVE

BUNDLE PRICE £1999 INC 1 GIG, JAZ & FX BOARD

Red

Although Waldorf are not associated with Focusrite in any way, we cannot deny that this Wave is red.

Waldorf Wave

We now offer a new custom range of Wave synthesizers with 76-note keyboards in four colour options - standard blue, red (as shown), Sahara and black. Totally unique sound.

EXCLUSIVE FROM £6299 CALL FOR DETAILS turnkey PROFESSIONAL Tel 0171 240 4086

DTC-A6

DAT MACHINE

Sony have done it again! A full size, full spec DAT machine at a bargain price! Just look at the list of features: SPDIF coaxial input and optical in and out, digital and analog recording at all three sampling rates (32 kHz, 44.1 kHz, 48 kHz), as well as all the usual ID functions and a full function infra red remote control. Sony's exclusive Super Bit Mapping process can also be switched in, cramming the sound of 20 bits into 16! Initial stocks are limited - get your order in now!

NEW PRODUCT £649 INC. 5 FREE 90 min TAPES

PCM-800

PRO 8 TRACK DIGITAL RECORDER

The definitive statement in 8 track digital machines? The Sony PCM800 is based on Tascam's DA88 but has the added advantages of balanced XLR connections and AES/EBU. Buying power makes our offer cheaper than the DA88! Limited quantities only available at this price. Buy now before stocks are exhausted!

RRP £5349 £3499 NEW BOXED turnkey PROFESSIONAL Tel 0171 240 4036

TCD-D8

PORTABLE DAT MACHINE

Turnkey bring you the first stocks of Sony's brand new portable, the TCD-D8. Sturdily built with a back-lit display, the unit features 48kHz and 44.1 kHz analog and digital recording.

No other portable is available under £1499 - initial supplies will be very limited, phone now to reserve yours. The ultimate Walkman !

RRP £599 £529 NEW BOXED

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turtle beach

PICK A CARD - ANY CARD!

U.S. company Turtle Beach have long led the way in the Soundcard business, and their current range caters for the needs of everyone from the beginner to the serious PC music producer:

- Range of Soundcards Specifically Designed for Music Production Use
- Games Compatibility (not Tahiti)
- Sample Store (Tropez Plus only)
- Full Duplex Recording
- CD-ROM Interface (not Tahiti)

TB S2000

The TB S2000 is the entry level card and is the cheapest full duplex card on the market meaning you can record and play back simultaneously. It has an onboard General MIDI synth, a CD-ROM interface, and is fully Soundblaster compatible - perfect for games too!

TB S2000 £169 INC. FREE MIDI ADAPTOR CABLE

Tropez plus

Next up is the Tropez Plus, which as well as having improved audio quality also has a killer feature - sample store. This means you can use the card just like a stand alone sampler and record sounds, manipulate them and spread them across a keyboard to play back as a real instrument. It is normally supplied without RAM, but we are bundling it with 4 meg free (fully upgradeable to 12 meg).

TROPEZ PLUS £299 INC. FREE 4 MEG RAM & MIDI ADAPTOR CABLE

Logic AUDIO **£349** WHEN YOU PURCHASE ANY OF THESE DEALS

CUBASE version 3.0 **£249** WHEN YOU PURCHASE ANY OF THESE DEALS

Tahiti

Top of the line is the industry standard Tahiti, which utilises the superb Motorola 56001 DSP chip in conjunction with 64x over-sampled ADC's and 18 bit DAC's, for some of the best recording sound around. Hurricane technology means no DMA channels for hassle free installation, the waveblaster socket allows for a top quality synth upgrade, and it comes bundled with WAVE SE, the renowned stereo editing software.

TAHITI £399 INC. FREE DB50XG & MIDI ADAPTOR CABLE

Roland

JV1080 Super JV Module

In the same way as the S1000 became the industry standard sampler, Roland's JV1080 has become the industry standard synth module. It's not hard to see the reason why - straightforward operation combined with top flight sound quality and a huge range of useable sounds.

But expandability of the machine is where it really comes into it's own. There are over 10 different expansion boards which can be fitted (up to 4 at once), each one with as much ROM as the original machine, covering sounds from Vintage to Orchestral and Dance to World.

RRP £1199 **POA** NEW BOXED

At Turnkey we have the full range in stock, as well as an unbeatable price on the machine itself. Check one out today!

RRP £1468 **£1299** WITH ANY EXPANSION BOARD

ALESIS

S4 Plus

Unbelievable clearance deal on this top of the range synth brings you a huge range of features and serious performance at a bargain price. The Alesis S4 Plus Piano features: 64 note polyphony, 16 part multitimbrality, a huge range of up to the minute sounds and large area of the ROM given over to top quality piano samples, the ability to download samples onto PCMCIA RAM cards, 4 simultaneous multi effects processors based on the Quadraverb 2, huge screen for easy editing and packaged in a 1u rack unit, with plenty of knobs and buttons for editing. Under half price! Limited quantity available - first come, first served!

- 4 Simultaneous FX Processors
- 64 Note Polyphonic
- Massive LCD Display
- Under Half Price!

RRP ~~£999~~ **£499** EXCLUSIVE DEAL

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Authorised Dealer | Soundcraft | BEHRINGER | MACKIE | Roland | SONY | TASCAM | FOSTEX | Digidesign

Technics

TECHNICS SX-WSA1 keyboard workstation

We're famous for bringing you quality products at a huge discount - but this one takes some beating! Launched last year, the Technics WSA1 was hailed as a breakthrough instrument, bringing the latest physical modelling technology to the market with 64 note polyphony, when other manufacturers were and still are offering only 1 or 2 notes.

Now as the UK's leading hi-tech music store, our tremendous purchasing power allows us to offer you these superb instruments at discounts of well over 70%!

The WSA1 produces it's sounds by feeding a PCM waveform driver into a custom DSP modelling resonator, and unlike other systems offering just 1 or 2 models, the WSA1 has a whole host of them including string, cylinder, cone flare, plate and membrane, and there are two per tone (up to 4 tones per note). Parameters like fit, mute and position allow incredible modelling flexibility. Sound is then fed through a digital resonant filter stage, and amplitude envelope. To top the whole lot off, there are three FX busses with 55 different algorithms, and digital EQ.

Ease of use and programmability is also unparalleled for a modelling system, the huge backlit display gives graphic representations of all editing parameters, whilst the array of modulation wheels and trackball type devices give unrivalled realtime control, and also offer a simple approach to new sound creation.

The keyboard version has a disk drive and sequencer (disk drive on rack plays files sounds and plays standard MIDI files only) which handles 10 songs, 16 tracks and 47,000 notes with full graphic note editing - probably the best workstation on the market.

Amongst other features are 32 part multitimbrality (2 sets of MIDI in, out and thru) and 4 individual outputs expandable to 8 plus SPDIF digital out (only £168).

Once in a lifetime opportunity to own a true quality instrument at a giveaway price.

Buy now whilst stocks last!

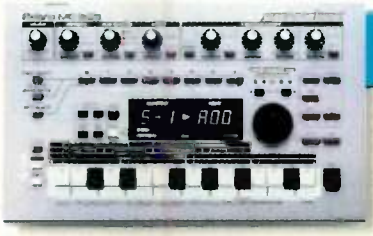
DEAL OF THE YEAR! WSA

TECHNICS SX-WSA1R Rack module

"The quality, scope and inventiveness of the programming are extremely impressive" - Keyboard Review
"Technics have obviously put a lot of tender loving care into the WSA1 sounds" - Sound on Sound
"A very comprehensive keyboard. Is there a catch? Not in my book." - Making Music
"A ground breaking sophisticated instrument" - Making Music
"The sequencer is outstanding" - Future Music
"The drums are excellent" - Sound on Sound
"All the hype was justified" - Future Music

RRP ~~£2199~~ **£649** SX-WSA1R

RRP £2499 **£869** SX-WSA1



Roland

MC-303 Groovebox

NEW PRODUCT **£549** NEW BOXED

The enduring popularity of the TB303, MC202 and TR909 has just refused to go away but increasing rarity has meant that secondhand prices have been driven up to ridiculous levels. Roland, the creators of these machines, now bring you the MC303 Groovebox which combines all their classic drum machine sounds, a step time / real time sequencer, 303 'acid' bass sounds complete with front panel filter controls and a whole host of other useable sounds (it's 16 part multi-timbral!). This box is an all in one dance music solution, and believe us, it sounds the business! Initial supplies will be very limited, order now to avoid disappointment!

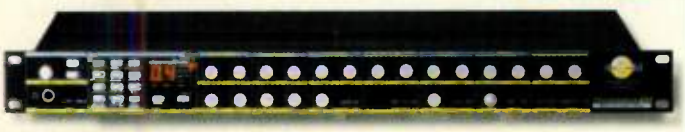
NEW PRODUCT **£649** WITH MK149 CONTROLLER KEYBOARD

PULSE waldorf

Waldorf quality at a previously unheard of price! Their first venture into the burgeoning monosynth market has been universally acclaimed, and rightfully so. The Pulse's three oscillators provide some of the fattest sounds around, and it's modulation matrix allows a far higher degree of programming complexity than anything else in its range. Add to that the fact that editing any parameter sends out a MIDI controller and you have a fantastic all round performer. On demo and in stock now.

NEW PRODUCT **£599** NEW BOXED

DrumStation novation



Someone had to build this eventually! Despite being discontinued for at least 10 years, Roland's TR-808 and TR-909 drum machines have remained indispensable popular classics ever since.
Now, Novation bring you those classic sounds with the original editing parameters, and in the convenience of a 1U rack, with MIDI. and 8 outputs. Initial supplies will be limited and demand high. We have been guaranteed a significant quantity of the first stock available. Call for further details.

RRP£449 **£429** NEW PRODUCT

CS1x YAMAHA

Here's another fantastic addition to this year's slew of equipment specifically designed for dance music. Not only does it look great, it sounds great too! As well as 480 XG format voices and 11 different drum kits, the CS1x also has 128 special performance sounds especially designed for dance and techno music. Front panel knobs allow instant access to crucial editing parameters like the filter, and 2 are assignable to anything you like. Round this off with top quality effects and an arpeggiator, and you have what has to be the best value keyboard of the year!

R R P **£599** NEW PRODUCT

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Mark of the Unicorn

THE INTERFACE TO BEAT ALL THAT DOES ALL!

midi timepiece

- *128 Channel MIDI Interface for Macintosh & Windows*
- *8 Independent MIDI In/Out*
- *Control ADATs with MIDI Machine Control*
- *Converts LTC to Digidesign Superclock (replacing the SMPTE Slave Driver)*
- *Genlocks to video/blackburst*

The Midi Timepiece AV is a breakthrough in MIDI/SMPTE interfaces for professional music providing all the features needed for your Mac or PC in one box. Purchasing a MIDI Timepiece II, Digidesign SMPTE Slave Driver, and a JL Cooper Datasync would only give you some of the facilities that the MTP AV offers. Where as owning these three products would set you back at least £1,700, the MTP AV is only £645! As an introductory offer we will take your old Studio 4 or MTP II and £410 for an MTP AV. Call for more details.

adat SYNC | digidesign super clock | Mac OS | Windows 95

PX DEAL £410 WITH STUDIO 4 OR MTP2 turnkey PROFESSIONAL Tel 0171 240 4036

RRP £645 turnkey PROFESSIONAL Tel 0171 240 4036

SyQuest & IOMEGA

Removable disk drives

There was a time when hard disks were a luxury for sampler owners, but with the advent of the ultra cheap Iomega Zip and Jaz drives, and the soon to be released Syquest EZ 135 drive, this has become a thing of the past. For under £200 the Zip drive stores 100Mb (94Mb formatted) on each cartridge and the EZ drive 135Mb (124Mb formatted). If you want greater capacity the Jaz's 1Gbyte will suit any large fx library and is ideal for many dedicated hard disk audio systems like the Emu Darwin or Akai DR series.

ZIP RRP £219 **£159** INC DISK & SCSI CABLE

JAZ RRP £649 **£469** INC DISK & SCSI CABLE

EZ-135 RRP £219 **£139** INC DISK & SCSI CABLE

Macintosh

MIDI Bundles

While stocks last we are offering Apple's Powerful Performa CPU with a MIDI sequencer of your choice - Steinberg Cubase, E-Magic Logic, Opcode Vision or Mark of the Unicorn's Performer. Comes with 1-in, 3-out MIDI interface.

BUNDLE PRICE **£1299** INCLUDING SOFTWARE

Performa 630 MIDI Package:
- *Performa 630 8/350CD c/w kbd.*
- *14" Colour Display*
- *MIDI Sequencer + Interface*
- *ClarisWorks Software*

* CPU Apple 8 stock - full warranty

SU10 Sampling Unit

YAMAHA

RRP ~~£289~~ **£269** INCLUDES 2 FREE TIME & SPACE CDs

Yamaha's SU10 is a ground breaking unit, making professional quality stereo sampling available to everyone. Up to 54 seconds of sampling is available and 48 samples can be held in memory at any one time. Samples can be filtered, reversed, scaled, crossfaded, pitchshifted and even scratched using the ribbon controller.

The built in sequencer means you can produce your own tunes using just this unit!

The SU10 comes bundled with 2 free Time & Space CDs containing almost 800 samples.

Also available with 4 octave MIDI keyboard for only **£349**.

Reno Portable CD-Rom Drive

MEDIAVISION

Are you making full use of your sampler? There are now a huge range of CD ROM discs stacked full of library available for virtually any sampler on the market. Each disc can hold up to 650 meg (the equivalent of about 500 HD floppies) and what's more, all the patch data has already been programmed! The Reno CD ROM drive works with nearly all samplers (please check compatibility when ordering) as well as Mac and PC. Most CD ROM drives can play audio CD's, but require special software on a computer to do so. The Reno though has integral buttons for playback and track search etc, and can even be run off batteries for use as a portable CD player (headphones included). We have managed to secure a quantity of these at a huge discount - order now whilst stocks last!

RRP £429 **£149** INC 'PHONES & CARRY CASE

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EUROPE'S LOWEST PRICES GUARANTEED*

Sound Modules

E-MU ORBIT DANCE PLANET
INC. FREE CABLES

Emu have taken their wealth of experience in making modules such as the Proteus, Vintage Keys and Morpheus, combined it with the filters from the incredible Emulator 4, and with their usual innovation, come up with the Orbit - especially built for dance music

The Orbit is stacked full of classic drum sounds, pulsating basses, ambient pads, as well as a huge variety of hits and effects The inclusion of the E4's 16 different types of 6 pole filters mean that this module has more powerful filtering than any other synth Finally the 'BEATS MODE' includes a wide selection of loops and grooves, which can have their pitch changed without tempo change and vice-versa, and even their sounds too!

The Orbit is already on demo at Turnkey - audition one today !

NEW PRODUCT
£799
NEW BOXED

F.A.T. FREEBASS FB-383
TB303 CLONE

Superb first product from new manufacturer Freeform Analog Technologies The only authentic sounding TB303 clone, with MIDI 1U rack with 1 knob per function, all the sound controls of the 303 are duplicated, Cutoff, Resonance, Envelope Mod, Accent, Tune and Decay Waveform is continuously variable from square wave to sawtooth, and an auto tune button is included to retune the oscillator Filter cutoff CV controllable (convertor box available only £69 if bought with FB383) The ultimate analog bass machine - this incredible price means these will fly out of the door' Turnkey Exclusive

NEW PRODUCT
£199
NEW BOXED

NOVATION BASS STATION
BUDGET MONO SYNTHS

If you need to get into analog synths on a budget, then the Bass Station rack or keyboard is for you But this is no mere toy! Two oscillators, pulse width modulation, two LFO's and knobs that send out MIDI information make this a versatile sound creation tool, capable of a wide range of bass sounds and effects The ideal addition to any MIDI setup!

FROM ONLY
£329
NEW BOXED

ACCESS
PROGRAMMER
FOR MATRIX 1000 OR MICROWAVE

There's no doubt that the Oberheim Matrix 1000 and Waldorf MicroWave deliver powerful analog sounds However, when it comes to programming your own sounds, top producers have tended to go for older synths like the Minimoog and Super Jupiter, because their knobs and sliders make for easy creation of new sounds The Access programmer gives you the best of both worlds - now you can freely experiment with your modern analog synth using the same intuitive front panel, and better still, record every tweak of a parameter into your sequencer

SCOOP EXCLUSIVE
£369
NEW BOXED

E-MU PROTEUS FX
THE WEST END'S EXCLUSIVE EMU CENTRE

8 Meg of superb ROM samples from the E-IV library including orchestral sounds and the Proformance Grand Piano 2 independent fx units built in, 16 part multi-timbrality and 32 note polyphony in a full size 1U rack. TURNKEY MEGADEAL!

RRP £599
£399
NEW BOXED

E-MU CLASSIC KEYS
THE WEST END'S EXCLUSIVE EMU CENTRE

8 Meg of Vintage Keys samples, 2 independent stereo effects units, 32 note poly, what more can be said Ideal for anyone needing great vintage sounds without the hassle of an analog synth Satisfaction guaranteed, unbeatable price

RRP £649
£399
NEW BOXED

KURZWEIL
MicroPiano
SPECIAL PURCHASE

The MicroPiano is the most highly regarded piano module on the market, featuring Kurzweil's breathtakingly realistic true stereo samples - 32 note polyphony means you won't suffer from note-stealing and the wide range of other keyboard sounds and strings make it useful in many other situations Built in effects including very high quality reverb mean there's no need to tie up another effects unit Strictly limited quantities at this price mean that stocks won't last long Order today - you won't be disappointed !

RRP £599
£369
NEW BOXED

ALESIS
SR-16
DRUM MACHINE

The SR-16™ Stereo Drum Machine is an excellent tool for songwriting and performance It features a great selection of 233 realistic, natural drum sounds, offered both in dry form and sampled with our incomparable digital reverbs Alesis's exclusive Dynamic Articulation™ feature enables a drum sound to change its tonal content as it's played harder for truly realistic performances The SR-16 features 50 preset patterns that were actually played in by top studio drummers - not just programmed and quantized You'll find enough built-in rhythmic variations (with A, B and two Fill sections) for composing complete arrangements Of course, the SR-16 also provides complete MIDI implementation, a footswitch input, flexible programming and editing features and velocity-sensitive pad buttons Plus, it's so easy to use that you'll be up-and-running and composing new music in minutes

RRP £299
£199
NEW BOXED

YAMAHA
VL70M
VIRTUAL ACOUSTIC MONO SYNTH

Physical Modelling Synthesis for the rest of us - Yamaha's ground-breaking new unit Physical modelling takes a completely different approach to sound reproduction than any previous method - extremely powerful DSP chips simulate in real time characteristics of real instruments such as tube/string length, damping, absorbtion, lip/bow pressure, throat characteristics, tonguing and many others

The sound can then be passed through a powerful multi-mode filter section with resonance, harmonic enhancer, impulse expander, resonator and five-band fully parametric EQ with key-scaling abilities Finally, a 32 bit effects section provides up to 3 simultaneous effects processors ,capable of flanging, pitch-shifting, reverb, delay, distortion etc

Initial supplies will be limited on this exciting piece of technology - get your order in now to avoid disappointment.

NEW PRODUCT
£499
NEW BOXED

OBERHEIM
MATRIX 1000 EXCLUSIVE

Now almost 10 years old, and still sounding as fresh as the day it was released. The Matrix 1000 is essentially a Matrix-6 in a rack - 6 note polyphonic, 2 oscillators per voice, true analog VCF filters with 8 modes, "Matrix 1"™ modulation with 20 sources and 32 destinations, raw gutsy analog sounds Why 1000? The 1000 presets were generated by Matrix6 owners worldwide in response to a competition to find the best analog sounds on the planet You're sure to find the perfect patch for virtually any application Group mode allows chaining of up to 6 units to create a true monster! Fully editable via MIDI, Mac, PC or Atari editor (available for only £49)

FACTORY DIRECT
RRP £599
£399
NEW BOXED

NOVATION DRUM STATION
BUILT AT LAST !

Someone had to build this eventually! Despite being discontinued for at least 10 years, Roland's TR-808 and TR-909 drum machines have remained indispensable popular classics ever since Now, Novation bring you those classic sounds with the original editing parameters , and in the convenience of a 1U rack, with MIDI, and 8 outputs Initial supplies will be limited and demand, high We have been guaranteed a significant quantity of the first stock available Call for further details

RRP £449
£419
NEW BOXED

HAMMOND
XM1 & XMc1
ORGAN MODULE

Amazing sounding all new organ module with remote drawbar controller Based on the guts of the £8000 XB3, there is nothing as realistic as this on the market. Built in Leslie simulator and overdrive, up to 3 registrations simultaneously, variable release envelopes, percussion and too many more features to list here Exclusively supplied by CXK

EXCLUSIVE
£1085
NEW BOXED

WALDORF PULSE
ALL NEW ANALOG MONO SYNTH

Waldorf quality at a previously unheard of price! Their first venture into the burgeoning monosynth market has been universally acclaimed, and rightfully so. The Pulse's three oscillators provide some of the fattest sounds around, and it's modulation matrix allows a far higher degree of programming complexity than anything else in its range Add to that the fact that editing any parameter sends out a MIDI controller and you have a fantastic all round performer

NEW PRODUCT
£599
NEW BOXED

WALDORF PULSE PLUS
ALL NEW ANALOG MONO SYNTH

The Pulse Plus has all the features of the Pulse but with audio input, CV and gate control You can even play your guitar through it !

NEW PRODUCT
£699
NEW BOXED

NEW, USED & EX DEMO

Yamaha RY8	£169	Oberheim OBMX2	£1799
Access MATRIX Prog	£369	Peavey SpectrumBASS	£299
Access MicroW Prog	£369	Peavey Spectrum Org.	£359
Akai SG01K	£299	Peavey Spectrum Syn.	£359
Akai SG01P	£299	Roland MDC1	£349
Akai SG01V	£225	Roland MGS64	£395
Alesis DM5	£379	Roland MK570	£649
Alesis SR16	£219	Roland MOC1	£349
Boss DR5	£359	Roland MS1	£399
Boss DR660	£459	Roland MSE1	£325
Dream GMX1	£69	Roland MVS1	£349
Emu CLASSIC KEYS	£699	Roland P55	£399
Emu MORPHEUS	£799	Roland SC55ST	£365
Emu Procussion	£645	Roland SC88VL	£549
Emu Proformance	£359	Studio Elec SE1	£1526.33
Emu Proteus 2	£810	Technics SX-WSA1R	£299
Emu Proteus FX	£449	WALDORF MICROWAVE	£1199
Emu UltraProteus	£950	Waldorf PULSE	£499
Emu Vintage Keys+	£499	Yamaha MU5	£179
Kawai GMega LX	£129	Yamaha MU50	£275
Korg 05R/W	£325	Yamaha MU80	£420
Korg X5DR	£399	Yamaha QY22S	£349
Kurzweil K2000KB	£2769	Yamaha QY300	£575
Kurzweil KMP1	£299	Yamaha QY8	£99
Marion PRO SYNTH	£699	Yamaha RY20	£299
Novation BaseStation	£329	Yamaha RY8	£99
Novation Drumstation	£429	Yamaha SY85	£1299
Oberheim Matrix1000	£499	Roland P55	£492995

Keyboards

ROLAND
PC 200-II keyboard
IDEAL ENTRY-LEVEL MIDI CONTROLLER KEYBOARD

Compact touch sensitive master keyboard offering full control over pitch bend and mod, data slider assignable to reverb, pan or any controller, sustain pedal input, transpose over 2 octave range, send patch & bank change messages

Check out our unique package prices with these modules

PC200 £149 NEW BOXED

Proteus FX + PC200 ..... £529
S4 Plus + PC200 ..... £629
MU 50+ PC200 ..... £499
SC7 + PC200 ..... £285

EVOLUTION MK149 KEYBOARD
IDEAL ENTRY-LEVEL MIDI CONTROLLER KEYBOARD

Compact touch sensitive master keyboard offering full control over pitch bend and mod. wheel assignable to reverb, pan or any controller, sustain pedal input, transpose over 2 octave range, send patch & bank change messages

Check out our unique package prices with these modules

NEW PRODUCT
£119
NEW BOXED

Proteus FX + MK149 - £499
MGS64 + MK149 ..... £529
MU50+ MK149 - £469
SC7 + MK149 - £249

HAMMOND
XB-2
B3 LIVES AGAIN !

If you need an authentic Hammond sound, there is currently only one place to turn Hammond's XB2 has been specifically made to recreate the sound of the legendary B3, with 128 presets, 9 drawbars for easy programming, built in Leslie simulator, overdrive and reverb, nothing else comes close You can even connect a genuine Leslie via the 11 pin connector (reconditioned Leslies also available), and best of all, it weighs only 30 pounds! Exclusively available through Turnkey

EXCLUSIVE
£1399
NEW BOXED

The UK 4 track Centre

THE turnkey 4-TRACK PACK

Our famous 4 track pack includes everything you need to start making music Maxell headphones microphone with cable, chrome tapes cables, head-cleaning kit and the best book we've yet seen on multitrack recording, taking you through basic track laying, mixdown etc. with sections of everything from mic placement to synchronisation and MIDI We've obtained some great 4 track pricing AND for a limited period we will give you the 4 track pack (normal price £59.95) absolutely free with the units featured herein

PORTA 03 Mk2
only £199
INC 4 TRACK PACK

New version of a classic portastudio Improved styling and metering (!)

RRP £229
£199
NEW BOXED

FOSTEX
XR-3Multi-tracker
INC 4 TRACK PACK

High speed machine at £249 ! New auto-bounce facility and built in mic - ideal for 4 track recording on the move.

NEW PRODUCT
£249
NEW BOXED

FOSTEX
XR5 Personal Studio
INC 4 TRACK PACK

Stunning new double speed Fostex machine with individual EQ, up to 3 aux sends and 2 stereo returns, 2 inserts & 4 sep tape outs allowing use with an external mixer

RRP £420
£335
NEW BOXED

FOSTEX
XR7 Personal Studio
INC 4 TRACK PACK

The XR7 breaks new ground in price and performance - 6 inputs (2 mics), 2 separate aux sends, low/hi + sweep mid EQ. Records up to 4 tracks at once - double speed transport, Dolby C.

RRP £499
£449
NEW BOXED

NEW, USED & EX DEMO

Fostex 380S	£799	Tascam 424MK2	£499
Fostex DMT8	£1199	Tascam 464	£599
Fostex XR3	£219	Tascam 488MKII	£995
Fostex XR5	£319	Tascam Porta03 MK2	£199
Fostex XR7	£419	Tascam PORTA07	£269
Roland VS880	£1499	Yamaha MT4X	£399
Roland VS8F1	£340	Yamaha MT50	£279
Tascam 424	£379	Yamaha MT8X	£600

YAMAHA
MT50 Multi-tracker
INC 4 TRACK PACK

High Speed, record on all 4 tracks simultaneously , dbx noise reduction, 2 band EQ on each track, as well as auxiliary send/return

RRP £389
£299
NEW BOXED

TASCAM
Porta07 PortaStudio
INC 4 TRACK PACK

A fantastic new machine from the makers of the Portastudio Double speed, EQ on each channel, built-in dbx, 4 channel metering system

RRP £399
£339
NEW BOXED

TASCAM
424 Mk 2 PortaStudio
INC 4 TRACK PACK

A brand new version of the best selling 424 from Tascam, inventors of the portastudio Features include 3 band EQ with a mid sweep, records to all 4 tracks at once, 2 independent auxiliary sends (1 switchable pre/post fade) Logic controlled 2 speed transport with built-in memory location points, DBX noise reduction, initial supplies limited.

NEW PRODUCT
£499
NEW BOXED

FOSTEX
DMT-8 digital multitracker
INC 4 TRACK PACK

The personal digital multi-track is here at last, and at a price you won't believe! 8 separate tracks of CD quality audio recorded to half-gig hard-disk (up to 12 minutes) Record up to 4 tracks simultaneously, jog-shuttle, sync to MIDI without losing a track The 8 channel mixer accepts up to 4 mics, 2 band EQ and 2 aux sends Separate outputs and S/PDIF optical output. Unbelievable discount

RRP £1499
£1099
INC. FREE 1 GIG DRIVE
NEW BOXED

Sampling

TIME & SPACE
THE BEST EVER DR. RHYTHM !

We have two Time & Space Jukeboxes in store, each fully loaded with the current top 100 CDs There are choices to cover everything from straight instrumental sounds through sound effects, to loops and breaks We carry virtually the full range in stock and can also supply most disks in CD-ROM format for direct loading into your sampler Come and check out the latest sounds today

From as little as £29.95

EMU E64
COME FRO A DEMO AND HEAR THE DIFFERENCE!

64 note polyphonic. Uses the same operating system as the E-IV (new version includes around 13 different filter types). 16 part multi-timbral, 8 balanced outputs, SIMM memory, 2 SCSI ports, AES/EBU and SP/DIF digi I/Os.

WITH 8 MEG & HARDDRIVE
RRP £3297
£2348
NEW BOXED

EMU E-IV
SUPER SAMPLER
EXCLUSIVE UK DEALER EXCLUSIVE UK DEALER

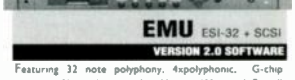
Our superb product knowledge and backup service have lead Turnkey to be chosen by E-mu as the UK's exclusive E-IV dealer As if this 128 polyphonic sampler wasn't great enough already, version 2.0 software and a range of new extras have transformed the product Version 2.0 features include 4 new editable 6 pole filter types (now 20), direct reading of Roland library as well as S1000, and the incredible SoundSprint technology from the E4K, allowing virtually instantaneous loading of sounds from disk. Also new are the FX board (RRP £329), giving 2 simultaneous top quality FX processors as in the E4K, and the 8 output board (RRP £799) giving an extra 8 balanced analog outputs, bringing the total to an incredible 16! Our bulk purchasing allows us to bring you this incredible price

RRP £4499
£2999
NEW BOXED

ROLAND S760
WITH FREE CD-ROM DRIVE & DISK

MEGADEAL! - incredible new low price from Turnkey including free SCSI CD-ROM drive and disk Everything you need to get started with plenty of usable library Also available packaged with OPI video/digital board at £1599, or with OPI plus DA400 8-output convertor for £1899

RRP £1899
£1299
NEW BOXED



EMU ESI-32 + SCSI
VERSION 2.0 SOFTWARE

Featuring 32 note polyphony, 4xpolyphonic, G-chip resonant filters, huge quality library, (Akai and Emax!! compatible) Time-stretch, doppler FX, parametric EQ, exciter etc.... All E-mu samplers come with free access to our enormous sample library (we have all the EIII library on CD-ROM) and excellent tech support (many staff are owners)

WEST END EXCLUSIVE
RRP £1199
£949
NEW BOXED

Now bundled with SCSI interface, CD-ROM drive, ZIP-drive and 8Mb of RAM plus 2 CDs for the incredible price of only £1199

NEW, USED & EX DEMO

Akai EXM003	£189	Emu E64	£1699
Akai EXM006	£129	Emu ESI32	£199
Akai EXM008	£499	Emu ESI32 SCSI	£899
Akai EXM01	£99	Kurzweil K2500	£2799
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Akai EXM3008	£549	Kurzweil SMPK	£893.99
Akai IB208P	£399	Roland DA400	£420
Akai IB3015	£49	Roland JS30	£850
Akai IB302D	£49	Roland OP760 IP	£350
Akai IB303T	£149	Roland S760	£999
Akai IB304F	£349	SIMM 1 MEG 30 PIN	£29
Akai MPC3000	£2799	SIMM 16 MEG 30 PIN	£499
Akai S1100	£1199	SIMM 16 MEG 72 PIN	£449
Akai S2000	£879	SIMM 4 MEG 30 PIN	£129
Akai S3000XL	£1699	SIMM 4 MEG 72 PIN	£129
Akai S3200XL	£3299	SIMM 8 MEG 72 PIN	£299
Emu E4	£2999	Akai IB302D	£49
Emu E4 Keyboard	£2699		

NEW, USED & EX DEMO

Alesis QS6	£699	Novat on Bass Stn R	£399
Ensoniq SQ1PLUS32	£899	Roland A30	£399
Evolution MK10	£59.95	Roland A33	£369
Fatar CMS41	£239.95	Roland AX1	£399
Fatar Studio 1100	£1099	Roland EP 5	£239
Fatar Studio 1100FC	£1299	Roland EP3	£149
Fatar Studio 2001	£829.95	Roland JV 50 EX	£569
Fatar Studio 2001FC	£849.95	Roland PC200GS	£165
Fatar Studio 49	£1099.95	Roland RD500	£1299
Fatar Studio 61	£109.95	Roland SPD11	£649
Fatar Studio 610	£229.95	Roland XP10	£399
Fatar Studio 610+	£299.95	Roland XP50	£1279
Fatar Studio 900	£599.95	Roland XP80	£1799
Fatar Studio 900FC	£829.95	Sequent. Prophet VS	£1199
Goldstar GMK 49	£129	Technics SX-WSA1	£2499.99
Hammond XB2	£1390	Ultimate keybd stand	£119
Hammond XB3	£8630	Viscon FK1000	£899
Kawai K11	£399	Waldorf Wave	£6845
Korg PROPHECY	£749	Yamaha CBX K3	£139
Korg Trinity	£2099	Yamaha CBX K1	£129
Korg Trinity PLUS	£2399	Yamaha KX5	£199
Korg Trinity PROX	£4300	Yamaha P300	£3199
Korg X3	£1299	YAMAHA PF150	£1459
Korg X5D	£549	Yamaha PF85	£949
Kurzweil PC88	£1899	Yamaha QS300	£869

PRICES INCLUDE 17.5% VAT
Uk mainland carriage £9.99

*We will beat any genuine quote from a UK or European dealer. We must be able to substantiate the quote and the goods must be available and in stock.

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EUROPE'S LOWEST PRICES GUARANTEED*

Outboard

LA AUDIO GCX2

NEW PRODUCT

The new LA Audio GCX2 offers 2 channels of high quality Compression and Gating for a measly £189 inc VAT. Soft Knee Compression Circuitry features fully variable Threshold, Ratio and Gain controls plus Attack and Release modes. A Side-Chain insert provides Frequency Conscious Compression 2 fully featured Gates have variable Threshold and Release controls, an ultra fast Attack rate plus a Side Chain insert for Frequency Conscious G-G-G-Gating'
Dual mono and Stereo modes make this product an extremely versatile processor for ALL Studios

WARNING This product will be extremely popular so place a deposit now for guaranteed allocation'

JUST OUT £189 NEW BOXED

SPL STEREO VITALIZER

BULK PURCHASE

The Vitalizer is the Rolls Royce of enhancer / exciter processors. Using a significantly different process to other such products, the effect deals with the full frequency range and is substantially smoother and richer. Also included is a "surround" effect which varies the width of the stereo field, massive bulk purchase allows this unbelievable price - check one out now - we guarantee you'll be impressed

RRP £569 £329 NEW BOXED

DIGITECH TSR-12

FEATURES 'S-DISC' PROCESSING

With the introduction of the Studio Quad, Digitech have decided to stop production of the TSR12 as it is too expensive to make. We have stock of the last ever units available at a bargain price. Features include S-DISC processing, up to five effects at once including several different types of reverb, delays, chorus etc. Full MIDI spec allows realtime control of individual effect parameters. Limited stocks only

RRP £399 £269 NEW BOXED

DIGITECH STUDIO QUAD

4 CHANNEL STUDIO EFFECTS PROCESSOR

At last - Multi effects as they should be' The new Digitech Studio Quad features not only their custom designed and ultra-powerful 'S-DISC' chip, but also 4 independent inputs and outputs, which using the built-in sub-mixer, can be configured as 4 mono ins feeding 4 effects processors, feeding 4 stereo outputs. Huge screen, and new intuitive operating system make editing a breeze. 20 bit convertors give greater than 90 dB signal to noise ratio. Effects include reverbs, delays, detuning, chorus, flanging etc. Hundreds of other features too numerous to mention. Very limited initial stocks, order now to avoid disappointment'

NEW PRODUCT
SHORT SUPPLIES
£499 NEW BOXED

DIGITECH TSR-6

STEREO PROCESSOR

The TSR6 offers Digitech's legendary SDISC true stereo processing, in an easy to use 1U rack mounting box. Controls include, input, mix level and 3 program dependant parameter controls. FX include Reverb, Chorus, Flanger, Tremelo, Mtap Delay, Single band parametric and De-tune. Program change can be controlled over MIDI. 99 User and 99 Preset memory locations are available.

RRP £299 £199 NEW BOXED

DIGITECH Studio Twin

NEW MODEL - NEW MODEL

True Stereo. 99 Presets 99 users. 46 kHz sample rate 18 bit. Internal PSU 1U / case.
Fx Include Reverb, Multi-tap delay, Chorus, Flanger, Phaser, Tremolo, Parallel effects processing using S-DISC chip, 2 digit display, MIDI program change

JUST OUT £249 NEW BOXED

ALESIS NANOVERB

NEW REVERB

To create the NanoVerb™, Alesis created sixteen powerful new preset effects algorithms, added 18 bit digital converters, and fit them into a compact, easy-to-use and incredibly affordable package. Lush Hall, Plate and Room Reverb, rich true stereo Chorus, Flange, Delay and useful Multi-effect programs are all offered. The NanoVerb's powerful assortment of programs offers enough variety that you can use it on your guitar rig, author a multi-media presentation the next day, and mix bands at the coffee house the following night. The Adjust knob allows you to tweak its great-sounding programs until they're just right for your music, while the Input/Output levels and Mix controls ensure proper effect levels for a wide variety of applications. And since the NanoVerb is so affordable, you can put two or three in your rack for dedicating to multiple sources

RRP £169 £POA NEW BOXED

BEHRINGER Composer

WORKHORSE COMPRESSOR

A natural sounding and fully featured compressor at a give away price ! Built-in gate removes any unwanted noise, soft-knee action makes compression much less obtrusive, "auto" mode makes quick setup a doddle and side-chain access means it can also be used for de-essing etc

RRP £349 £229 NEW BOXED

LEXICON Alex and Reflex

SPECIAL OFFER

If You're looking for a straight reverb unit, Lexicon have a reputation that's hard to beat ! These are the cheapest units to offer the famous 'Lex' sound - The Reflex has the additional benefit of dynamic MIDI - allowing real time control of multiple effects parameters. Huge discount at Turnkey !

RRP from £449 £POA NEW BOXED

NEW, USED & EX DEMO

Alesis 3630	£199	Klark Teknik DN300	£939
Alesis MEQ230	£185	Klark Teknik DN301	£939
Alesis MICROVERB3	£165	Klark Teknik DN320	£611
Alesis MICROVERB4	£199	Klark Teknik DN330	£646
Alesis MIDIVERB4	£299	Klark Teknik DN332	£891
Alesis QUAD2	£549	Klark Teknik DN360	£1479
AMEK 9098	£	Klark Teknik DN3600	£2345
Aphex 720	£1818	Klark Teknik DN3601	£1820
APHEX-104	£219	Klark Teknik DN3698	£1880
APHEX-105	£379	Klark Teknik DN405	£727
APHEX-106	£339	Klark Teknik DN410	£1175
APHEX-107	£549	Klark Teknik DN500	£939
APHEX-108	£239	Klark Teknik DN501	£979
APHEX-320A	£1818	Klark Teknik DN510	£939
APHEX-720	£1818	Klark Teknik DN514	£856
BBE 322	£149	Klark Teknik DN6000	£3237
Behringer EX2100	£149	Klark Teknik DN716	£1232
Behringer EX3100	£249	Klark Teknik DN726	£1749
Behringer MDX2100	£229	Klark Teknik DN728	£2100
Behringer MDX2400	£299	Klark Teknik DN750	£2150
Behringer MX8000	£1199	Klark Teknik DN775	£1999
Behringer XR2400	£399	Klark Teknik DN800	£1433
BOSS RV70	£399	LA 4C2	£399
BOSS VT1	£399	LA 4G2	£399
BSS DPR402	£849	LA 4X4	£299
BSS DPR901	£849	LA C8	£699.13
DBX 130X	£149	LA CX2	£199
DBX 160A	£504	LA GX2	£219
DBX 165A	£1426.45	LA MX2	£249
DBX 166A	£548.73	LA V8	£816.63
DBX 168A	£1028.13	Lexicon 300L	£4641
DBX 266	£351.33	Lexicon 480L	£10569
DBX 274	£539.33	Lexicon ALEX	£299
DBX 290	£410	Lexicon DUALFX	£249
DBX 296	£417.13	Lexicon JAMMAN	£399
DBX 760X	£383.05	Lexicon LARC	£1512
Denon DRM550	£159.98	Lexicon LXP15II	£699
Denon DRM640	£209.99	Lexicon PCM80	£1998
Denon DRS810	£309.99	Lexicon PCM90	£2585
Denon DWR580	£499.99	Lexicon REFLEX	£329
Denon DWR760	£259.99	Lexicon YORTEX	£449
Digitech DHP33	£699	Massenb. GLM8200	£3319
Digitech DHP55	£999.95	Massenb. GLM8900	£5046
Digitech MIDIVocalist	£449	Neve 33609C. £*3 2,192	
Digitech RPM1	£549.95	P+R DB 1 DI	£29
Digitech StudioVocalist	£999	Peavey Analog Filter	£359
Digitech TSR12	£399	PHONIC PCL3200	£169
Digitech TSR24S	£799	Roland RSS10	£2199
Digitech VOCALIST B	£549	Roland SDE330	£856
DOD 231	£449.95	Roland SDX330	£799
DOD 830	£259.95	Roland SRV330	£549
DOD 834	£249.95	Samson E30	£219
DOD 835	£199.95	Samson E62	£299
DOD 866	£249.95	Sony DPSV77	£1399
Drawmer 1960	£1169.13	Sony MRGP3	£499
Drawmer 1961	£1169.13	Sony MRMP5	£499
Drawmer DF320	£499.37	SPECK EQ316	£699
Drawmer DL221	£558.13	SPL CVXLR	£822
Drawmer DL251	£440.63	SPL EQMAGIX	£1175
Drawmer DL251	£558.13	SPL MIKEMAN	£468.82
Drawmer DL441	£616.88	SPL OPTIMIZER	£1173
Drawmer DS201B	£405	SPL SVLXLR	£645
Drawmer DS301	£616.88	SPL Vitaliser Stereo	£299
Drawmer DS404	£616.88	SSL 834	£2350
Drawmer LA12	£287.88	Summit DCC2000	£313
Drawmer LX20	£175	Summit EQF100	£2526
Drawmer M500	£910.63	Summit EQP200	£2345
Ensoniq DP/4+	£1299	Summit TLA100A	£1610
Ensoniq DP2	£799	Symmetrix 402	£699
Eventide DSP4000	£4694	Symmetrix 420	£380.7
Eventide H3000B	£3401	Symmetrix 421	£499
Eventide H3000DSE	£2696	Symmetrix 422	£599
Eventide H3000DSX	£1991	Symmetrix 425	£499
Eventide H3500DFX	£3701	Symmetrix 488	£599
Focusrite BLUE 230	£2932	Symmetrix 501	£329
Focusrite BLUE215	£2932	Symmetrix 501/01	£379
Focusrite BLUE245	£2879	Symmetrix 528	£649
Focusrite BLUE315	£4653	Symmetrix 564E	£995
Focusrite BLUE330	£5076	Symmetrix 571	£799
Focusrite RED0	£117.5	Symmetrix 572	£699
Focusrite RED1	£2262	Symmetrix 601.1938.75	
Focusrite RED2	£2344	Symmetrix 602.1938.75	
Focusrite RED3	£2879	Symmetrix 620.1095.1	
Focusrite RED4	£2344	Symmetrix SC1	£20
Focusrite RED5	£2056	Symmetrix SC2	£30
Focusrite RED6	£1675	Symmetrix SX201	£258
Focusrite RED7	£1757	Symmetrix SX202	£258
Focusrite RED8	£1440	Symmetrix SX204	£258
Frontline DDS 20	£99	Symmetrix SX208	£258
Furman LCX	£349	TC 2290 22D24	£2080
Furman PL8 PLUS	£235	TC M5000 SADF	£3496
Furman PL8E	£175	TLA CL1	£1169
Furman QN44	£399	TLA EQ1	£1052
Joe Meek Voice Chan.	£589		

Monitoring

ABSOLUTE 2 Studio Monitors by SPIRIT

PHONE FOR BEST PRICE

Here at last ! Stunning sounding and looking monitors from the UK's leading mixer manufacturer. Incredible bass extension and power handling at a killer price. In stock now, come in and audition them ASAP !

RRP £249 £POA NEW BOXED

CONTROL 5 JBL

NEW LOW PRICE

These classic monitors from JBL have been a standard in studios for several years and still stand up very well against more recent competition. The solid build quality you can expect from JBL comes as standard and the ported design gives fantastic bass response. Internal fuses help to prevent blown tweeters and a separate sub-woofer is also available for only £199. Exclusive to Turnkey

RRP £499 £249 NEW BOXED

YAMAHA NS10M Nearfield Monitors

INDUSTRY STANDARD

The Yamaha NS10M is a high-performance near-field monitor - the choice of recording professionals throughout the world. Its wide acceptance means that you can take your mix from studio to studio and always be sure of hearing it on a similar system. Using NS10Ms also means you'll get a clear idea of what your mix will sound like on the "average" hi-fi system

RRP £369 £299 NEW BOXED

OMNIPHONICS FOOTPRINT Power Amplifier

FLYING OUT OF THE DOOR

Superb quality 75w per channel power amp from top studio amp manufacturer omniphonics. Balanced inputs, emergence cut-out and bridgeable to mono, 1U rack-mount case. These are flying ! RRP £399

SCOOP RRP £399 £279 NEW BOXED

CONTROL 1c JBL

NEW LOW PRICE

These superb compact monitors (RRP £289) are ideal for accurate monitoring on a budget. Sturdy impact resistant casing makes them the only choice for location work. Bundle them with the Peavey PHA70 power amp for only £299

RRP £199 £139 NEW BOXED

NEW, USED & EX DEMO

AKG LSM50	£89	JBL CONTROL5+	£575
Alesis monitor 1	£399	JBL CONTROLSB1	£269
Alesis MONITOR2	£799	JBL CONTROLSBS	£339
Alesis RA100	£299	KRK 6000	£699
AR Powered Partners	£149	KRK 6000S	£817
ATC SCM10	£995.23	KRK 7000B	£1169
ATC SCM100	£4033.78	KRK 7000B/S	£1287
ATC SCM100A	£5659	KRK 9000B	£1874
ATC SCM20	£1505.18	KRK 9000B/S	£1992
ATC SCM200A	£11207.15	KRK KROK	£351
ATC SCM300A	£11994	KRK KROKS	£469
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Digidesign Pro Tools 4.0

Digital Audio Software Upgrade

There are now more options on the market than ever before for anyone wishing to indulge in hard disk recording and editing. PAUL D LEHRMAN previews the latest update for the popular Pro Tools system, designed to keep Digidesign on top amidst increasing competition.

Digidesign's latest and greatest version of the software for their signature hard-disk recording and editing system, Pro Tools 4.0, is scheduled to be released by the time you read this. It's not the revolutionary jump that the last Pro Tools upgrade was — Pro Tools III, you may remember, not only revamped the software but essentially required that you turn in your old hardware for new — but it's a significant step forward for the system, with lots of clever and well-designed new features. While Pro Tools has always been particularly well regarded for its editing capabilities, the new version improves the system's recording and mixing functions substantially, bringing them closer to the level of its editing, both in sophistication and usability.

I was able to see a late Alpha version of the system, a few weeks before the Los Angeles AES convention, and just before it went into the Beta-testing stage. There were some instabilities in this version, but all of the new features were up and running, and many are impressive indeed.

HARDWARE OPTIONS

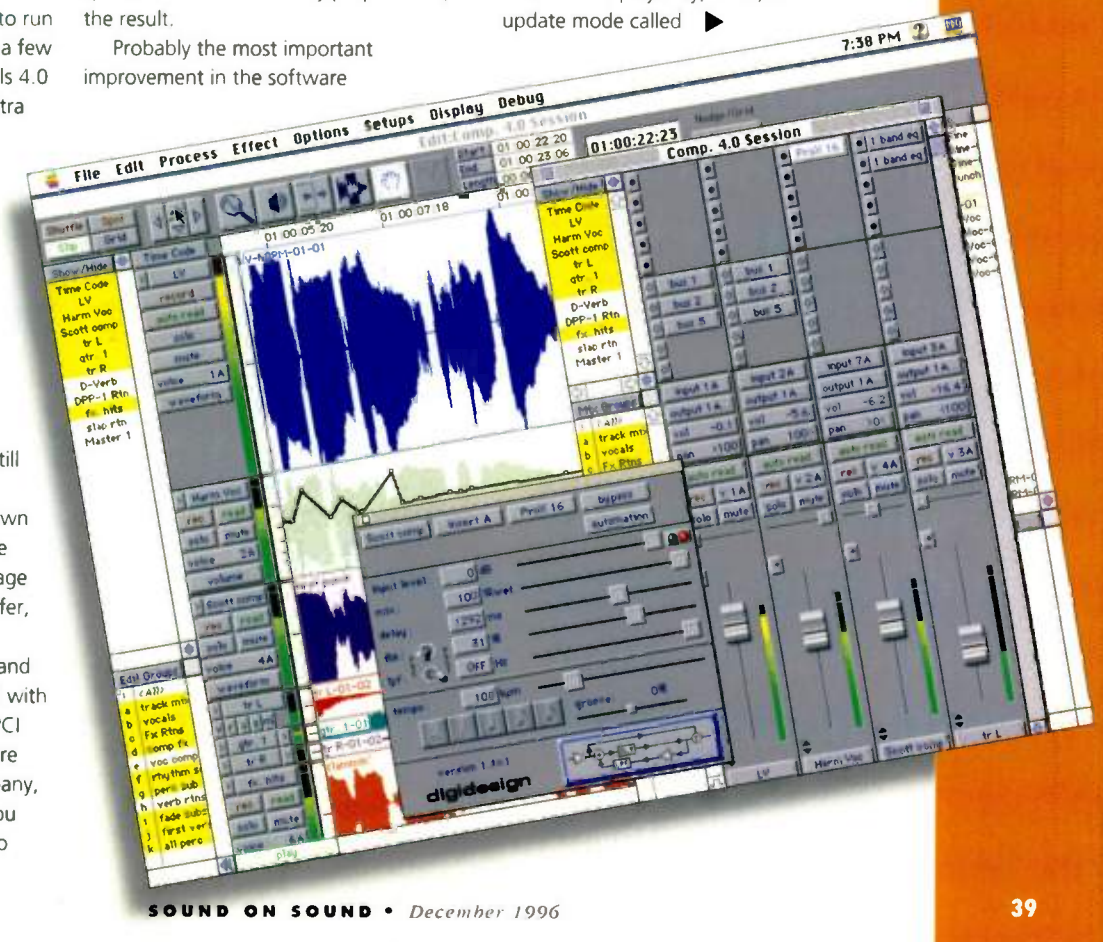
First things first: what do you need to run this software? Well, there are quite a few hardware choices available. Pro Tools 4.0 can run on a Power Mac with no extra hardware at all, using the internal 16-bit sound. The output will be stereo, but the number of tracks can be 4, 8, or even more, depending on the speed of the CPU and the hard disk. On this platform, the program is fully functional, except that real-time DSP is not available. The next step up is Digidesign's Audiomedia III card for PCI Macs, which offers better and faster performance but still only two outputs. Then there's the 'Project' card, which used to be known as Session 8, and has eight analogue ins and outs. Finally, to take advantage of *everything* the program has to offer, you need a full-blown Pro Tools III system, which starts at eight tracks and goes upwards, and comes equipped with one or more DSP-farm cards. Both PCI and NuBus versions of Pro Tools III are supported, the latter, says the company, "for some time to come," in case you were worried (which I am). Older Pro Tools systems, however, are not officially supported, although they may still work.

SOFT IMPROVEMENTS

The program code for Pro Tools 4.0 has been optimised for Power Macs, so that it runs a lot faster. This is especially apparent in screen redraws of tracks, which seem almost instantaneous, and with on-screen metering, which now has ballistics remarkably close to a real plasma display (and in three colours!) The improvement is also evident, if not quite as obviously, in other areas, such as DSP crunching and crossfade calculation. On pre-Power PC Macs, there is also some performance improvement, but it's not nearly as great.

The severe restrictions on file formats in previous versions are gone: Pro Tools 4.0 can read and write audio in *Sound Designer II*, AIFF, .WAV, SND, and QuickTime Movie formats, using a wide range of sampling rates and word lengths — a welcome development for multimedia producers. Format conversion is automatic when you import a file, and when you perform a conversion, either coming in or going out, you can specify the quality and speed, (which are inversely proportional) of the result.

Probably the most important improvement in the software is the way in which it handles automation. Faders can now be grouped, and groups nested within each other. Up to 26 groups can be set up, and they can be enabled or disabled, individually or globally, without changing their configuration. Moving any fader in a group moves all of them, and they all move proportionately to each other. There are four modes for automation: play only; write; an update mode called ▶



▶ Touch, in which the fader reverts (or 'glides') back to the previous level when you let go of it (the glide time is programmable); and Touch Latch, an update mode in which the fader stays put after you've moved it.

Automation can now be applied not just to level and pan, but to any parameter on the screen, whether it's a built-in function such as EQ, or a third-party plug-in. Parameter controls are record-enabled in just the same way as fader or pan controls. Once you've recorded a parameter change, the track can be displayed as a horizontal line on the edit screen, just like level changes, and can be adjusted in that screen using the 'hand' cursor. In fact, this can be done while the program is playing — it no longer comes to a sudden halt whenever you move anything on the edit screen — and while you're adjusting the parameter, its current value (EQ centre frequency, decay time, delay feedback gain, or whatever) is displayed right next to it. Unfortunately, you can only view one parameter at a time on this screen — maybe that will change in Pro Tools 5.

When automation is being recorded in real time, the program creates a new event every 5ms — which Digidesign say is even faster than an SSL desk. This much data can load down the computer, however, so a 'Thin Automation' function, similar to the 'Thin controllers' function in many MIDI sequencers, is provided. This can be applied automatically after each pass, or used manually. Solos and mutes (which now work instantaneously and intelligently, so that soloing a reverb, for example, doesn't shut off all of the inputs to the reverb!) also have their own automation track.

There's a new 'narrow mix' display mode, in which the faders slim down so that 27 of them will fit onto a 17-inch screen. This will be helpful to anyone who uses a lot of tracks and wants to see them all. For further slimming of the screen, a 'Show/Hide' window lets you remove tracks that you don't need to see from the screen, while continuing to play them. The Show/Hide window is itself hideable!

In addition to being able to set up automation groups, you can define editing groups, so that slicing and dicing one track can affect all of the others in a group. Groups can overlap each other, and any group can be designated as an edit group, an automation group, or both.

SOUND DESIGNER FUNCTIONALITY

The other major change in Pro Tools 4.0 is that destructive editing of files has now been brought inside the Pro Tools environment. Previously, the program was strictly non-destructive: if you wanted to change an actual sound file, it had to be exported into another program, like *Sound Designer II*, modified, and then brought back into Pro Tools. Most of *Sound Designer*'s functions are now in Pro Tools, and when you modify a file destructively, it stays right where it was, so you don't have to re-import anything. (One reason for including these functions is that making *Sound Designer* compatible with the new PCI machines would have meant rewriting it from scratch — it's a 10-year-old program — and Digidesign, understandably, were not too eager to do that!)

There are now five levels of screen height available for each track, the largest one being about the size of a typical *Sound Designer* window. A new icon has joined the Pro Tools Toolbar: *Sound Designer*'s pencil. When you zoom in on a soundfile far enough, you can redraw the waveform with the pencil.

The destructive audio functions are found in the Process menu; the usual operations, such as normalise, reverse, change level, and so on, are available, and a new function removes any DC offset from a file. When a region is edited, the program gives you the choice of creating a new soundfile or overwriting the old one, but regardless of which you choose there is always an Undo facility available. The Process menu will gain additional functions as third-party developers modify their *Sound Designer* and TDM plug-ins for the new software. This new plug-in architecture is known as AudioSuite, and it can be used with even the lowliest Power Mac-only Pro Tools system. A welcome corollary to this feature is that multiple regions, when shift-selected in the Regions window, can be batch-processed by any operation in the AudioSuite, in a single stroke.

The playlist feature of *Sound Designer* has also been brought into Pro Tools 4.0,

> "...it's a significant step forward for the system..."

and up to 99 playlists — that is, different arrangements of audio material — can co-exist on a single track. This can help when you have several alternative takes of an instrument or vocal in a recording: you can use different playlists with a single set of processing parameters, instead of multiple virtual tracks, each of which needs its own automation, EQ, reverb, etc, and so on.

AND THERE'S MORE...

There's a lot more to Pro Tools 4.0. Regions can be sorted by name, date created, SMPTE time, or other criteria. A true destructive-record function, which permanently wipes out unwanted takes, has been implemented. You can now draw your own crossfade curves, and a representation of how the resulting waveform looks is displayed as you draw. As I said, lots of clever new stuff. The rest of the features list will have to wait until after the software is released, and we have a chance to dig into it at length. I'll let you know what I come up with! SOS

info

£ Pro Tools 4 Core System (PCI) £7131; NuBus £6238. Prices inc VAT. Version 4.0 software upgrade for Pro Tools III owners, free; a reduced-cost exchange system is in place for owners of pre-Pro Tools III systems.

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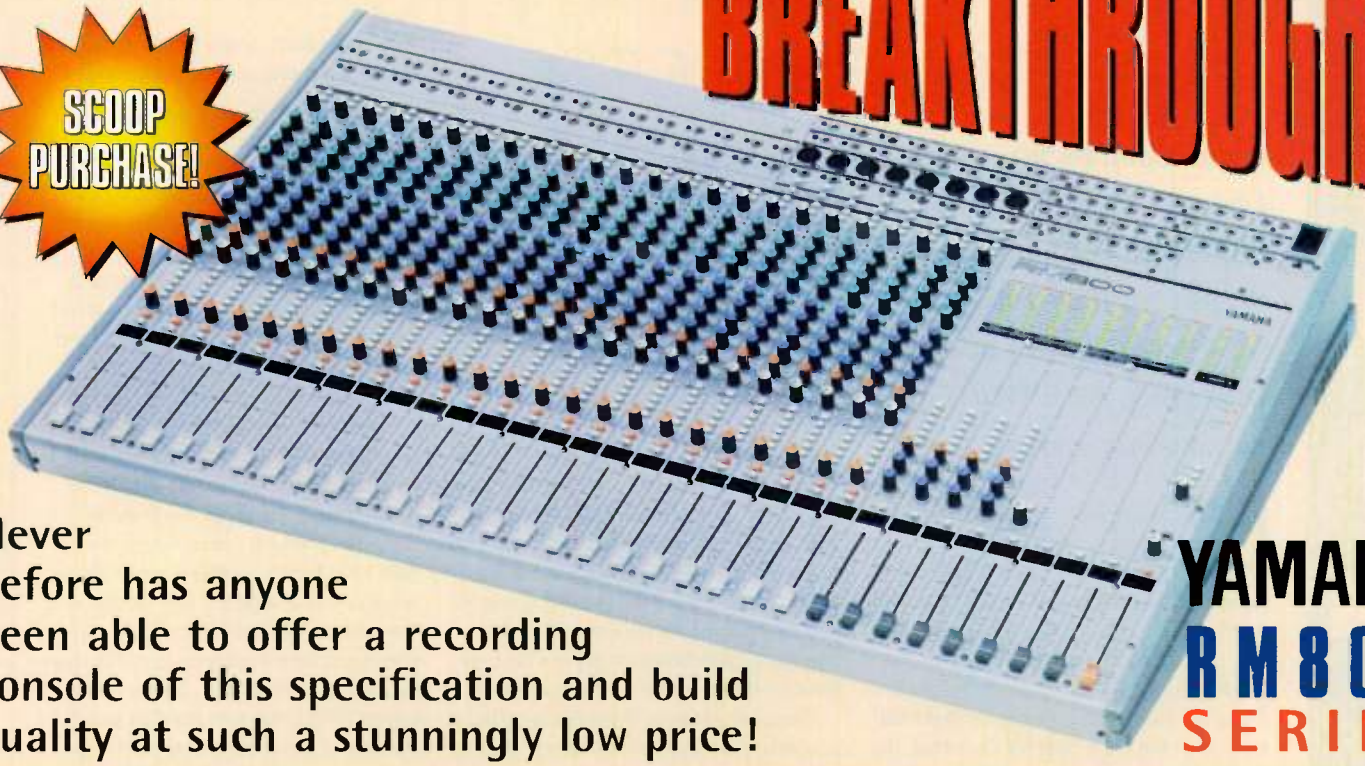

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preview

Lexicon MPX1

Multi-effects Processor

If you aspire to pro Lexicon effects such as the PCM80, but don't have deep enough pockets, the MPX1 could be just up your street. PAUL WHITE gets a sneak preview.

Lexicon's recent product releases have been moving steadily upmarket (the PCM80 multi-effects unit, reviewed *SOS* December 1994, and the PCM90 reverb, reviewed *SOS* May 1996), but now the company have turned their gaze to the middle market, with the announcement of the MPX1 multi-effects processor. Destined to arrive in the UK in time for Christmas, the MPX1 might be seen as a replacement for the elderly LXP15, but technically has more in common with the PCM80.

OVERVIEW

Like the PCM80, the MPX1 uses one Lexicon LEXI Chip 2 for reverb processing and a separate DSP (Digital Signal Processor) for multi-effects, but its styling is quite new, and its operating system is, in many ways, simpler than some previous Lexicon products.

On the face of it, the MPX1 looks like a fairly conventional multi-effects unit, with six effect blocks which may be connected in any order, utilising various series/parallel routing options. Each block may be edited independently. Because available processing power has to be shared between the non-reverb effects, the number of simultaneous effects on offer depends on the specific effects chosen, though you can usually have at least three or four going at a time, and some patches use all six effects blocks.

Though the above appears conventional, the MPX1 has some unusual aspects, not least the matrix-style modulation normally associated with more up-market Lexicon processors. Using this system, various effect parameters can be modulated via on-board LFOs, input envelopes, pedals, MIDI, and so on, to create very dynamic effects. Furthermore, several morphing options are offered, which may be used to recreate real-life effects, such as Leslie speakers varying in speed from fast to slow. Abstract treatments may be created by morphing between less likely pairs of effects; the morphing process actually modifies the parameters of one effect until it becomes the other effect, so there's more to it than simple crossfading.

The quality of even the everyday effects is superb, with reverbs coming very close to what you'd expect from a PCM80, and Lexicon's legendary ambience algorithm also putting in an appearance. On the minus side, with delays you don't get so many taps as on a PCM80, and the MPX1 has no resonant chord programs.

Looking beyond the traditional chorus, flange, delay, phase, pitch-shift, and reverb effects, the MPX1 is also able to produce remarkably convincing analogue filter treatments, and using the modulation capabilities of the machine, these can be made to sweep according to input envelope, on-board ADSRs, MIDI note triggers, and so on. To my ear, a number of the preset effects seem to have been optimised for guitar, and because there's an EQ block on board, there's plenty of scope for timbral tailoring in this application. Furthermore, as with many well-designed effect algorithms, creative effect combination often produces results which are more spectacular than the sum of the parts, and is further enhanced by good ordering and routing options.

USING THE MPX1

To make accessing the 250 on-board memory locations (200 presets, 50 user patches) easier, a database-style tagging system has been implemented on the MPX1, so you can search for effects by number, by sound source type, by effect type, or by a combination of source and effect type. Tap-tempo facilities are included for real-time delay or rate settings, and so-called 'soft' controls can be created for fast access to frequently-adjusted parameters of each patch, without having to go into edit mode.

Unlike previous Lexicon units, the MPX1 has both an alpha-numeric display window and a large numeric indicator. The user creates patches by calling up a preset and then modifying it, rather than by starting from scratch. Once loaded, effects blocks may be turned on or off, their order and routing may be changed, and effect parameters altered. Though there are only six effects blocks, the sub-divisions of effects within each block mean that there's a huge repertoire of treatments to choose from. Usefully, the Chorus block (chorus, flanging, phasing, and so on), is separate from the Mod block, which is dedicated to panning, tremolo and overdrive effects.

As we've come to expect from Lexicon, the MIDI implementation is comprehensive to the point of overkill, and up to three MIDI patch maps may be created and stored. Digital I/O is also provided as standard.

WATCH THIS SPACE...

The MPX1 promises to be a flexible machine that can be approached on a number of levels: the factory presets provide instant gratification, simple editing will provide enough variation to satisfy many users, yet the sound designer will find the flexible routing and modulation options provide plenty of scope for creativity. I've only played with the MPX1 for a day so far, but I'm already impressed. Expect an in-depth review very soon! SOS

info

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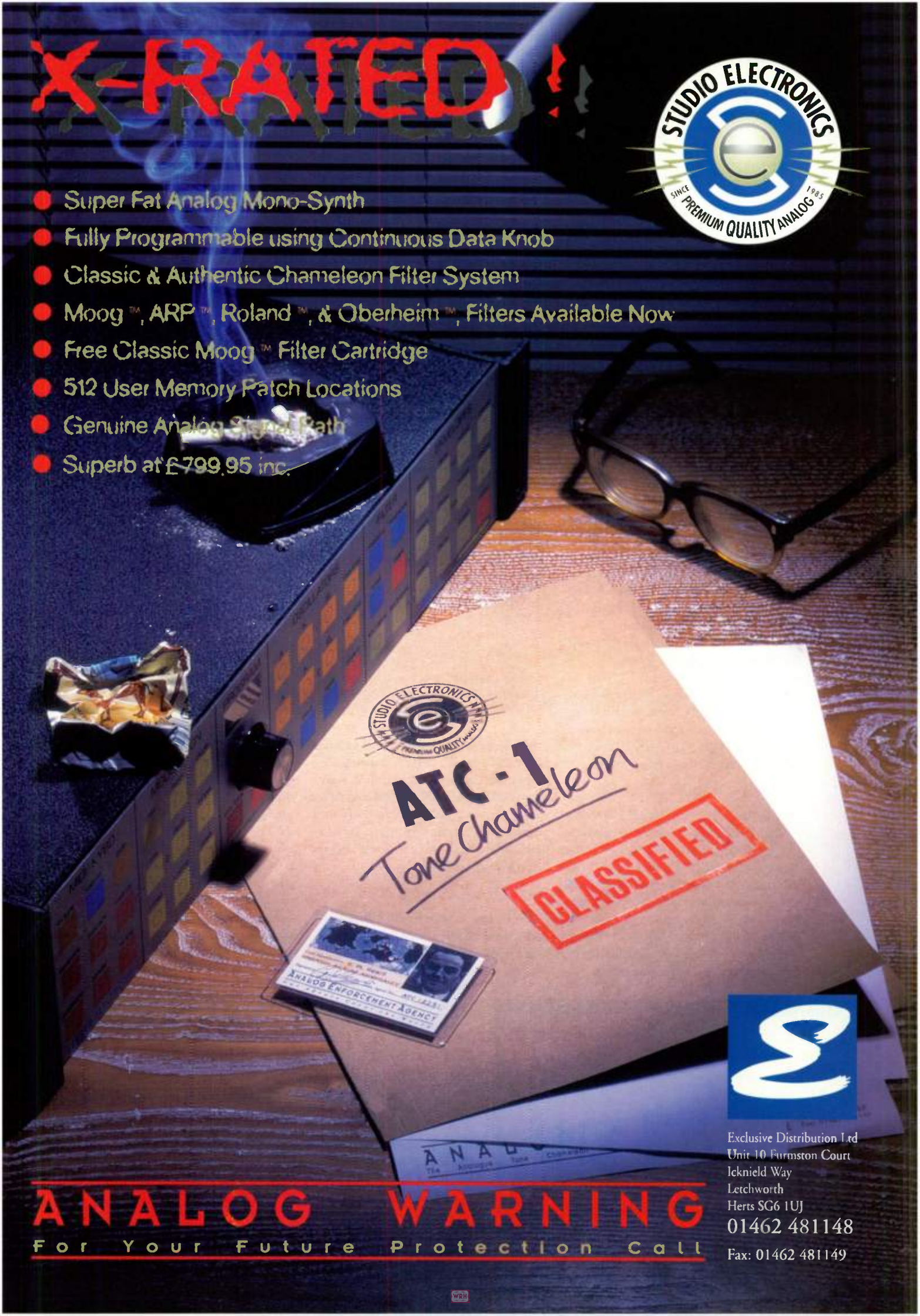
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Yamaha MU10XG

GM/XG Sound Module

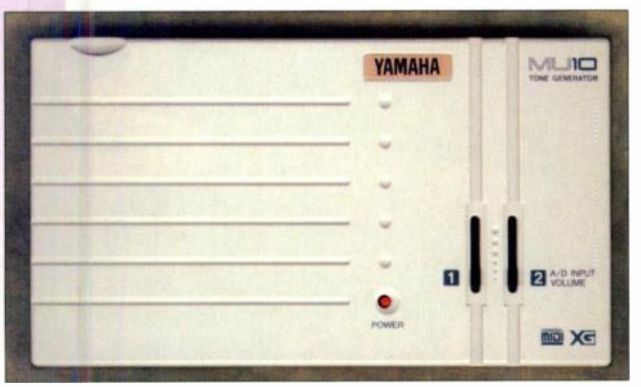
The MU10XG's unassuming casing conceals a sound source with hidden depths which you can explore using MIDI SysEx. DEREK JOHNSON dives in.

As announced in last month's news, Yamaha have entered the burgeoning sub-£200 General MIDI module market. The MU10XG might be the size of a video cassette, but its internals have a lot in common with the MU50/DB50XG line (which includes the CS1x control synth, reviewed August 1996 *SOS*).

Externally, the MU10 is pleasingly rounded, if grey and a bit plain — though it perfectly matches most computers and peripherals. Its spec is virtually identical to other DB50XG-based products, but is especially noteworthy at this price: 16-part multitimbrality; 32-voice polyphony; 676 sounds; 21 drum kits; three effects processors (11 reverbs, 11 choruses, 43 variations); GM and XG compatibility; serial port for PC or Mac connection; two audio inputs, ideal for guitar, mic or synth, with input level controls; full SysEx control of editing parameters.

FACILITIES

The MU10's only controls are the level sliders for the audio out and two audio ins, a power switch, and the serial port selector switch; the only visual feedback is from a power LED that flashes in the presence of MIDI data. Connectors include a stereo mini-jack output (for line use or headphones), a pair of quarter-inch audio input jacks, MIDI In and Out, a power socket (although the module will run on six AA batteries) and the serial port.



The MU10 is a sample-based synth, each voice using one or two elements (waveforms); two-element patches cut down polyphony. A full set of synthesis parameters includes envelope generator, resonant filter, LFO, alternate tuning table and pitch EG, although these features are only accessible through the use of MIDI System Exclusive commands. This is a highly capable synth, as evidenced by Yamaha's impressive XG demo files.

EFFECTS

The MU10's effects, and their implementation, are nearly as sophisticated as those found on more upmarket synths. They can be used as 'system' effects, applied to all 16 parts, or as 'insertion' effects, where a designated effect treats just one part. Reverb and chorus are dedicated system effects, but the insertion effect can be a system effect *or* a variation effect: there are 42 of these, ranging from reverbs and modulation treatments to delays, distortion and pitch-shift. This means that if a sound depends upon an effect — distorted guitar, say — it doesn't lose the effect when used multitimbrally, since it can be assigned that effect independently.

XG XPLAINED

XG is an extended version of General MIDI, rather like Roland's GS format. Any XG instrument will play back GM files accurately, but Yamaha also equip their XG synths with alternative (variation) patches accessible with MIDI Bank Select commands. Not every patch has variations, but many have several. Most of Yamaha's XG MIDI files not only use these additional patches, but fully exploit editable parameters through judicious use of SysEx.

BUNDLED EXTRAS

Mac or PC users in need of a MIDI interface will be able to use the MU10's serial port right away, since the MU10 comes in a bundle that includes a multi-purpose serial lead and a CD-ROM full of PC and Mac software, drivers and demo files. All you add is a MIDI keyboard. Pride of place on the CD-ROM goes to a full copy of Steinberg's *Cubasis* sequencer, worth about £129. A shareware copy of *XG Edit*, currently only available for the PC, provides control over the hidden wonders of the MU10XG, but a Mac version is due soon — check out Yamaha's web site, or contact your local dealer. The user manual is also on the CD-ROM, in Adobe *Acrobat* format — no wasted trees here — and you decide whether to print it out or not.

pros & cons

YAMAHA MU10XG £199

pros
- Cheap.
- Compact.
- 32-voice polyphony.

cons
- No display.
- Using the audio ins cuts two notes of polyphony.
- Editing requires software.

summary

A fine set of GM sounds, full editability if you need it (albeit via SysEx), compact size and an even more compact price tag mean that the MU10XG will fly off the shelves.

SOUND ON SOUND

CONCLUSION

Taken with the Midiman module reviewed last month, the MU10XG might indicate the start of a trend. If other manufacturers decide to launch a sub-£200 module, however, they'll already have some serious competition from this new Yamaha unit.

The downside of the MU10XG is that its full potential is only achieved when software capable of generating SysEx data is used. Computer-less owners will gain a great GM module, but will not be able to edit the sounds — or make use of the bundled extras. Other things to note include the fact that using the external inputs (which route a signal through the MU10XG's effects) cuts polyphony by two voices. It's also a shame that the MIDI connections can't be used independently, which would have provided you with 16-part multitimbrality internally, and another 16 parts to send to external modules. This is a trick used by many internal PC cards.

However, this module packs a mighty sonic wallop for the money, offering a collection of uniformly excellent sounds, with wondrous depths for the money, thanks to the magic of System Exclusive. If I had just £200 to spend on a GM module, at the moment this would be it. SOS

info

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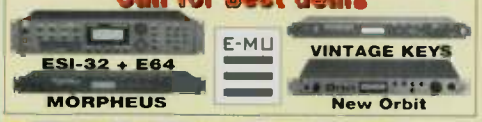

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Crown CM700

Back-Electret Cardioid Microphone

PAUL WHITE reviews an uncharacteristically compact mic and discovers that size isn't everything.

The perfect mic would translate any sound without adding to or detracting from it in any way, yet the modern engineer is faced with a multitude of different models designed for different applications or to give different tonal 'enhancements'. This is due, at least in part, to the technical impossibility of making a microphone that performs optimally for all parameters that are of concern to the end user; a mic designed to withstand huge sound levels, for example, might tend to be noisy on low-level signals, and a mic designed for a pristine on-axis response might fall short when faced with off-axis sounds.

Then there's fashion: do you actually want a mic that sounds accurate, or do you want one that flatters — rose-tinted spectacles for the ears? And what about pickup pattern? Omnis invariably produce the most natural sound, but they may pick up sounds we'd rather not hear. Cardioids, on the other hand, provide better rejection of off-axis sounds, but often at the expense of tonal neutrality. Multi-pattern mics are available, but they cost rather more than fixed-pattern models, and choosing one makes little sense if it's going to be left set to 'cardioid' day in, day out.

CROWNING GLORY

With the CM700, Crown haven't been rash enough to try to build a mic that promises all things to all people. Instead, they seem to have tried to deliver most things to most people, all at an affordable price. Most live performers use cardioid mics because of the need to reject spill, and in the studio, cardioids are popular for the same reason. That narrows it down a bit — let's build a cardioid. In order to get high-frequency accuracy, you need a capacitor capsule because of the low moving mass of the diaphragm when compared to a moving-coil mic, but you can get the same performance from a well-designed back-electret capsule, often at a lower cost, and with the added bonus that you can use lower phantom power voltages when the full 48 volts is unavailable. So it's no surprise that the CM700 is a back-electret and can run from any phantom power voltage in the 12-48V range. However, Crown have resisted the temptation to provide battery power as an alternative, because this rather compromises the amount of available headroom.

In order to maintain a reasonably accurate off-axis response (the level should drop, but the frequency response should stay as nearly the same as possible), Crown have used a fairly small-diameter diaphragm. Indeed, the whole microphone is surprisingly small — so small that when you plug an XLR into the end of it, the mic almost doubles in size. In fact, the black powder-coated finish and the general proportions of the mic make it look like a small Maglite torch.

Recessed into the side of the mic is a switch for providing a bass roll-off characteristic, and there are also two alternative filter positions: a steep slope and a more gentle roll-off. Without the filter switched in, the mic has a useful response from 30Hz to 20kHz, enabling it to capture the entire audible spectrum.

People like the *idea* of honest microphones, but in listening tests, they still tend to pick the ones that sound the most pleasing rather than the ones that sound the most accurate. What's more, in live situations, mics tend to need a little help in the 3-5kHz presence region to aid projection. Pragmatically, Crown have introduced a gentle presence rise, which is just enough to add that all-important 'air' to the top, and to improve diction in difficult environments. To put this in perspective, some mics provide between 5 and 10dB of boost at around 3kHz; the CM700 has only around 2.5dB of lift above 4kHz.

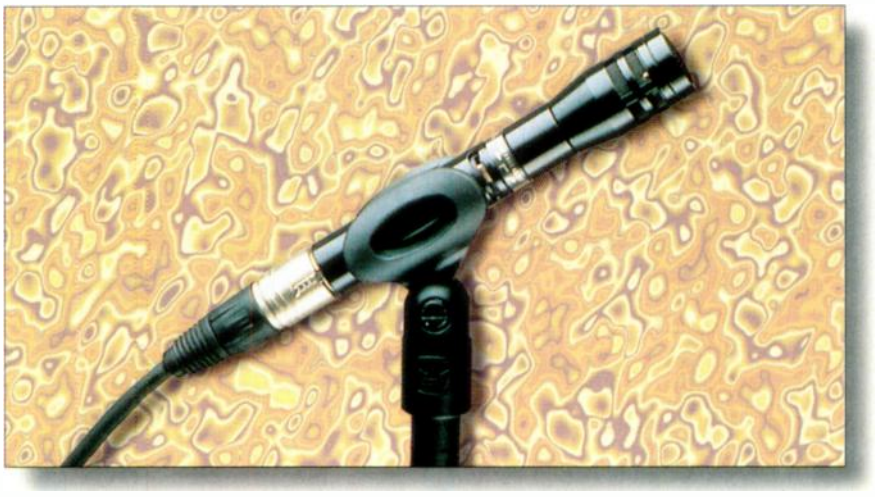
For live vocals where capacitor mics are used, popping is always a problem, but you can't really go on stage with a pair of tights stretched over a coat-hanger. To try to get around this, Crown have included a push-on foam windshield which has the unusual feature of a secondary foam disc suspended a few millimetres above the main section of the foam by means of a plastic moulding. I would expect this to compromise the off-axis response slightly, so it's probably best to use it only when working with close vocals.

Turning to specifications for a moment, the mic has an equivalent self noise of 21dB SPL (A-Weighted), which is not untypical for this type of microphone. Working with a sound level of 94dB, this would provide a signal-to-noise ratio of 73dB SPL. The maximum SPL (Sound Pressure Level) is 151dB for 3% distortion (using 48V phantom power). This is incredibly loud; no wonder, then, that the manufacturers also recommend the CM700 for drums and percussion, as well as vocals, pipe organ and classical music.

On the sensitivity front, the quoted figure is 2.5mV/Pa, which is adequate for most purposes, though actually quite low when compared to some other capacitor mics. This brings me back to my point that mic design is a compromise: Crown have obviously designed with close to middle-distance miking, where high sound levels are a distinct possibility, in mind. As supplied, the mic comes in a tough, zip-up carry case with a stand adaptor clip and the aforementioned windshield.

SOUNDCHECK

Most mics I review surprise me in at least one way. The first thing that surprised me



pros & cons

CROWN CM700 £311

pros

- Has a natural sound that is clear without being thin or edgy.
- Useful on a wide range of sound sources.
- Withstands ludicrously high SPLs, making it useful for percussion of all kinds.
- Small enough to get into awkward places.

cons

- Relatively low sensitivity (for a capacitor mic), which means that the CM700 is unsuitable for distance miking unless the sound source is relatively loud.

summary

A compact mic that works well in virtually all situations where a cardioid mic is needed, either at close quarters or in a high-SPL environment.

SOUND ON SOUND

about the CM700 is that it doesn't sound small at all. I compared it side by side with some other high-quality back-electret stick mics and found that, although the CM700 was noticeably less sensitive than most of its competitors, it delivered a smooth, full sound with an open, natural top end, while some of the other contenders sounded slightly thin or scratchy by comparison. This was particularly evident on the acoustic guitar tests.

Low sensitivity can sometimes be a problem, but tested with a small Mackie mixer and an acoustic guitar around 12 inches away from the mic as the subject, the CM700 provided adequate level with no obvious background noise. To some extent, I think the CM700 may sound full-bodied in comparison to other mics of the same type because many other manufacturers introduce a deliberate, and quite severe, low-frequency roll-off to counteract the bass rise caused by the proximity effect (of cardioid mics), when the mic is used very close up. By fitting two different roll-off filter settings, and perhaps by keeping the sensitivity down to prevent breath noises from overloading the electronics, Crown have been able to extend the useful low-end response rather further.

The pop shield arrangement makes an obvious difference on vocals, and is quite effective when used in conjunction with one of the bass roll-off settings. However, for studio use, an external pop shield is still recommended.

SUMMARY

This is a surprisingly nice-sounding and versatile little microphone that will deliver first-class results in most high-SPL or close-up miking situations. On the other hand, its low sensitivity really makes it unsuitable for jobs like distance miking of choirs or classical ensembles. Close-miking of classical instruments is no problem, and pipe organs at a distance should be well represented, but for cockroaches mating at 50 yards, you need to choose a mic with a different set of compromises.

As to subjective sound, the CM700 gives the impression of honesty, delivering a smooth, articulate sound with just the right sense of openness at the high end. Vocals sound clear without being thin, and if I hadn't seen the mic first, I wouldn't have been able to guess at its size from listening to the results it produces. Crown are a very reputable microphone company and this little mic will do nothing to damage their reputation. In short, if you don't need to impress clients with a 'grenade on a stick' mic, the CM700 will meet the majority of recording needs. SOS

info

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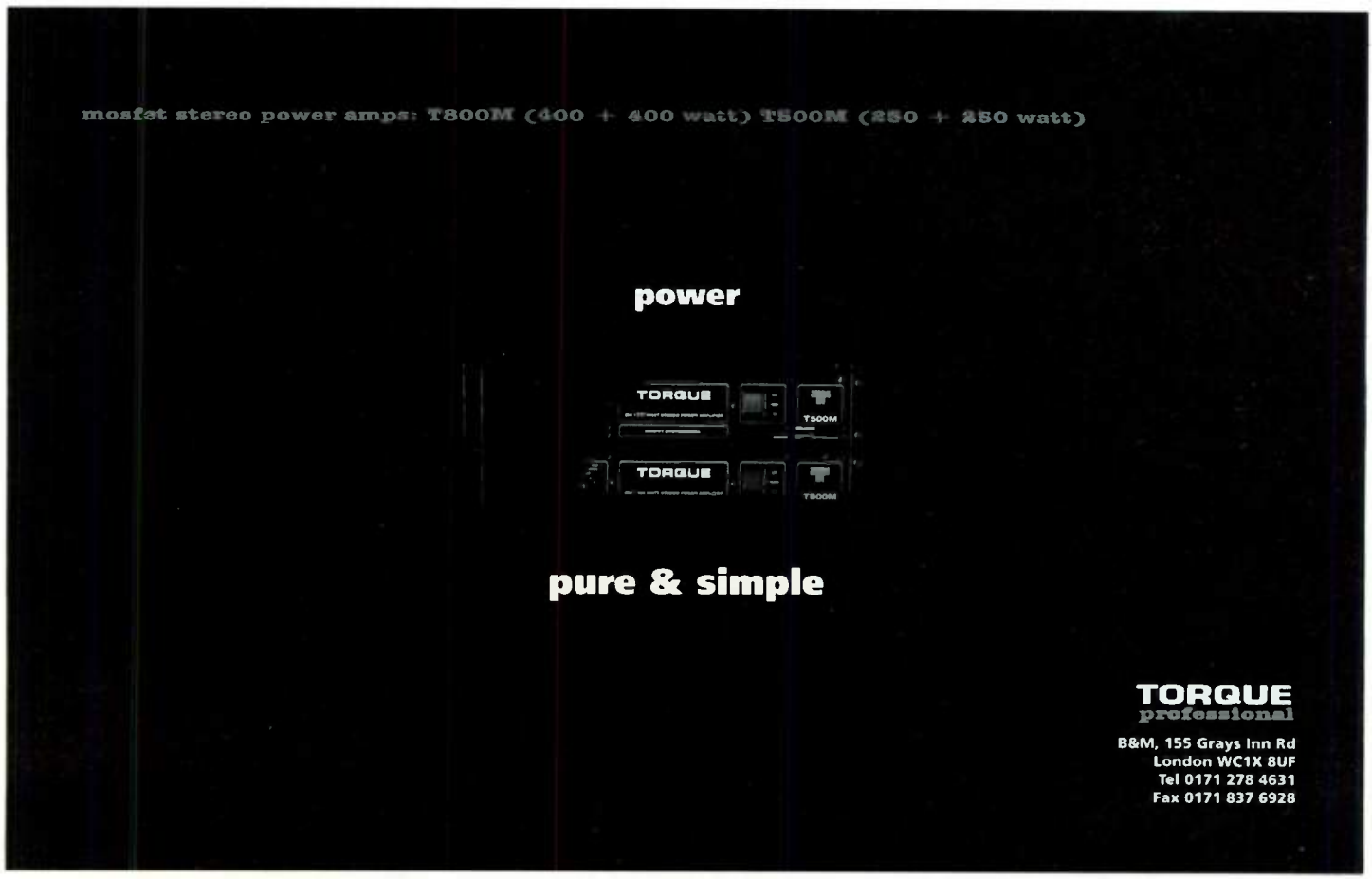

Audio Technica ATH-M40

Studio Headphones

These high-quality headphones have been redesigned to make them more suitable for studio use. PAUL WHITE listens in.

It's some time now since I reviewed Audio Technica headphones. I do recall, though, that I was very impressed by their sound quality, but less convinced that they would survive studio use. My two main concerns were that the capsules were not field-replaceable, and that the cable was fixed rather than plug-in. This new generation of headphones has been redesigned so that damaged capsules can be replaced in the field without needing any specialist tools, but the fixed lead remains. Admittedly, it features a strain-relief system, but in the studio, it's all too easy to tread on a lead such as this, and it would be rather safer if it plugged into the main body of the phones, instead of being fixed.

DESIGN & CONSTRUCTION

The ATH-M40s are enclosed phones which sit on top of the ears, rather than enveloping them completely, as some designs do. A small bass port is evident on the outside of the phone. Inside, the Neodymium-driven capsules have a very wide (5Hz-28kHz) frequency response, though the spec fails to show how much deviation can be expected within that range. The voice coil uses copper-clad aluminium wire, to combine lightness with good electrical conductivity, and the overall driver diameter is 40mm. With an impedance of 60 ohms, the phones can handle up to 1.6W of power, and in practice, there's plenty of clean level available. The sensitivity is quoted as 100dB, but in the absence of any reference power level, this doesn't really mean anything at all to me.

Weighing just 250g without the 3.4m cable, the phones are exceptionally comfortable and have a generously-padded, adjustable headband. The earpads are made from the same leather-like, soft synthetic material used by many other headphone manufacturers, and sit on the ears quite snugly, without exerting undue pressure. To facilitate one-ear monitoring, the right earpiece can swivel through 180 degrees.

SOUND

The traditional problem with enclosed phones is that while they are capable of far greater levels of bass than most open phones, they can sound a little boxy or coloured. In recent years, there have been a number of welcome exceptions to this rule, and I'm glad to say that the ATH-M40s are one. Indeed, the sound is very similar to that produced by my Beyer DT250s, which surprised me with their clarity and accuracy when I first tried them.

In listening tests, the difference between monitoring via the ATH-M40s and a pair of high-quality, medium-sized loudspeakers was astonishingly small, though the stereo imaging perceived using headphones is always different to the same material auditioned over speakers. There also tends to be a difference in bass response depending on the physiology of the listener's outer ear and, to some extent, on how snugly the phones are fitted, which means that it is unwise to rely solely on headphones when mixing, no matter how good they are. However, working with phones this good means that you can do a lot of your mixing work on them and then just do the occasional check on speakers to confirm that the bass end is doing what you think it should. In a home studio situation where noise is an issue, this can be a tremendous help.

SUMMARY

Audio Technica have produced a very accurate-sounding, enclosed headphone capable of more than enough sound level for serious monitoring or mixing work. Because these phones are enclosed, not only do you get a very solid bass end, you also get very little sound leakage — an important consideration when recording or overdubbing vocals or acoustic instruments. In the project studio, the ATH-M40s should meet all headphone needs both sides of the glass; my only remaining reservation is the lack of a plug-in lead. Even then, I guess it would be easy enough to fit a small in-line stereo plug and socket into the lead, close to the headphones, if you felt very strongly about it. In a nutshell, though, these are some of the better-sounding enclosed phones on the market. SOS

DRUM 'N' BASS

For the benefit of drummers and bass players, Audio Technica have produced a version of these phones, the ATH-D40s, with an artificial lift at the bass end to create a more powerful sound. In all other physical respects, the phones are identical to the ATH-M40s (and they retail for the same price), but the bass boost obviously makes them unsuitable for accurate mixing. However, for those recording loud instruments with a lot of bottom end, the D40s could be very useful for hearing a foldback mix

pros & cons

AUDIO TECHNICA ATH-M40 £120

pros
- Accurate, uncoloured sound.
- Field-replaceable capsules.
- Comfortable.

cons
- Still no unpluggable cable.

summary

Great-sounding headphones for performing or mixing, with none of the usual boxiness of fully-enclosed models.

SOUND ON SOUND

info

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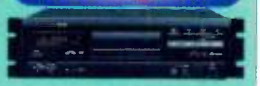

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dbx 1066

Compressor/Limiter/Gate

Does the dbx 1066 represent one in the eye for its competition? Is it a device for Norman-lizing signal levels, or does it Harold a new era in signal processing? PAUL WHITE tries to keep off the puns long enough to find out.

American company dbx are probably best known for their tape noise-reduction system, and in the studio, their Over Easy compressor. After counting the knobs on their 1066, you could be forgiven for thinking that this is their Over Complicated model. First impressions can be deceptive, though, and closer inspection reveals that each channel of this two-channel device actually comprises three largely independent sections: an expander/gate, a compressor, and a peak limiter. Gated compressors are nothing new, but the only model I've worked with before that gives you gating, compression *and* separate peak limiting is the Drawmer 241.

LAYOUT & CONTROLS

Connection to this 1U processor is via either balanced XLRs or balanced TRS jacks, and two further unbalanced jacks per channel provide a means to insert an equaliser or other device into the side-chain input. The operating level may be switched between +4dBu and -10dBV.

The layout of the control panel is slightly confusing, in that there are no clear dividing lines between the three sections of each channel, so it isn't immediately obvious which controls relate to the compressor and which ones to the expander/gate. As it happens, the expander uses just two of the controls: Threshold and Ratio. To bypass the expander, the Threshold control must be turned to its 'off' position; a pair of LEDs, one red and one green, show whether the signal is being expanded or not.

The compressor section may be switched to operate in Over Easy mode — dbx's interpretation of soft-knee — or conventional hard-ratio mode, and like all the buttons on the 1066, its related button lights up when active. As with the expander, red and green LEDs show whether the input is above or below threshold, and a further amber status LED shows when compression is taking place in the Over Easy section of the compression range — a nice touch. A conventional 12-section LED gain-reduction meter is also fitted, and there's also an 8-section level meter which can be switched to track the input or output level.

It's well known that low-frequency sounds tend to dictate a compressor's behaviour, and sometimes this leads to a dulling of the sound, so dbx have added a Contour switch, which filters some bass end out of the side-chain. In effect, Contour makes the compressor less sensitive to bass sounds, thus preserving high-frequency detail. A Side Chain Monitor switch enables you to hear the side-chain signal after processing by whatever is connected into the external loop, and a Side Chain Enable switch makes it possible to bypass any external side-chain processing without having to repatch. The side-chain monitor facility is particularly useful if you have a parametric EQ connected for de-essing, as it allows you to hear exactly which frequencies are being picked out.

The compressor controls are standard: Threshold, Ratio, Attack and Release. Even though there's a separate limiter, it's still possible to crank the compressor ratio up to infinity. For applications where the nature of the programme material is constantly changing, an Auto attack and release setting is available. Once the signal has been compressed, you can make use of the familiar make-up gain control, here labelled Output.

LIMITER

The limiter section comprises a single knob and a threshold LED, but the simplicity of the controls belies what's going on inside the box. In fact, limiting is achieved in two stages, the first being 'Instantaneous Transient Clamp' — complete with obligatory trademark. This applies a soft logarithmic clamp function to ensure that the signal doesn't exceed the limit set by the 'PeakStopPlus' (trademarked, obviously) level control by more than a couple of dBs.

Stage two employs 'Intelligent Predictive Limiting', and it doesn't take too much intelligence to predict that this term also carries the familiar trademark logo. Its job is to monitor the input, then let the gain-reduction stage know, just in the nick of time, when a biggie is coming, so that it can attempt to pull the signal down below the level where the Instantaneous Transient Clamp clobbers it. Because the PeakStopPlus limiter is a failsafe device designed to work with absolute levels, it comes right at the end of the signal path, after the make-up gain control. In real life, such limiters are there as protective measures, but just occasionally, hard limiting can also be a useful creative effect.

A Stereo Couple button links the two channels for true stereo operation, and each channel has its own Bypass button, controlling a relay-switched hard bypass. Once you know what the controls do, the layout looks a lot less complicated than when you first open the box.

IN USE

The 1066 is quite straightforward to use. In stereo link mode, the left-hand set of controls takes over, and any illuminated switches on the right-hand channel go out. As you might expect, there's a significant subjective difference between Over Easy and hard-knee operation — and as you flip between the two, you notice that gain reduction starts at lower threshold settings with Over Easy selected. On a test piano track, a hard-knee setting which produced minimal gain reduction on peaks increased to around 6dB of gain reduction when Over Easy was chosen.

Unless the degree of compression is kept fairly low, neither hard-knee nor Over Easy is particularly transparent, with hard-knee, as expected, producing the most positive compression. I get the impression that this unit was designed for people who like to use compression to create vocal or instrumental effects, rather than for

pros & cons

dbx 1066 £480

pros

- Classic dbx compressor sound.
- Separate gate and limiter.
- Useful range of control options.

cons

- Panel legending and layout not as clear as it could be.
- Sometimes difficult to set up transparent compression.

summary

A flexible and powerful gain-control processor combining compression, limiting and gating. Better as a creative tool than for routine level control.

SOUND ON SOUND

invisible mending. The Contour control's action is subtle, but it does help prevent HF detail from suffering and doesn't seem to change the amount of gain reduction being applied too significantly.

The expander works smoothly and predictably, while the limiter is fast and positive; you can hear it working (unless the amount of limiting is kept to a minimum), but the side-effects are far less intrusive than those of clipping, especially if you're feeding a digital recorder, which won't tolerate any excess input signal. The signal path is, predictably, superbly clean and quiet, with plenty of headroom.

Operationally, I found the 1066's controls difficult to identify, because of the small legending and its position beneath the control knobs. The lack of well-differentiated areas on the front panel tended to exacerbate this problem, and the fact that all the buttons are grey when not lit up doesn't help much, either. In a studio, this unit would need to be mounted at a carefully-considered height in a rack to overcome these problems, while in a live situation (in poor lighting conditions), there's potential for getting hopelessly lost.

SUMMARY

I found the 1066 to be a combination of really good features and minor irritations, the poor control visibility probably being the biggest worry. I liked the illuminating buttons, the separate threshold indicators, and the unambiguous way in which control shifts to the left channel in stereo link mode. I was slightly disappointed, however, that I couldn't achieve more transparent compression when needed. With the Auto function engaged, using a 4:1 ratio with 6dB or so of displayed gain reduction resulted in quite audible compression, even in Over Easy mode. When you want to use a compressor as an effect, the 1066 sounds exactly right and works beautifully on vocals, drums, basses and so on, but for the times when you need to be more subtle, finding the right settings can be tricky.

The compressor market is more crowded now than it has ever been, with a choice of valves, FETs, VCAs, opto-isolators and who knows what else — and every type has a unique effect on the sounds it processes. In the case of the 1066, the new dbx V2 (trademarked, naturally) VCA delivers pristine audio quality, yet this is anything but a sterile-sounding compressor. For many engineers, the dbx approach to compression is the definitive gain reduction treatment, and the 1066 provides plenty of character and scope for creativity without sacrificing the dbx sound. I'd feel less comfortable about using the 1066 for more subtle compression jobs, but if you're a fan of the dbx sound and want to combine it with a good expander/gate and a peak limiter, this has to be the box to go for. SOS

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ART FX1

Stereo Digital Effects

This bijou processor is deceptively spacious. DEREK JOHNSON shows you around.

When ART released their MR1 reverb (see *SOS* February 1995), many applauded its low price, portable package, 16-bit sound quality, and ease of use. However, there was one small problem: it was a mono-only device, which we reviewers found disappointing. Let no-one say that ART never listen to suggestions — the MR1's new brother, the FX1, which operates in stereo and seems to offer more of everything for less cash, is the proof that they do.

WHAT IT IS

In addition to 16-bit stereo operation, the FX1 has nearly four times as many presets as the MR1 — 60 altogether, including reverbs, delays, modulation, pitch-shifting and, surprisingly, a range of dual, triple and parallel (for processing two signals at once) presets.

EFFECTS PRESETS

- BANK A: Hall, Chamber, Plate, Room, Gate and Reverse Reverbs; Stereo Chorus; Stereo Flange; Delay; Dual and Doubling Delays; Pitch Shift; Tremolo; Reverb & Panner; Tremolo & Reverb.
- BANK B: Reverb & Delay; Flange & Delay; Chorus & Reverb; Chorus & Delay; Reverb & Delay & Chorus; Reverb & Delay & Flange; L Dual Delay/R Gate Reverb; L Chorus/R Gate Reverb; L Flange/R Gate Reverb; L Reverb & Slap delay/R Flange; L Reverb & Slap Delay/R Chorus; L Reverb/R Flange; L Reverb/R Chorus; Dual Room Reverb & Dual Plate Reverb (both true stereo).

Even more remarkable is the collection of four true stereo reverbs — a nice touch for such an affordable unit.

Though it offers more than the MR1, the FX1 remains refreshingly simple in use. Like many other sub-£200 effects processors, presets are selected with a rotary knob. Other controls comprise a wet/dry balance knob, input and output level switches (for +6dBv line or -4dBv instrument operation), the Bank A/B select button, and a button intriguingly labelled Normal/More. Connections are on unbalanced jacks, and power comes from a 9V external supply, which, while not particularly bulky, is actually two-thirds the weight of the FX1 itself!

I wouldn't reasonably expect a unit such as this to have a display, and it doesn't, but there is a power indicator LED, plus a clipping LED. Preset names are screened on the top of the unit, for quick reference, and a fold-out manual explains all functions, and supplies a list of all the effects, plus notes of what the 'More' option provides.

Operation of the FX1 is simplicity itself: choose one of the Preset banks (with the A/B switch), and twirl the Preset knob to the desired Preset — there are 15 in each bank (thus 30 altogether), plus a bypass position. Now let's introduce that curious More button: pressing this provides another 30 Presets, each of which is a modified version of a main Preset. Bank A Preset 01 is a bright hall reverb with a 2.5-second delay: pressing 'More' offers you a warm hall with a 4-second delay. The More button gives access to two delay times for delays, two depth values for modulation effects, octave-down or fifth-up shift for the pitch-shift Preset, and so on. Editability it's not, but at least there is some choice.

Further choice is provided by the multi-effect and parallel processing algorithms. In the latter case, two separate signals (say, a guitar and vocal), via the left and right inputs, can be treated independently.

HOW IT SOUNDS

Now I suppose you'll want to know what it sounds like. I could be churlish and tell you to get down to your local dealer and find out for yourself, but I know that's not good enough. Let's just say that I was pleasantly surprised. Despite the preset nature of the delays and modulation effects, I found the majority of the treatments perfectly useable. The reverb quality is good enough for many purposes, working well on overall mixes, if tending to 'boinginess' with solo drum machines. Delays and flanges are also pleasing — the choice of parameter values by the ART design team is more widely applicable than you might think.

VERDICT

For under £150, you won't get a Lexicon PCM80. But if you buy an FX1 you *will* get a pocket-sized processor that's easy to use and offers a serviceable collection of presets, plus the advantages of a selection of true stereo reverbs, and the option to process two signals simultaneously. There's no MIDI, and no editability, but you wouldn't seriously expect those at this price. When I got my first Portastudio years ago, I would have killed for an FX1: all *you* have to do is find £150!

pros & cons

ART FX1 £149

pros
- Cheap.
- Easy to use.
- Compact.
- Wide variety of treatments.

cons
- No editability.
- No MIDI.

summary

At one time, any digital effects processor for under £200 was thought of as amazing; that point has been well and truly breached, with plenty of choice at around the £150 mark. The FX1 is a great example of this new breed, and is perfect for beginners or the financially challenged. Ideal partner for a first cassette multitracker.

SOUND ON SOUND

MULTIPLE CHOICE: BUDGET FX

SOS has reviewed several sub-£200 effects processors recently, including the Alesis Nanoverb (August 1996), the DOD 512 (October 1996), the Viscount EFX10 (reviewed at £249 in September 1996, but now £199), and Zoom's 1204 (October 1996). Peavey's Deltafex, coming soon, is also in this price range at around £160, and Zoom's 1202 (*SOS* February 1995) was recently reduced to £150. There's now more choice in the ultra-budget effects area than there's ever been.

info

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Spendor SA200

Active Monitors

A pair of active small studio monitors with the Spendor pedigree have to be worth investigation. Gumshoe PAUL WHITE pulls his hat low, dons his mac and checks them out.

The Spendor name may be unfamiliar to some *SOS* readers, but it has been associated with broadcast monitoring for around a quarter of a century, ever since Spencer and Dorothy Hughes, co-founders of the company, created the name by amalgamating their own. Before starting Spendor, Spencer Hughes worked in the BBC's research department. The BBC's in-house monitors at that time had a reputation for accuracy and neutrality, and building upon that expertise, Spendor took quality monitoring into the commercial world. Today, the company's loudspeakers are used in recording and broadcast studios around the world.

Though the Spendor reputation was originally built on monitors optimised for classical music, the company has recently designed a series of speakers to meet the specific needs of monitoring in a contemporary music environment — the SA200 and the SA300. The SA200, reviewed here, is a two-way active system and competes well on cost with active systems from other reputable manufacturers.

FIRST OF THE SMALL SPENDORS?

Constructionally, these monitors are fairly conventional, and employ a reflex cabinet design with a rectangular front port. The cabinet is made from MDF with an attractive, dark grey textured finish, and the front panel has a distinctive chamfered profile to help reduce cabinet edge diffraction effects. Inside the cabinet, bitumen panels are used to provide further mechanical damping, and the power amp assembly is mounted at the back of the cabinet, where a large-area, shallow heatsink is visible. Input connections are via balanced XLRs.

Handling the top-end frequencies is a 25mm, ferrofluid-cooled, silk-dome Vifa D27TG tweeter. Vifa (a Scandinavian company) tweeters are used in several leading hi-fi and studio monitor designs, and this one sits in a smoothly-profiled surround, presumably to reduce diffraction effects and to help control the dispersion characteristics. Spendor's own mid/bass driver reproduces the rest of the spectrum. This is a 160mm unit with a filled homopolymer cone, suspended in a compliant rubber surround. Two amplifiers are built into the SA200 cabinet, a 50W unit to drive the tweeter, and a 130W unit to drive the bass and mid range. The crossover frequency is set at 3.5kHz, nicely above the vulnerable speech mid band, and judging by the circuit diagram, the crossover has a fairly steep slope to minimise overlap effects at the crossover point.

Although these are fairly powerful speakers, capable of peaking at 116dB SPL at 1m, they are actually quite light for active monitors, weighing in at just 12kg each. The cabinet measures 380 x 220 x 260 mm, which makes the SA200s comparable in size to other powered monitors like the Genelec 1030As or Event 20/20s (reviewed in *SOS* June 1994 and July 1996 respectively). A green LED set into the tweeter surround shows when the units are switched on, and a delayed switch-on/off circuit prevent speaker thumps when powering the system up or down.

USER MODS

By providing a generous power supply with a correctly-ported box, Spendor have managed to get an impressive low-frequency performance out of these speakers, but in acknowledgement of the different room types in which the speakers may be used, each cabinet has a set of screwdriver-accessible controls on the rear panel to allow the response to be modified. A gain preset is provided to allow the monitors to be matched to the output levels of different mixers. In addition, to prevent the speakers from being overworked by frequencies lower than they were designed to handle, there's a subsonic filter, which can be switched to operate at 50, 70 or 90Hz. The default setting is 50Hz for normal applications.

Two further controls relate to high- and low-frequency tilt. LF Tilt is a shelving control operating from 500Hz down, and can provide up to 3dB of cut or boost in 1dB steps. If a speaker is mounted close to a wall, its bass end will be enhanced, so a little bass cut may help to restore accuracy. On the other hand, if the room tends to absorb bass, then a gentle bass rise can be introduced to compensate. A similar Tilt control modifies the high-frequency end of the spectrum, operating above 4kHz. The Tilt controls shouldn't be expected to compensate for really badly behaved rooms, but should rather be seen as tools for fine-tuning performance in an already reasonable room. If in doubt, the Tilt controls should be left in their flat position, but it's nice to have the option for adjustment if it proves necessary.

No matter how loud a sound studio monitors are capable of making, there's always an engineer who wants to make them louder still, and this often results in a distorted sound, a fried driver, or both. Spendor are obviously familiar with this tendency, because they've put in a protection circuit, which monitors the levels to the SA200's bass and treble drivers, and

pros & cons

SPENDOR SA200 £1404

pros

- Even, accurate sound with good bass extension.
- Excellent stereo imaging.
- Plenty of level.
- Controls to optimise the response in different rooms.

cons

- Though good value, these monitors will still, sadly, be beyond the financial means of many private studio owners.

summary

The SA200 is a good value, high performance monitor for discerning mixing, editing and post-pro applications.

SOUND ON SOUND

operates a muting circuit whenever the drivers are in danger of damage. Under normal circumstances, the protection doesn't operate, not even at punishingly high SPLs.

PERFORMANCE

After hooking up the input XLRs to my mixer, I dug out my usual collection of test CDs and got down to some serious listening. The results were both surprising and impressive — not only did the SA200s sound inherently 'right', they also exhibited more bass extension than I'd imagined they would from the spec. What's more, the bass extension was deep and smooth, not just peaked up to make kick drums sound impressive — bass synth pads and pedal notes came over full and even-sounding, with no 'rogue' notes or odd dead spots.

Well-designed active speakers invariably sound tighter and better controlled than their passive equivalents, and the SA200s operate seemingly effortlessly, revealing depth, detail and transient articulation. The sound doesn't become ragged until you push the levels up to the point where your ears start to retreat into your skull and the speaker cones beat against their end-stops! Another feature of active speakers is that the stereo imaging is often more precise than you'd expect from equivalent passive models, but the SA200s exceeded all expectations here, by producing some of the clearest imaging I've heard to date. Playing back excerpts from Roger Waters' *Amused to Death* album quite clearly revealed the QSound tricks employed to push the sound effects outside the speakers, and the illusion was so convincing that I found myself looking up to confirm that the speakers really weren't that far apart. What's more, the listening 'sweet spot' is quite wide.

SUMMARY

It would seem that Spendor's reputation is well deserved; they've managed to build a very revealing pair of monitors that really let you hear what a recording sounds like without trying to flatter the result. The overall sound is clear, well balanced and detailed, and there's no tendency to harshness or splashiness, which makes listening on the SA200s far less fatiguing than it is with many studio monitors. While the bass extension isn't as great as you'd expect from full-range, full-size studio monitors, it is certainly up to the job of nearfield monitoring in large studios, as well as full-range monitoring in smaller studios, where the control room may not have the benefit of thorough acoustic treatment. What's more, the SA200's stereo imaging is as good as I've heard: there's plenty of level, and there are no significant vices to report. A really nice monitor — and good-looking too. SOS

info

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Technics SX-WSA1R

Acoustic Modelling Synth Module

DEREK JOHNSON takes a second look at this powerful instrument, now available at a fraction of its original retail price.

Whether we, as consumers, like it or not, electrical goods eventually become obsolete or are discontinued. This is particularly noticeable in the synth and studio gear market. On a regular basis (every year, in some cases) manufacturers revamp or overhaul their product lines, making the previous generation technically obsolete in the process. While the occasional instrument will remain available for a period of years, all too often seemingly worthwhile instruments inexplicably cease to be available after quite a short time on the market. This can cause extreme aggravation if you bought the item in question brand new on its release — but on the other hand, the quick-witted musician is regularly offered the chance to grab a bargain, as older stock is cleared to make room for the latest developments.

In spite of the inevitable mutability of the hi-tech music market, we at *Sound on Sound* were as surprised as anybody to hear that Technics' first stabs at the serious synth market — the acoustic modelling-equipped SX-WSA1 workstation and SX-WSA1R rack module — were turning up at Soho Soundhouse for a fraction of their former retail price. End-of-line hardware is often discounted, but seldom by as much as this: the WSA1 keyboard originally listed at £2499, and is now selling for just £869; the rack was £2199 and now costs just £649. Stocks are limited, but these prices represent savings of 75% and 70% respectively, which is pretty amazing for this kind of instrument, offering 64-voice polyphony, 32-part multitimbrality, and (in the case of the workstation) a 16-track sequencer.

While the WSA1 was covered in depth by Martin Russ, back in December 1995, we thought that, in view of this intriguing situation, it was worth having another quick look at the Technics take on synthesis.

GETTING PHYSICAL

The name for the technology employed by these synths — Acoustic Modelling Synthesis — really does promise a lot. Anything with 'modelling' in its name implies some sort of DSP-based physical modelling system, such as is found on Yamaha's VL series. To a certain extent, this is true of the Technics synths, although their physical modelling sections are simplified and more accessible.

The WSA1's architecture works like this: at the start of the chain is a sampled PCM waveform, or Driver, which forms the attack portion of a sound; there are 307 waveform samples available, including raw synth waveforms, real instruments, percussion, and various useful samples of fret and breath noise. The Driver is treated by a Resonator, the modelling section of the synth, with models including string, cylinder, cone, flare, plate, membrane, and others. The Resonators are provided in several different flavours — bright, mellow and soft, for example — and can be modified quite drastically, courtesy of a comprehensive range of parameters; Resonators can even interact with each other. The Driver/Resonator combination is further processed by a traditional synth section, offering control over Pitch, Filter (a choice of 12dB low- and high-pass, and 24dB low-, high- and band-pass are provided) and Amplitude. Each of these 'synth' blocks has a full range of envelope and LFO parameters. What Technics term a Sound — a patch to you or me — is made up of four of these Driver/Resonator/synth collections (or Tones), plus routing to the three effects processors.

The next stage up is the Combination — up to eight Sounds that can be split or layered. Here, the workstation and rack diverge slightly: the WSA1 has a 16-part multitimbral section to go with the 16-track sequencer, but both it and the rack have a 32-part multitimbral mode which is accessed via two sets of MIDI sockets, and controlled by a comprehensive mixer section. This is used for assigning Sounds, and controlling volume, pan position, effects and output routing to the main and subsidiary outputs, and so on.

BELLS & WHISTLES

Editing and controlling of WSA features is greatly assisted by a large, and very informative, backlit blue LCD, and a dizzying number of buttons. Luckily, most

pros & cons

TECHNICS SX-WSA1 £869/ WSA1R £649

pros

- Excellent, large display.
- Refreshingly high polyphony and multitimbrality.
- Very good value at the new price.
- Lots of sonic power.

cons

- Manual a bit of a let-down.
- Some people might find the WSAs complicated.
- Four outputs on an instrument of this power (base model) seems a little stingy.

summary

Programmers will love this instrument, since it offers a rewarding and potentially deep platform for sound creation. Good-sounding, accessible, modern technology, at an unmissable price.

SOUND ON SOUND

of the buttons are labelled fairly logically, with 28 arranged around the display in soft-key fashion; their functions change according to what screen you're currently accessing. The display, while often busy, is equally logical if you keep a clear head.

One unusual feature, for a synth module, is the so-called Realtime Creator, a sort of stickless joystick — like a trackball — which can alter the quality of your current Sound or Combi in real time. You can assign a range of parameters to be controlled in this way, and the facility is extremely useful. The WSA1 workstation goes one better, featuring two trackball-type controllers (one of which is sprung), plus a pitch-bend wheel, and two modulation wheels.

While the WSA1 has a fully-working sequencer, the WSA1R is not entirely lacking: through its disk drive, it can play back Type 0 MIDI files, which will be good news to some gigging musicians.

Other nice features include alternate tuning tables, digital drawbars (on-screen drawbars for certain organ-based sounds), and a certain amount of expandability. The WSA1 I looked at was equipped with both the SY-EW1 wave expansion board and the SY-ES1 output expander board. The former adds a collection of drum loops and the like, ideal for dance musicians, while the latter doubles the number of audio outs — to four stereo pairs — and adds a 20-bit S/PDIF co-axial digital output.

SUPER MODEL?

The WSA's editing facilities are powerful, and pay back whatever effort you might like to put in: if you don't like editing at all, I'd first of all ask you why you were buying such a powerful synth, and then tell you that it's got quite a worthwhile collection of presets that can be customised on the fly using the many control options.

But does it feel like a physical modelling instrument? Yes, to a certain extent, although a rather restricted one. If you want the power and flexibility of a Yamaha VL1, you'll probably have to buy one. If you want access to the latest DSP-based synth technology, however, in an arguably more useable form, look at the WSA1. Its basic sound generation is, and always will be, samples — which means the occasional noticeable loop and jarring crossover point. However, the Resonator and synth sections really go a long way towards covering up these faults: the quality of the Resonators is good, although sometimes you get the feeling that you're playing with a sophisticated filter. At other times, however, the results can be quite striking, and sounds of considerable complexity and movement are possible. Overall, the presets give an impression of variety and depth, with some exciting and playable sounds on board. The WSA1 can also be squashed into the GM straitjacket: a very fine collection of GM sounds are provided. They're not, perhaps, as exciting as those that exploit the modelling capabilities of the synth, but they're still bright and useable.

At the original price, the SX-WSA1 and SX-WSA1R were interesting, but expensive, examples of a direction in which synth technology might go — the mixing of a flavour of physical modelling with more familiar sample-based synthesis. But that's the conclusion for a pair of instruments costing well over £2000 each. At their new prices, of comfortably less than a grand each, it's time to re-write the ending. It's hard to think of where else you could find this combination of power, editability, polyphony and multitimbrality (and even GM compatibility). In the current climate, either version of the WSA1 could definitely be worth dragging out your cheque book for. SOS

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Francis Buckley EQ Magazine July 1996

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Musique Sans Frontières

IRCAM • INSTITUTE FOR RESEARCH & CO-ORDINATION IN ACOUSTICS & MUSIC

If you've heard of Paris's IRCAM, you probably imagine it's a government-funded research bunker devoted to a kind of avant-garde sonic and musical experimentation that has little relevance to the average hi-tech musician. Over the last few years, though, as PAUL TINGEN discovers, IRCAM has been coming down to earth, and a new spirit of openness and commercial awareness now shapes its work.

Right in the middle of Paris stands an outrageous piece of modern architecture called the National Centre of Art and Culture, better known as the Centre Georges Pompidou. Everyone who has done the tourist sites in Paris will vividly remember this building — it's that bizarre. Yet few will have realised that right next to it, some of the world's most advanced and serious work in a field that's of primary interest to the reader of this periodical is taking place. For this prestigious location is the residence of IRCAM, or the Institute for Research and Co-ordination in Acoustics and Music. The institute is legendary in the classical music world for pioneering avant-garde computer-generated music, yet strangely it's largely unknown or ignored in the world of popular music. And if you work in the field of popular music and have actually heard of IRCAM (pronounced 'ear-cam'), the name is likely to evoke images of white-coated science boffins working with bespectacled and goatee-bearded classical composers at homebrew computers, creating atonal screeching noises that have little relevance to most of us.

This picture's rather unfair, though; the original concept of IRCAM — to put scientists and artists together in the pursuit of new music — was, and is, truly visionary. Peter Gabriel's Real World studio and record label may have been far hipper in pursuing a similar aim, but they stated their credo almost a decade later ("...developing new ways for artists of all sorts to work together with technologists") and their results are much less radical and revolutionary. Despite still being hampered by its ivory tower image two decades after it was founded by France's number one avant-garde classical composer, Pierre Boulez, IRCAM is still unique in the world. It was laudable and far-sighted of the French government to invest big money in something as 'far out' as electro-acoustic and computer music. But with government funding safely in hand, IRCAM appeared to lock and bolt its doors to the outside world, and set about developing large and unusual music-producing computers that had little relevance to anyone not working in the field of avant-garde classical music. Yet in the process they developed technology, such as real-time Digital Signal Processing (DSP) and ▶

physical modelling, that eventually had a far-reaching impact on the popular music field as well.

MOMENTUM FOR CHANGE

IRCAM today is becoming more interesting and relevant to anyone working with electronic music than ever before. The institute abandoned the development and construction of its own computers in the early '90s, and after a period of using Next and Silicon Graphics computers, IRCAM personnel now work almost exclusively on the Macintosh platform, dedicating much of the institute's time and resources to developing DSP and graphics software for the Mac. Three years ago, IRCAM began to make much of this software available to outside users via their user-group, called Forum (see 'IRCAM Forum' box).

The software available via this user group clearly benefits from IRCAM's unique 20 years of experience in the field, and includes physical modelling, virtual acoustics simulation and directionality packages. IRCAM's new openness and relevance to the outside world have also been driven by the appointment of a new, dynamic young director, Laurent Bayle, who took over from Pierre Boulez in 1992, and by the dramatic breaking down of boundaries between different musical styles, disciplines and cultures that has been happening everywhere during the last decade.

NEW SPIRIT

The Finnish musicologist Risto Nieminen has been IRCAM's artistic director since 1991: part of his brief is overseeing the choice of young composers that come to study at IRCAM, and organising the 80-odd concerts that IRCAM is involved in every year around the world. In a large, airy and light-filled office in a building called the Piano Tower, he muses about the dramatic changes that are affecting IRCAM: "There's been a big change here since Laurent Bayle became director, that's true. But it's also true that many of these changes were part of a natural evolution. Twenty years ago it was much more difficult to collaborate and communicate with other art forms and we had to build computers that ▶

Photo courtesy Centre Georges Pompidou

The Anechoic Chamber.

"Despite still being hampered by its ivory tower image two decades after it was founded by France's number one avant-garde classical composer, Pierre Boulez, IRCAM is still unique in the world."

A BRIEF HISTORY OF IRCAM

It was in 1970 that the then-French president Georges Pompidou asked Pierre Boulez to set up an institute dedicated to musical, acoustic and computer research, to be linked to the Centre Georges Pompidou. Building work started in 1973 underneath the Place Igor-Stravinsky, and the underground premises were inaugurated in 1978. This oldest section of IRCAM contains the huge and revolutionary Espace de Projection, with a floor area of 375 square metres and unique prismatic modules, called periacts, which can be rotated to display different acoustic surfaces (absorbent, reflecting and diffusing). The underground area also contains the anechoic chamber, eight recording studios, and eight laboratories, plus the offices for the R&D and Valorisation departments.

During the '70s, IRCAM built the 4A computer, the first DSP workstation, and created the first version of a computer program called *Chant*, which synthesized sounds modelled on singing; a modernised version of this is still part of the Forum portfolio. Son of 4A, the 4X, was completed in 1981, and the *MAX* and *Modalys* softwares came to fruition in 1988. IRCAM started the '90s with a spectacular extension above the ground, the Piano Tower, named after its architect, Renzo Piano. Comprising 728 square metres, with huge amounts of glass, it now houses general services, communications, artistic and general direction offices.

In 1991, IRCAM switched over to commercial computers as its platform, with the Next computer, resulting in the Ircam workstation, or Black Box. This important move was followed by Laurent Bayle's introduction as director and a resuming of IRCAM's publishing activities the year after. The institute was now going overground in more than one sense. The user group Forum was set up in 1993, and the move to Macintosh followed a year later. 1996 saw yet another huge extension to IRCAM's premises, with the opening of L'école Jules-Ferry et Les Bains Douches, a whopping 1969 square metres of space created by the renovation of an adjacent old building. It gives space for conference halls, the expanded Education and Music Creation department, and archiving space, made accessible to the public via the hi-tech Médiathèque.

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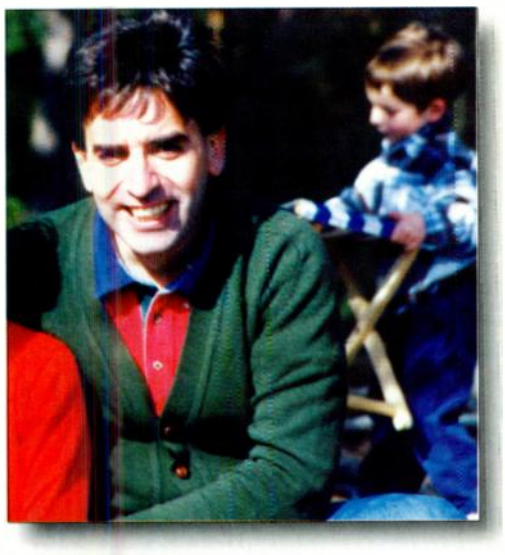
Risto Nieminen.

made sounds from scratch ourselves, because they didn't exist yet. That was a pioneering phase, during which we had to invent and build everything in-house, and it was natural that we were closed and didn't have a lot of contact with the outside world.

"Then, when we switched to the Next computer in the early '90s and built the IRCAM Workstation, or Black Box, then later switched to the Mac, it was suddenly possible for IRCAM to communicate much more easily with other studios and performance bodies. We didn't need to drive a truck with a huge computer inside any more, to play a piece somewhere, and we didn't need to bring specialist technicians along. It's now much easier for us to do outside collaborations and still maintain our artistic standards. This is also reflected in the Forum, our user group. The fact that much of our software is now available to anyone who has a good Mac means that we don't have, and don't want, control any more over the kind of music that is made with our technologies. IRCAM technology is now used to make a wide variety of music. This also reflects the fact that different music styles have become much more integrated in general. In the '70s, music styles were very segmented, we had one aesthetic here and a composer couldn't do much else. Now composers feel free to mix different styles, whether classical, avant-garde, rock, jazz or world music."

Vincent Puig.



One of the most far-reaching changes initiated by Laurent Bayle, a 45-year old former theatre and festival director and former artistic director at IRCAM, was to set up a department called 'Valorisation', a word that translates as 'to promote', 'to develop' or 'to put to good use'.

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▶ Valorisation started in 1993, and its aims radically changed the working methods at IRCAM. The information and technology transfer expert Vincent Puig was made director, and he initiated not only Forum, but also numerous institutional contacts with the outside world, which led to many industrial and commercial applications of IRCAM-developed technology, some of them quite spectacular. Puig remembers the new wind that blew through IRCAM: "Laurent gave many impulses for new ideas and for a new spirit, in the sense that we opened the doors to the public and offered much more information to it. He also pushed to make our education department much bigger and attracted a new director for our R&D department, Hugues Vinet, who was the developer of *GRM Tools*, a Digidesign plug-in, and who comes from the development rather than the research side. This made a big change in our working methods too."

Puig acknowledges the existence of IRCAM's ivory tower image, and asserts that "there's a conscious effort to change that, but it's difficult to erase an image that's been around for so long and that's very strong. But we are trying to make everything available that we research and develop here, and have much more contact with the outside world. We have to do that to survive. Forum, for example, was partly set up to get feedback from the users. They get very early versions of our

IRCAM'S OPEN DOOR: FORUM

Forum, the IRCAM user-group, was set up in 1993 by IRCAM's then-new marketing director, Vincent Puig, and marked one of the most far-reaching changes in policy and direction in the institute's history. Through Forum, IRCAM-developed technologies became available to everyone in the outside world, not just the chosen few who were selected by IRCAM.

IRCAM Forum offers its private and institutional members a selection of specialist and highly-advanced software that uses the Macintosh as a platform (Forum is a registered Apple User Group). One of IRCAM's main aims in setting up Forum was to get feedback on the development of its own technologies from a wide variety of people — which was considered the only way to be able to remain cutting edge in relation to the fast-moving technologies of the outside world.

Forum is organised into three thematic groups: Computer Aided Composition, Analysis/Synthesis, and Real Time, and different software programs are available through each of them.

• COMPUTER AIDED COMPOSITION.

"Making software an intelligent collaborator for writing music is the main focus of this group", states the Forum information pack. Vincent Puig comments: "The members are mainly composers who use notation to make music. The software in this group consists of intelligent tools to allow you to manipulate a score, to manipulate musical structures, and this is not only for composers who work with notes/pitches, but also for composers who work with existing sounds. The software that's offered is called *Patchwork*, and it allows composers to graphically represent even very abstract sounds. There is no other software available which combines this with the music notation world. It's a very powerful tool. The members of this user group tend to come more from the classical music field, and they use the software for algorithmic composition, working with the symbolisation of music, not working directly on the sound. *Patchwork* also includes extensive libraries, which partly come from the users themselves."

• ANALYSIS/SYNTHESIS

IRCAM say that "Inventing new sounds through creative use of powerful analysis methods is the main theme for this group". The software offered through this user group offers a wealth of sound analysis and synthesis technologies, made accessible by highly intuitive and editable graphic representations. Puig offers some clarification: "The members of this group, mostly studios and sound designers, work directly on sound. The latter group are sometimes people who're not really musicians in the normal sense of the word — they just want to create special effects or invent new sounds."

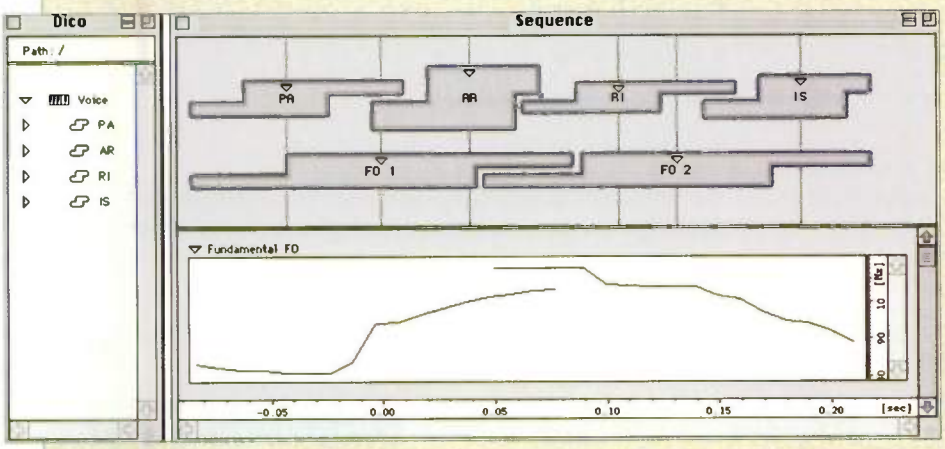
Three kinds of software are offered. *Audiosculpt* is, explains Puig "software with which you can display an image of the sound on your screen and then intuitively shape or sculpt it, to manipulate the sound. It's based on Super Phase Vocoder (SVP) technology, and includes DSP options like filtering, time-stretching, transpositions and morphing. You use it in conjunction with sample software on the Mac, such as *Alchemy*, and then you apply *Audiosculpt* as the processing device. It's used in composition, sound design, special effects [the castrato voice in *Farinelli* was created using SVP technology], mixing and post production."

The second type of software offered through this user-group is *Modalys*, considered to be one of the most important fruits of IRCAM's 20 years of acoustic research. Based on a technique known as modal analysis (and originally created in 1988 on UNIX machines) *Modalys* makes it possible to create the sound of virtual instruments from scratch, using parameters that relate to the physical sound and sound-production mechanisms of real instruments, but which are not limited by the constraints of the real world. It is, for example, possible to "construct a gong whose size changes over time" according to the Forum description, or morph two sounds together. Puig: "It's the most complicated of our software to use at the moment, because it has a very poor graphical interface. The problem is: how do you represent a virtual instrument on screen, like a gong that's 100 metres in diameter? Because the point of this software is not to try to re-create an existing instrument, but to create a non-existing one. We're working on a new interface, which should be available early next year, and which will probably be of a 3D graphic nature."

Chant is the third type of software available from this user-group. First developed in 1979 to analyse and resynthesize the human singing voice, the modern version casts its net much wider, using paremeters based on the simulated physical methods used by the human body to create any kind of sound. Puig: "It can be used to create any kind of sound or instrument, but still works best for different types of voice synthesis, especially vowels. It works a little like FM synthesis, but it's a very abstract system. This autumn we will be bringing out another voice-based synthesis program, called *Diphone*. It's mainly meant to process samples and has specific tools for morphing, and an improved algorithm for additive synthesis that will make it very powerful to use for musicians."

• REAL TIME

The software from this user group is designed for live, interactive purposes. To make the computer follow



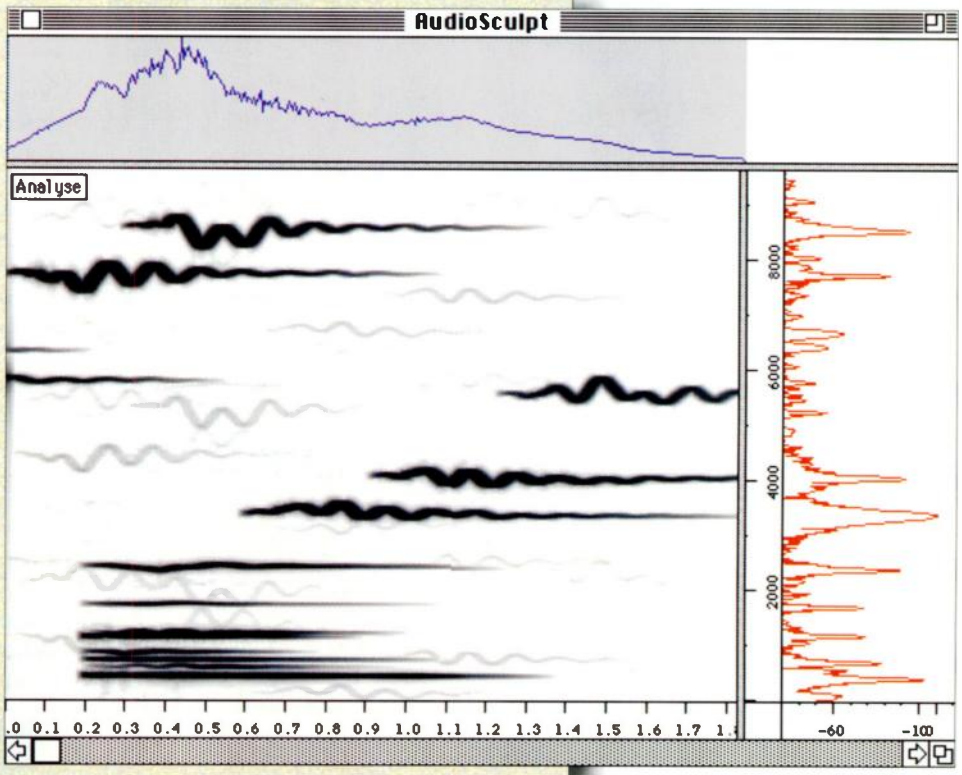
Diphone screen.

software, and their feedback is essential, not only to improve the software, but also to make better manuals and documentation and provide everything that comes with regular commercial software: training, service, and so on. So there's been a real change in the spirit of our development. In the past it was more a matter of the R&D team coming up with technological developments and the composers waiting to find out what was presented to them and then seeing how they could apply it. There were, of course, discussions between composers and researchers — and occasional battles and confrontations — and some very interesting things came out of this. But now the work is structured in teams of composers, users, students and researchers working together in development groups for specific projects. The researchers are not just doing their own thing any more, but are ▶

"Forum, the IRCAM user-group, was set up in 1993 and marked one of the most far-reaching changes in policy and direction in the institute's history."

the performer, rather than the other way around, has long been a prime objective of IRCAM. Puig: "This group doesn't only deal with applications for live performance, but also visual arts and real-time interactions in virtual reality and sound installations. The main software in this group is *MAX*, which is marketed by Opcode as well. The Opcode version is capable of generating and processing MIDI data, and the Forum version also has real-time DSP. It's become the industry standard for multimedia installations, and has a graphical language that allows you to patch in all kinds of different types of MIDI or live sound events."

The second type of Real Time software is *FTS* (Faster Than Sound), "a basic server for real-time control and digital signal processing", which usually works in conjunction with other software. *FTS* is the engine for the third software from this group, *Spatialisateur*, which is dubbed "a real-time virtual acoustics simulation environment", and is not to be confused with the 3D sound processing box called the Spatializer. *Spatialisateur* is also a 3D software of sorts, and because of its extreme processing demands, it runs on a Silicon Graphics platform, but will be available on the Mac from early next year. Puig: "This software also comes from the results of years and years of taking acoustic measurements, and allows the user not only to create localisation and surround sound effects, but also to adjust parameters like distance, brightness, liveness, sound presence, and so on. It goes way beyond any of the other 3D systems on the market at the moment. The new [Mac] interface will be made for musicians, rather than physicians, and it's a great tool for live purposes and during final mixes in the studio. We're negotiating with other companies to have it released as a studio effects box, and we're also talking to virtual reality companies about it, trying to make them aware that as they create visual illusions — like walking through a room — they also need the corresponding aural illusion, like the minor changes in acoustics that happen with every step you take in a room. Believe it or not, VR sound is still mono most of the time, and people who create VR weren't even aware that 3D virtual sound is essential for creating realistic VR, let alone that it is possible to create such aural illusions."



AudioSculpt screen.

Forum is non-commercial, which is reflected in the low price at which the software is made available: for individuals, it's 1750FF (around £220), for one user group, 2850FF (around £350) for two, and 3800FF (around £470) for all three. For institutions, the prices are 4700FF, 5800FF, and 6800FF respectively. These fees provide access to all the software relevant to the user group of which one is a member, plus technical support and reduced rates for the training sessions and bi-annual workshops that Forum also offers. On top of this, Forum supplies information about new technologies and new music, including via the Internet. Forum currently has about 300 individual users, and 900 institutional users, with the largest group of users being in the UK.

Forum can be contacted at:

A Forum IRCAM; 1 place Igor-Stravinsky; 75004 Paris; France.
T +33 1 44 78 49 62.
F +33 1 44 78 15 40.
E admin-forum@ircam.fr
W http://www.ircam.fr

also answering the needs that are expressed in these groups."

The youthful director of R&D at IRCAM, Hugues Vinet (34), tells me that these development groups are for subjects such as acoustics, real-time systems, on-line studios,

Hugues Vinet.

analysis/synthesis and DSP, information systems, and so on. Within these, there are two strategies: "One level is where a user has a specific need and we try to adapt software to his or her needs. That's a short-term development. But there are also longer-term strategies that deal with designing brand-new software in response to people's needs, and examining at a higher level all the problems that occur when people spend time with technology — how they lose time converting formats, or with badly-designed interfaces and so on — and we try to integrate these findings into our software developments. The fact that our software is now available to the outside world also requires a different organisation of the R&D department, because we now have to guarantee a certain level of quality and we have to support the software in the long term."

> "Computers have taken a lot of energy from people in recent years, so that they have little left for creativity, and we try to reverse that trend..."

Another aspect of going public with its technological developments is that IRCAM has to keep a close eye on the movements of the commercial players in the field, such as Opcode, Steinberg, Digidesign, and so on. Presumably IRCAM chooses what software to develop on the basis of what it perceives as its specific strengths. Asked what these are, Vinet stresses first and foremost "the people we have here at IRCAM. We have a dynamic team with many brilliant people who have been here for a long time and who are well-connected to the scientific community around the world. We know all the top researchers working in this area, and you can count them on the fingers of two hands. The second thing is that we do both research *and* development. Companies like Opcode and Digidesign are developers who apply the results of the research. They're not interested in everything we do, but take from researchers what they want. So we are the originators. At the same time, many researchers aren't connected to developers, let alone users. We have a close relationship between research and development here, which is a unique situation in the world, and on top of that we also work in close communication with composers and other users."

EXPRESSION

Vinet stresses that this close connection between research, development and user still forms the core and *raison d'être* of IRCAM: "The chain between research and useable software is not always easy to create. We try to have as much communication as possible, and a number of composers work here every year to help with scientific research and give our development teams feedback. For example, when giving feedback on new software, they may either make a set of musical sketches with it, to evaluate it from a musical point of view, or they make what we call a tutorial, a set of musical examples that demonstrates the whole range, from the easiest way to use the tool to the most complex way, so that other people can try it out and get trained. Composers are very demanding — time-stretching came out of the needs articulated by avant-garde composers, for example. Because of these high demands, the tools we develop usually are very complex. But we don't want to force users into

IRCAM HARDWARE

There was a time when IRCAM was heavily into making hardware, which tended to be very big and very expensive. Today, IRCAM produces only small hardware products, like quarter-tone modifications for flutes, special mutes for trumpets and horns, and a mouthpiece for a clarinet which allows the player to change volume and pitch with a foot pedal. On the electronic front, IRCAM have also been perplexed by the irritating habit of hard disks to make a racket, and have developed something which they call a Mac Motus: this is simply a signal modification/amplification box and high-quality cables which allow you to place your hard drive and computer up to 150 metres from screen and keyboard. Since it's in low-volume production only, the price is sadly rather steep: 5000FF (around £600!). Finally there's the IRCAM mouse, called Felix. It plugs in on top of one's ordinary mouse, hence the name, and gives the user 3D capabilities, helpful for 3D games, internet, and 3D graphic sound representations.

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▶ having to adapt their music to the parameters of our technology.

"Computers have taken a lot of energy from people in recent years, so that they have little left for creativity, and we try to reverse that trend and make our tools as transparent and easy to use as possible, so that people can concentrate on music, rather than technology. Developing good graphic interfaces is an important part of this. We have to identify our specialities in the work that we do, and we have decided that they lie mainly in the area of developing software tools for composers to work with, developing interfaces for inputting information into a computer that comes from gestures, movements, playing and so on, and designing musician-friendly graphic interfaces. These are ways of introducing meaning into computers and keeping a musician's work away from equations and computations and needing to be a technical expert. Technology must be at the service of the composer's or performer's expression, and I think that musicians who have something to say will try to hide technology rather than show it."

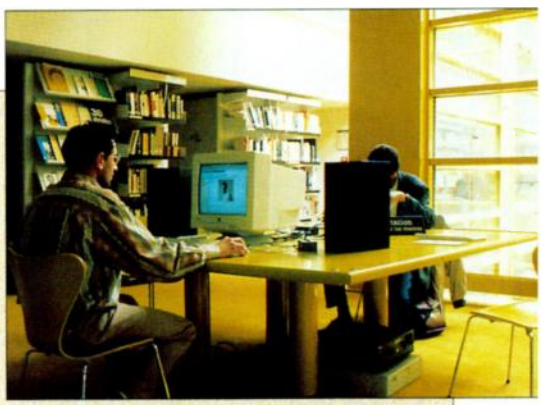
The successes which IRCAM is having in achieving these aims do not mean that the institute will soon follow in the footsteps of the big commercial players in the music technology field. Puig, Nieminen and Vinet all stressed the fact that IRCAM works within the constraints of government funding, and artistic considerations take precedence. Vinet: "The industry can do mass production and marketing much better than us. We're simply not set up to do that. We therefore concentrate on high-level technology, which we try to licence to any of the major companies, who can either adapt our technology to their own needs, or produce it exactly as we made it, as Opcode did with *MAX*." Puig: "The only place where we ▶

THE INSTITUTE TODAY

In 1995, IRCAM's budget was 42.6 million francs, (about £5.3 million), of which 31 million francs came from the French ministry of culture. The remainder was supplied by income from concerts, workshops, education, publications, CDs, Forum, licensing fees and industrial partnerships. Outgoings were divided between R&D (£1.8 million), education (£1.8 million), music creation/production (£600,000), and general services (£1.2 million).

Almost all the institute's current activities are described at some length in the main article and the Forum box. However, three areas have hardly been touched upon, and these are Education, Music Creation and the Médiathèque. Jean Baptiste Barrière is director of the Education and Music Creation department, and he explains: "In Music Creation, we do everything to call a piece of music into being other than composing it — we record the music and feed the composer, and so on, which is why I prefer to call it Music Production. The education side was for a while separate and has now been joined together again, and we now have a complete educational program, with a couple of PhD degrees, one-year programs for composers, and 16 weekend workshops that cover everything from computer composition to sound sculpting. The R&D department looks after about 20 people who do research for their post-graduate degrees."

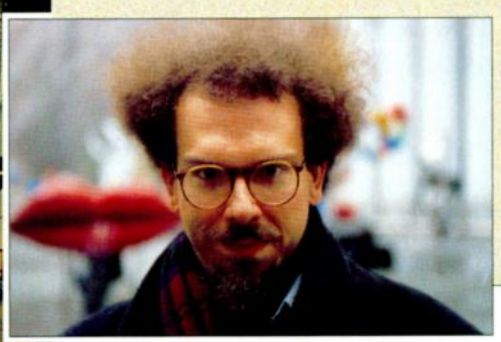
Barrière is responsible for the eight studios that are housed largely in the original underground building, and the four studios that are in the top of the Piano Tower. All studios are equipped with similar equipment — a Mac with Pro Tools, *SampleCell* and all IRCAM software, a Next Computer — the Black Box — with *Spatialisateur* software, a Yamaha FM keyboard such as an SY99 or SY77, custom-made Amadeus monitors, outboard effects-processing gear, Tascam DA30 DATs, and Sony or EMT desks. The studios are used almost exclusively for sound-sculpting and composition, with the exception of Studio 8, which is also a genuine recording studio, featuring a Neve desk and a Studer 48-track digital recorder.



The Médiathèque.

Photo: Christian Thomas

The Médiathèque, housed in the recently opened Jules Ferry and Bains-Douches building, is basically a computer-driven music archive and library. It contains around 15,000 books, 8000 scores, and 2500 recordings by the Ensemble Contemporain — although independent, this is more or less IRCAM's house orchestra — plus many recordings by others. All this material is accessible via computer terminals, and a catalogue is available on IRCAM's website. The Médiathèque is open four days a week to members, at 300FF per year — Forum members 200FF and students 150FF.



Jean-Baptiste Barrière, above, and Studio 5, left.

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Stephen Croes *(Producer, Arranger, Engineer - Fleetwood Mac, Kenny Loggins, Steve Wonder) - "The Indigo 2011 EQ and 2021 Compressor are exceptional - both responsive and flexible. I can stomp or be subtle, hype a sound or just detail it. These are real tools for any level of music production."*

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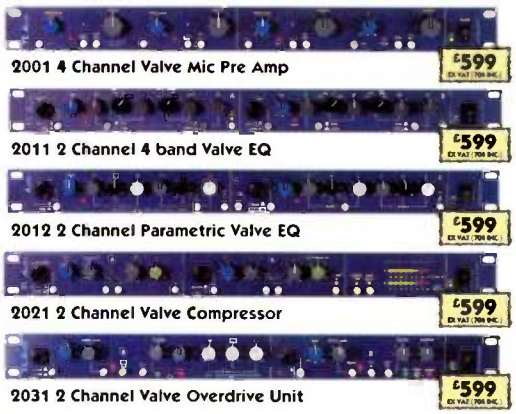
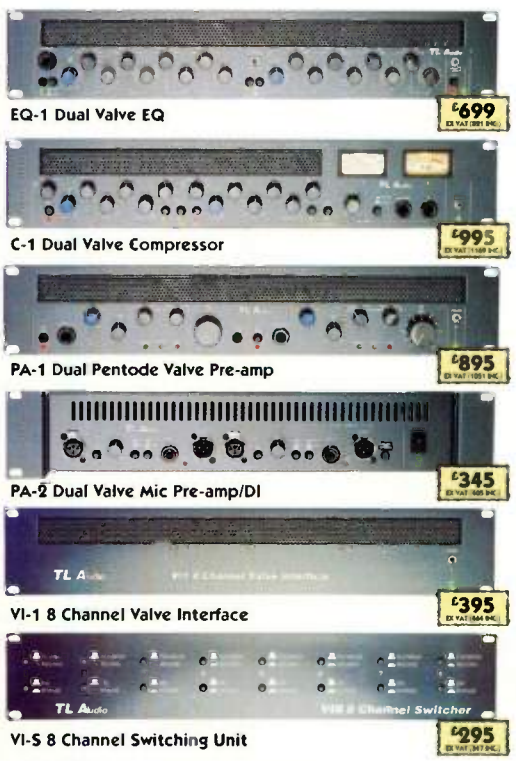


CLASSIC



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ourselves make our technologies directly available to larger amounts of users is via Forum, which is commercial, or with the few bits of hardware that we make."

FUN

To the same question about IRCAM's particular strengths, Vincent Puig points to the wealth of data that the institute has accumulated during 20 years of acoustic testing, and describes how this has given rise to some very peculiar bits of software, available via Forum: "You cannot imagine all the measurements of instruments that we have here, done in our anechoic chamber or in the concert hall. It's incredible, and they, and the know-how and studies that we've built up during 20 years, are now being applied for physical modelling in software like *Modalys*. You can build your own virtual instrument with *Modalys*, and we also use it for industrial applications. For example, a company came to us asking us to design a sound for their future electric cars, and we're working with France Telecom on designing a new acoustic for teleconferences. We've also used our computer experience and acoustic data to create 3D software called the *Spatialisateur*. It has an interface that's designed for musicians, and with it you can create illusions of distance, brightness, presence, placing and even out-of-speaker placing." (see 'IRCAM Forum' box). One groundbreaking commercial application of IRCAM's acoustic and computer know-how was their fantasy creation of the voice of a castrato for the movie *Farinelli: Il Castrato*, in 1994, by skilfully blending and colouring the voices of a counter-tenor and a coloratura soprano. Another notable achievement is the breakthrough of the aforementioned *MAX* software, as marketed by Opcode, and apparently Oberheim are close to releasing IRCAM-developed software for the Mac, based on additive synthesis, which allows, for instance, the sound of someone playing the guitar to be remodelled into another sound, with the added option to morph between the two sounds. It works in real time, and a pedal to establish the morph point between the two sounds is part of the system. IRCAM are also looking for a partner with whom they can make their amazing directionality software, which alters the directional characteristics of sounds, commercially available.

> "...IRCAM continues to play an important role in the increasingly fast-moving world of computer and DSP technology..."

All these developments demonstrate that IRCAM continues to play an important role in the increasingly fast-moving world of computer and DSP technology, and that their ivory tower image is as defunct as the monster computers they made more than a decade to go. Clearly, IRCAM remains as outrageous and revolutionary as it was 20 years ago. Moreover, it appears that a lot of the technology they produce is now not only highly practical, but also fun — and maybe even hip...

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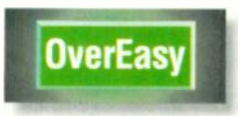

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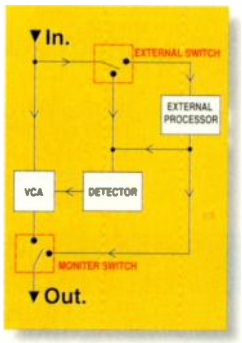
The 1066 makes using external devices in the sidechain simplicity itself. *Monitor* lets you instantly flip between the sidechain and



the compressed signal for rapid set-up whilst the *External* switch allows you to A/B processed and unprocessed signal without the need for complex patch-bay normalisation.

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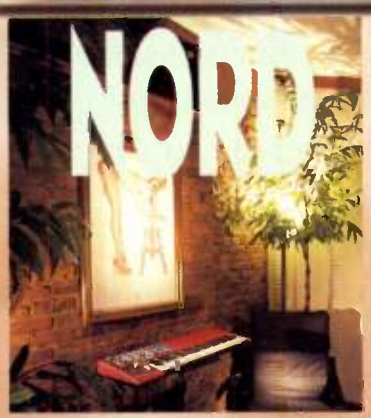

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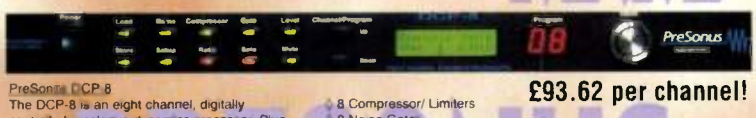

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16ch	£1095
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TASCAM

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E-100 £299

E-200 £449

designed for critical applications such as recording, sound reinforcement and broadcast. it's unique combination of transparent reproduction of any sound source and high spl capability make it one of the most versatile high quality microphones ever made. equally at home in a vocal booth, in front of a whole symphony orchestra, close micing a kick drum or recording a classical guitar.

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- high spl capability - 148db
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Lexicon's PCM-80 offers effects with a capital E whilst the LXP115 mk 2 is a flexible multi-effects processor with world class studio sound for less than may have thought. They'll leave you breathless!

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E6400
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CD3000i £1699

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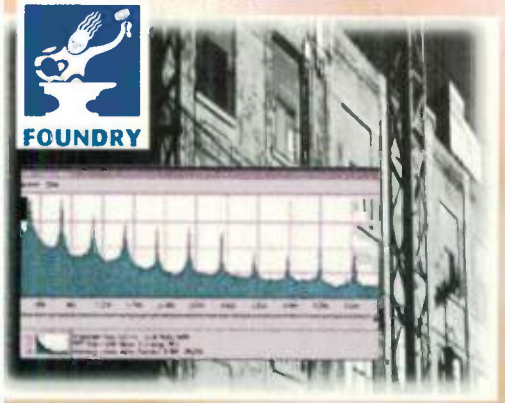

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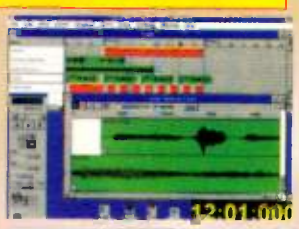

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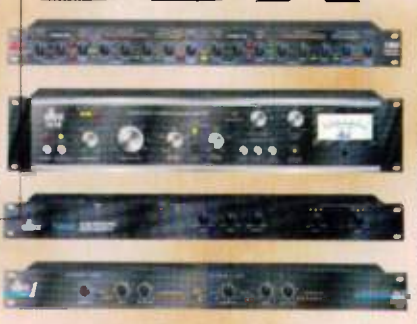

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SPIRIT FOLIO F1 14/16-INPUT MIXER

Employing the same surfacemount technology and 100 millimetre faders featured on the larger Folio SX, the stylish new F1 continues the progressive Folio tradition of offering more features for the same price or less. Man of taste PAUL HEDGES decides whether he likes the cut of the F1's jib...

Spirit by Soundcraft's sub-£1000 Folio range has been one of the mixer success stories of the past few years, with Folio after Folio seemingly offering more facilities for around the same price. The new F1 follows this honourable tradition: it's a 2-buss mixer available in two versions (with either 14 or 16 inputs — the 16-input version is under scrutiny here), and the cheaper of these costs only £30 more than the original 10-input Folio did on its introduction (see *SOS* February '93).

Over time, a group of long-term Folio users has been sending their thoughts on the range back to the manufacturers, and several of the most common suggestions have been incorporated into the design of the F1. The most obvious of these improvements are the full-size, long-throw 100mm faders which give it its name (F1 is short for 'Fader 100', apparently), and of which more shortly. Like the more expensive Folio SX (reviewed in *SOS* July '96), the F1 has also benefited from Spirit's new surfacemount circuit board technology, which has been instrumental in allowing Spirit to cram extra features into both the SX and F1 designs without having to significantly widen the physical size of these mixers. Overall, the F1 shares many of the facilities found in the SX, but has fewer channel inputs, and does without the sub-buss routing facility and the dedicated direct outputs on channels 1 to 8.

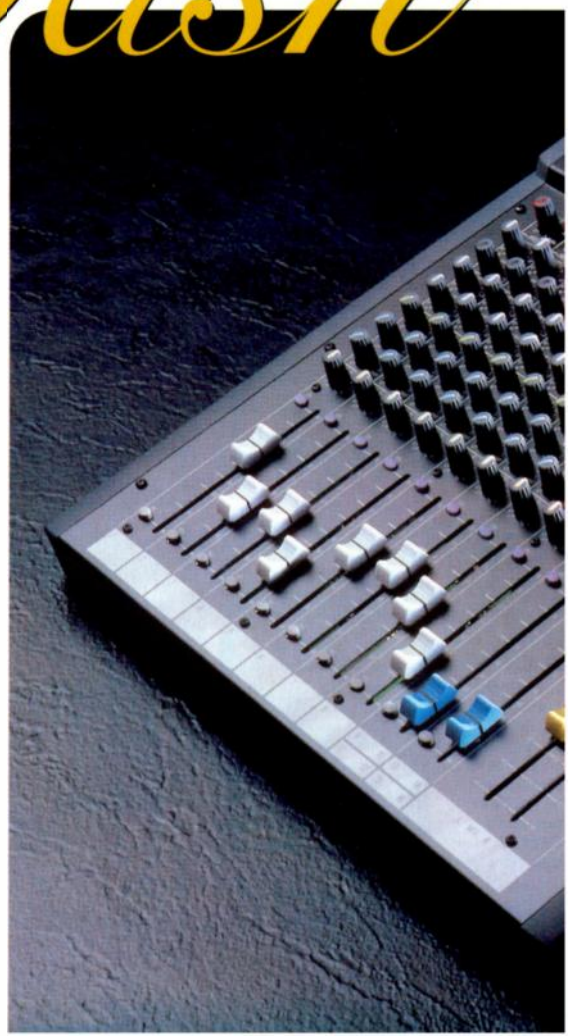
INPUTS & FADERS

What you're left with is eight mono line/mic channels (or six on the 14-input version), each with high and low shelving filters and a sweepable mid EQ, two stereo channels (with just the shelving filters and no insert points), two extra stereo inputs (with gain controls only), two track return inputs, and, finally, those long-throw left and right mix output faders. Whilst the MIDI module/ sequencing user might not use the faders much, having the extended fader travel to do a quality 'real-time' fade in and out is a real plus point. The faders all felt spot-on in a two-handed 'active mix' (ie. one with lots of ever-changing and unpredictable source signals!), and there is plenty of space between each channel, so your fingers fall comfortably on each fader.

The noise figures for this mixer are impressive, both on paper and in practice, with more-than-acceptable hiss levels when the mic gain is cranked to its full 60dB. This maximum boost is going to be absolutely fine for all but a handful of ribbon mics with weedy output levels — certainly Spirit's trademarked UltraMic preamp circuitry did a fine job on a selection of my moving-coil and electrostatic mics. Power to these was supplied by switchable global 48V phantom power, which is available on all the mic channels. Newcomers to phantom power need not fear — the F1's excellent user guide is quick to warn about the potential problems of sending phantom power to unbalanced microphones. The mic and line inputs are wired in parallel, so it makes sense to remove any source you're not using from a channel. I often don't, and find that my moving-coil mike has had a nervous breakdown and become a miniature loudspeaker being fed from the tandem line input!

Two pairs of phono sockets at the top of the stereo channels give you two additional stereo inputs. As mentioned earlier, you only have level control over these (there's no EQ or aux sends), but they are ideal as returns from a signal processing device, as they go to the main mix output.

Two phonos close to the main output balanced XLR sockets are intended for the 2-track return from the device you are mastering on (eg. cassette, CD or DAT) and a Mix/2Trk button allows you to choose whether you monitor the mix going to the mastering device or the signal returning from it. A level control is close to hand, and has a generous amount of gain in case you bring a low-level source in through this input. There's also a 2Trk To Mix button, which could be useful for quickly getting a pre-recorded DAT backing track up onto a mix ready for overlaying with more sounds.



pros & cons

SPIRIT FOLIO F1 14:2/16:2

£382/452

pros

- Sensibly thought-out features and facilities.
- Excellent user guide.
- Eminently useful for a range of applications.
- Ergonomically sound.
- Great value for money.

cons

- No EQ Bypass button.

summary

An excellent desk that is equally at home at the heart of a beginner's setup or as a sub-mixing facility in a more complex audio arrangement. It would also be the ideal companion in a church hall or amateur dramatics venue, where cost and ease of use are paramount.

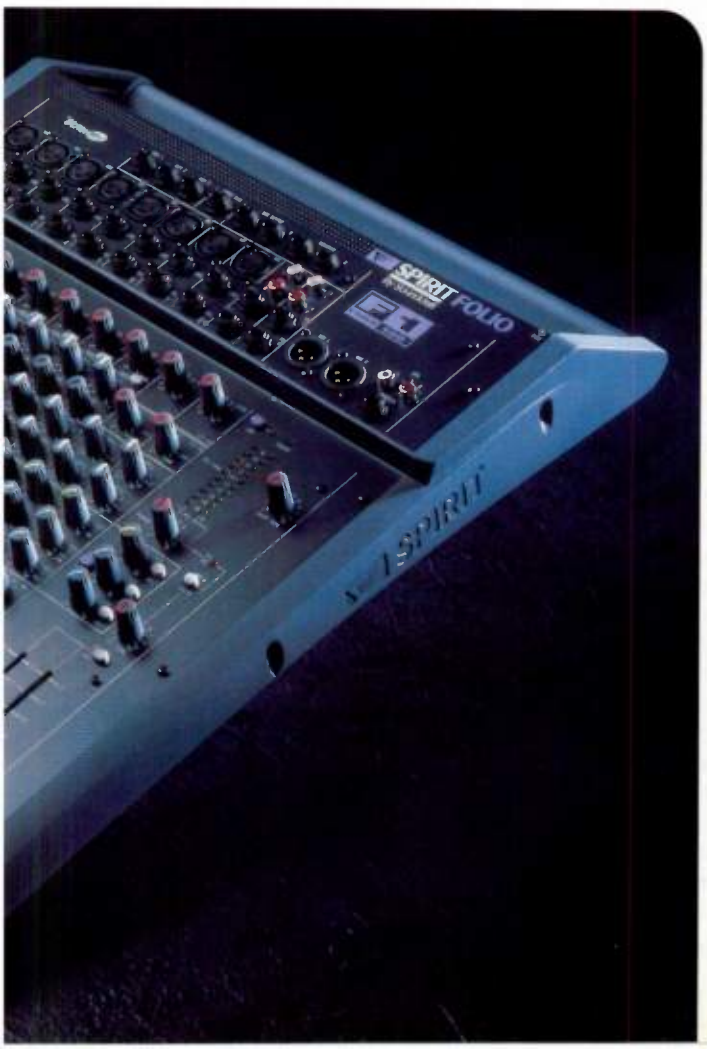
SOUND ON SOUND

THEY *DO* BUILD 'EM LIKE THAT THESE DAYS — BUILD QUALITY

Paul White noted the recent improvement in build quality in the Folio range in his SX review, and this has been maintained for the F1. The mono channel faders felt unhindered and uniform in their travel, with slightly more friction noticeable on the stereo channel faders, while the pots were all firm to the touch and furnished with centre detents where appropriate. A quick look inside the desk showed that the main surfacemount circuit board was screwed firmly in position at several points, which minimises the risk of warping. The only point of note concerns the moulded catch which keeps the power cable in place — it's of reasonable quality, but it wouldn't offer up much resistance to a good sharp tug.

EQ

Each channel on the F1 has a 100Hz 18dB/octave filter to eliminate rumble, and the EQ section provides you with a very usable palette of tone controls. The High and Low shelving filters boost or cut up to 15dB at 12kHz and 60Hz respectively, while the mid EQ offers 15dBs of cut or boost anywhere between 240Hz and 6kHz, with a fixed Q value of 1.5. I found that on most occasions I didn't have to move the cut/boost control far to achieve the desired audible effect, and using these controls to their full extent allowed any sound to be drastically altered (and not always for the better in artistic terms). This brings me to the fact that there are no EQ bypass buttons on the channel strips. Whilst I realise that these would add to the cost, anyone involved in mixing relies on bypass facilities a lot; it is very easy for our brains to lock onto a sound that has been radically altered by EQ and then take this as the definitive, improved product. It's only by comparing with your starting point that 'successful EQ' can be assessed, and the absence of an EQ bypass button makes this tricky. The embossed, boldly-coloured legending on the EQ, pan and aux send controls works well, and should help people to mix even in the darkest of corners. The tapered shape of the knobs ▶



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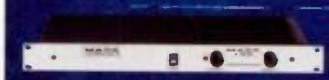

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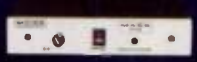

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KEY Audio Systems

▶ and the generous distance between all the controls and faders also helps to keep mixing a stress-free zone!

ROUTING, OUTPUT & AUX SEND OPTIONS

The pre-fade facility for each channel is at the bottom of the channel strip, to the left of each fader. Anything pre-faded gets put onto the monitor buss, headphones and meters, replacing the selected monitor source (Mix or 2Trk). A little LED close to the 10-section level meters alerts you to this fact, just in case your ears have stopped working. I suppose it would have been nice to have illuminated 'PFL active' on each channel to help you track down any rogue button presses, but once again, the price of this unit precludes such a luxury. Incidentally, inserting headphones into the phones jack cuts the monitor outputs, which could be a blessing or a curse, depending on your point of view!

The eight mono channels and the two stereo channels have On buttons that mute all outputs from the channel (except the insert output) when raised — these switches have to be depressed before you hear any signal from a channel. It's good to see where these buttons are located — at the top end of the fader travel there's little chance of accidentally removing something from the mix as you move the fader!

The Mono Sum is a bonus output which was also apparently incorporated at the request of long-term Folio users. Fed from a dedicated rotary control, the Mono Sum signal emerges via an impedance-balanced "A"-gauge jack socket. This mono output from the desk could be useful in live contexts, for example to feed a waiting area for the next band due to play, or, in a theatre, for the actors needed in the next scene of a play, so they can hear what's happening on stage. A church induction loop (hearing aid system) could also benefit from this facility.

There are three aux sends that offer sensible alternatives in terms of where they take their sound feed: aux 1 is fixed pre-fade, and aux 3 is permanently post-fade, whereas aux 2 allows you to choose either pre- or post-fader send courtesy of a global master switch (but you can't have a mixture of both). Each aux send buss has its own AFL soloing and master level controls. Again, the excellent F1 manual gives suggestions to the beginner about which configuration to use to achieve a specific purpose. The desk certainly allows you to drive a couple of external signal processing devices such as reverb and echo, whilst also providing a separate dedicated foldback or monitor mix to a performer or audience. When the aux sends are fully off, I couldn't hear any residue of sound leaking through, which certainly ties up with the F1 spec's quoted 'aux sends pots offness' figure of less than 89dB. The aux sends are muted with the other channel outputs when the On switch for a given channel is released.

BRIEF SPEC

Mic Input Impedance	1.8kΩ
Line Input Impedance	10kΩ
Stereo Input Impedance (unbalanced phono)	12kΩ
Stereo Input Impedance (balanced jack)	10kΩ
Aux Sends & Inserts	75Ω
Mic Input max. level	+22dBu
Line Input max. level	greater than 30dBu
Stereo Input max. level	greater than 30dBu
Headphones (into 200Ω)	150mW
Frequency Response (any input to any output, 20Hz to 30kHz)	less than 1dB
THD at 1kHz (+20dB at all outputs)	less than 0.006%
Mic EIN (max gain, 20Hz to 20kHz bandwidth, 150Ω source impedance)	-129dBu
Channel noise (auxs, mix and masters at max, 10 inputs routed, faders/pots down)	better than 85dBu

WIRE INTELLIGENCE — CONNECTING A MULTITRACK TO THE F1

The position of the EQ in the F1's sound chain in relation to the insert point is evidence of a well thought-out desk: the inserts on the mono channels are after the gain control and filter but before the EQ strip. This means that you can use the F1 to feed a multitrack device by sending the channel signal on the tip of a TRS 3-pole "A"-type jack to the record input, and taking the output of the multitrack machine back into the channel on the ring of the aforementioned jack. Very neat, and, of course, any EQ you apply is not on the recording but on the monitor mix. Don't worry if your eyes glaze over at the mention of 3-pole "A"-type jacks, and you quake at the thought of making up leads to perform these tasks, as the manual includes a truly excellent wiring guide that takes account of almost every cable wiring permutation I can think of.

CONCLUSIONS

The Spirit Folio F1 mixer is definitely a chip off the old Soundcraft block — it oozes value for money and audio quality, and comes in a compact, accessible package. As I've suggested here, anybody embarking on a flirtation with sound, whether it be in a home studio setup, amateur dramatics, live music or sound reinforcement at venues, will find the F1 an excellent tool. The beginner will also find much to cheer in the superb manual, which gives clear illustrations of how to integrate the desk with other equipment — and then there's that wiring guide (see the 'Wire Intelligence' box). I really like this level of commitment by manufacturers — it's obvious that Spirit are very keen to make using a piece of their equipment as straightforward and hassle-free as possible. Of course, in this case it does indicate where some of Spirit's target purchasers are — ie. those starting out on their recording and mixing careers. However, this isn't to say that only a beginner would find a use for the F1. The facilities bristling all over it make it ideal for the experienced user too, who will be able to scan the features and get up and running straight away (incidentally, the F1 is so light that running with one in each hand and two tucked under the arms is feasible!).

Several friends and colleagues witnessed me tinkering with the F1, and commented on how they would like to use it for radio outside broadcasts, or as a sub-mixer for a large band setup. I think this is the strength of this mixer — it might start off as the centre of a modest home studio setup, but its quality and facilities mean that it will continue to prove useful as your system grows. I can't imagine anybody glowering at an F1 in the corner of a studio thinking, "I've outgrown you, you sound cheap, I need to upgrade..." With the F1's no-nonsense, high-quality, good-value features, you'll simply find another application for this mixer if your sound requirements change. SOS

info

E 14:2 version £382;
16:2 version £452.

A Spirit by Soundcraft, Cranborne House, Cranborne Industrial Estate, Cranborne Road, Potters Bar, Herts, EN6 3JN.

T 01707 665000.

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Paul Hedges is a lecturer in audio operations at The Centre for Broadcast Skills Training at BBC Wood Norton. The views expressed in this article are the author's own and are not necessarily those of his employer.

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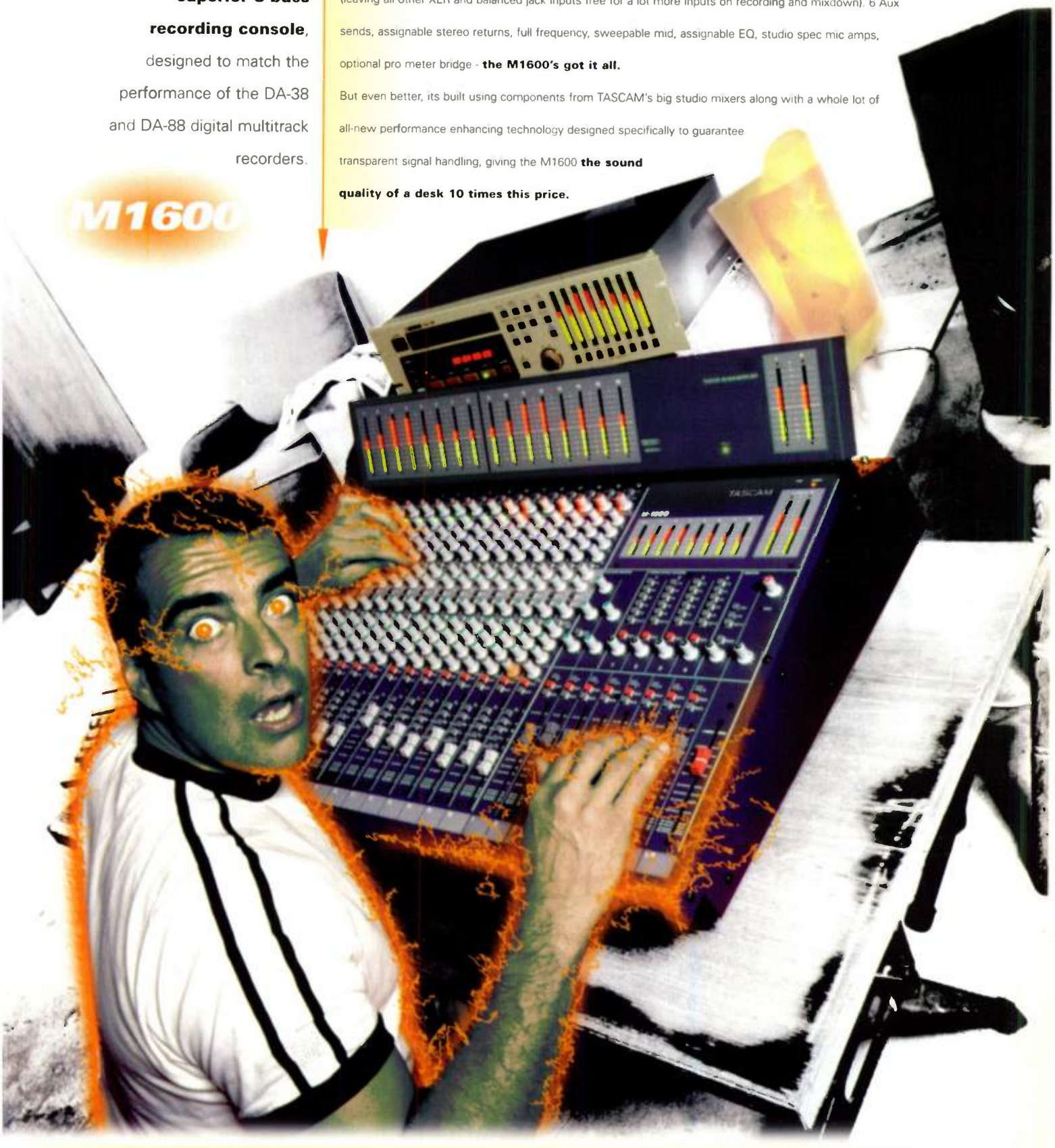

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Many bands make light work

BEHRINGER MDX 4000 MASTERCOM MULTI-BAND COMPRESSOR

Multi-band compressors tend to cost a little more but can often produce more natural-sounding level control than standard broad-band compressors. HUGH ROBJOHNS looks at a sophisticated new model from Behringer and tries to restrain himself...

Behringer are well known for their signal processors, and this latest offering is a very worthy addition to their range. The Mastercom is a dual-band stereo compressor with separate peak limiter system. It's well thought out, provides sensible control parameters, looks very elegant, and does the business as far as controlling dynamic range is concerned.

OPERATING PRINCIPLES

The Mastercom is rather different to the majority of compressor systems currently on the market because of its dual-band operating principle. The idea is not unique, of course — just expensive to implement, and most manufacturers do not perceive a need for such an elaborate device. However, dual-band or multi-band compression can be extremely effective, and often allows compression to be applied with much less obvious side effects.

One of the most common problems with a broad-band compressor is when a heavy bass signal (such as bass guitar or kick drum) dominates the dynamic control of the compressor, effectively modulating the high-frequency elements of the programme — an effect particularly obvious when compressing a complete mix. The dual-band approach of the Mastercom goes some way to reducing this problem, by splitting the audio into two bands (at either 500Hz or 2kHz, 24dB per octave) and compressing each band according to its own requirements. Compression follows a custom soft-knee curve, allowing very transparent effects with gentle settings, which then become harder as the compression reaches high levels.

Unusually for a compressor, the Mastercom has no dynamic controls, only the static ones for threshold, ratio and output gain. Attack and Release time constants are determined by the system itself and are optimised for each band, the user having no control over the settings. Even more surprising is that the otherwise excellent handbook makes no mention of this aspect of the compression process!

A further improvement over conventional compressors is the inclusion of a 'Leveller' system. This provides a long-term level control which is common to both bands and ensures a consistent output level with very slow attack and release time constants. The long-term aspects of this process do not interfere with the dynamic content of the programme — these are controlled purely by the main compression stage.

Finally, a separate limiter is employed in each band to control the peak output level. These limiters are almost as complex as the rest of the system and go to great lengths to ensure that even severe limiting remains as inaudible as possible. To achieve this level of signal processing, the Mastercom uses no fewer than six level detection stages and four VCAs!

THE BACK END

The Mastercom is housed in a standard 1U-high 19-inch rack unit, with a clear block diagram of the signal processing etched into the lid. The rear panel carries the IEC mains connector (with integral fuse holder and mains-voltage selector) and two sets of input and output connectors. In both cases, there is an XLR in parallel with a standard jack socket, all providing electronic balancing (although transformer-balanced outputs are available). The unit is capable of operating at either the professional +4dBu or the MI (Musical Instrument) standard -10dBV level without the need to switch between modes. The Threshold and Output level controls have sufficient range to allow operation in either type of system, but the Mastercom is actually more flexible and slightly easier to use within a +4dBu system, and the bargraph meters are calibrated for this type of use. The unit is bypassed through a relay system which maintains a direct signal path in the event of power failure.

FRONT PANEL

The front panel is deceptively simple, with only five rotary controls and a few push buttons. All of the controls have a quality feel to them, the knobs having a nice weight and subtle detenting, while the buttons have built-in LED indicators.

The audio controls start with the Threshold knob. This covers a range between -40 and +20dBu and simply determines the point where the signal will start to be compressed. The next knob, labelled Leveller, is rather unusual and controls what may be thought of as a slow AGC circuit. In other words, it controls a high-ratio compressor which has very slow attack and release time constants. The effect of this process is to provide long-term level control, much as you might gently ride the master fader during a mix to maintain a consistent overall level, but without altering the short-term dynamic content of the audio signal. The control is calibrated from 0 (no effect) to 6 (maximum effect).

The third control knob determines the compression ratio, over a range of 1:1 up to 6:1 and it is accompanied by a pair of gain-reduction

Hugh Robjohns is a lecturer at the Centre for Broadcast Skills Training at BBC Wood Norton. The views expressed in this article are the author's own and are not necessarily those of his employer.

bargraph meters (one for each band) which show up to 30dB of gain reduction. Between the meters is a push button which determines the frequency of the band splitting. It is normally set to 2kHz, which seemed to work well on solo instruments and voices, but may be reduced to 500Hz, which is sometimes more effective for complete mixes.

To the right of the gain-reduction meters is an Output level control calibrated for a +/-20dB swing. This control is not only used to make up for the natural loss in level associated with large amounts of low-threshold compression, but also to tailor the signal level for -10dB operating level systems.

The separate peak limiter is controlled with a single knob labelled Level and calibrated from 0 to +20dBu. This is accompanied by two LEDs, which indicate the limiter's activity in each of the two signal-processor bands. When operating at -10dB system levels, the flexibility of this control is reduced, since it really can only operate as a true peak limiter. In +4dB systems, it may be used at rather lower programme levels for very hard limiting effects.

Separating the Limiter section from the input/output metering is a bypass switch, which provides a true hard-bypass by means of a relay. This connects the input sockets directly to the output sockets, and is automatically engaged if the Mastercom loses power. The metering follows the bypass switch, such that when the unit is in-circuit, the metering shows the compressed output signal, and when the unit is bypassed, it shows the incoming signal level. The meters cover the range -30 to +15dB (zero equates to +4dBu) and are rather unusually arranged side by side, rather than one above the other, which would seem more appropriate for a stereo compressor.

IN USE

The Mastercom works well, and even severe provocation failed to make it produce anything that could be described as sounding really nasty. The manual is excellent, but whether you bother to read the manual or not, this device is supremely easy to set up, with only the Threshold, Ratio and Output controls to tune for the desired amount of compression. The Leveller helps to keep programme levels consistent in a very subtle way, and the peak limiter guarantees that maximum programme levels stay within the given bounds, even with digital recordings set to peak to zero.

Although I felt a bit lost without a Release control to play with, I cannot fault the Mastercom's dynamic control capabilities in any way. This is an excellent compressor best suited to final mastering applications or overall output level control for a recording desk or live-sound system. Dual-band compression sounds different to normal broad-band compression, usually being smoother and brighter, so that it often suggests a different approach to equalisation. With solo instruments, I found the Mastercom frequently removed the need for equalisation altogether.

It is possible to get some poor results from the system if it is used inappropriately — for example, compressing an acoustic guitar with the band-splitting set to 500Hz made even a Lowden, which is a pretty up-market instrument, sound cheap and boxy — and some settings of the Leveller control could, surprisingly, affect the perceived brightness of the signal. However, overall, when used sensibly, this box is an absolute cracker and I would be quite happy to strap it across the output of my desk for ever more! SOS

info

£ £499 inc VAT.
A Behringer UK, St Vincent House, 59 Woodbridge Road, Guildford, Surrey GU1 4RF.
T 01483 458877.
F 01483 458822.

pros & cons

BEHRINGER MASTERCOM £499

pros

- A tool for a classy, creative sound.
- Easy to use, hard to abuse.
- Might reduce the need for EQ if processing solo instruments.
- Nice solid feel to all the controls.

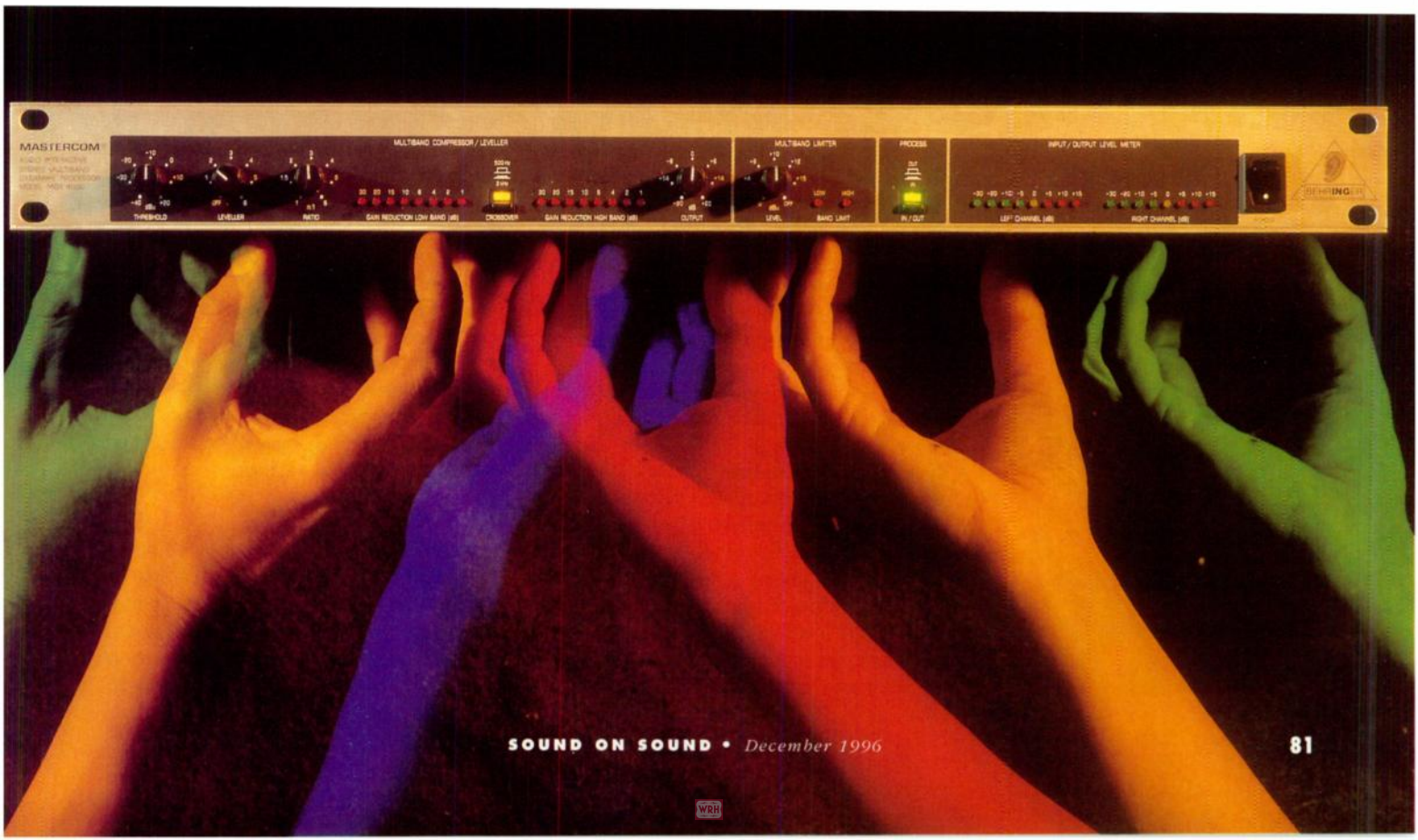
cons

- If you try really, really hard, you can just about make it sound a little bit naff.

summary

An excellent and very effective dual-band compressor which is easy to use and easily justifies its cost with a very classy sound.

SOUND ON SOUND



Belgium is better known for its chocolates than its studio monitors — but Belgian company FAR aim to change all that. DAVID MELLOR opens up the black magic boxes....

Sweet Spot?

FAR CR20 NEARFIELD MONITORS

pros & cons

FAR CR20 £799

pros
- Clean bass.
- Easy on the ear.
- Well made.

cons
- Slight peak around 3.5kHz.

summary
A viable option for nearfield monitoring, especially if you want accurate, rather than artificially boosted, bass representation.

SOUND ON SOUND

The FAR (Fundamental Acoustic Research) company is comparatively recently established, but judging from their range of studio monitors, which goes all the way up to the DBW200 at over £4500 per pair, this Belgian company are taking the business extremely seriously, and have a working relationship with the University of Liege, whose two anechoic chambers are used for testing FAR products.

FAR's stated philosophy on loudspeaker design includes the following aims:

- A good extension of the frequency range.
- A minimum of phase shift to maintain good stereo imaging.
- A natural low-frequency extension without excessively high Q, which generally gives a boomy sound.
- The engineer must be able to work a long time without becoming fatigued with the sound.

The FAR CR20 under review is designed as a nearfield monitor for video and film post production and editing suites, but there's no reason why it shouldn't be very useful in music studios, where it would compete on size and/or price with models such as the Alesis Monitor Two, KRK 7000B, and Tannoy System 800.

OUTSIDE

When I encounter a new pair of monitors, the first thing I want to know is that they are solidly constructed. I was encouraged from the moment I opened the outer carton of one of the CR20s and found that the packaging is partly made of chipboard! If they take this much trouble over the wrapping, the contents must surely be good. The cabinet of the CR20 is made from 18mm and 22mm MDF (Medium Density Fibreboard) which is pretty much standard these days and has a so-called soft black finish (other colours and finishes are available to order). The size of these monitors is 400(h) x 300(w) x 280(d)mm, which makes them on the large size for nearfield use, but not excessively so. On the base is a foam pad which should decouple, to a certain extent, any vibrations in the cabinet from whatever it is mounted on. At the back there's a pair of binding posts with decent-sized holes, to accept proper loudspeaker cable, which also look as though they will take 4mm connectors — but since I think this type of connector is a complete waste of time, and they're apparently going to be banned on grounds of electrical safety in continental Europe, I didn't have any to try out. I look forward to the day when we have a standard loudspeaker connector (any votes for the Neutrik Speakon?) so we can plug in speakers the way we do the rest of our equipment. At the front, there's no grille in front of the bright yellow diaphragms of the drive units, or any apparent provision for fixing one, which I would have liked to see, especially given the extremely eye-catching colour of the drivers!

INSIDE

As you'd expect, there are two drivers, both made by Focal. The 7-inch woofer has, according to the brochure, an ultra-rigid poly-sandwich Kevlar K2 diaphragm, an 11.5mm double voice coil, a powerful magnet and an ultra-rigid basket. What this means in terms a normal person could ▶

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E & OE

FAR CR20 Monitors

understand is that the woofer's cone is quite stiff, which helps to avoid distortion in the mid frequency band. The powerful magnet ought to mean that the woofer is quite efficient. The specified figure of 91dB SPL in anechoic conditions, with an input of 1 watt measured at 1 metre, is about par for the course for this type of loudspeaker. Power handling is rated at 100 watts (250W peak), and impedance is 8Ω.

The double voice coil is an interesting and unusual feature. Virtually all low-frequency drive units have only a single voice coil, which acts like an electromagnet when driven by a signal. The magnetic field of the coil interacts with the field of the drive unit's permanent magnet, to cause the diaphragm to move in and out. This happens over the full frequency range of the driver, the extent of this range of frequencies being controlled by the crossover. The LF driver in the FAR CR20 has two voice coils and, according to the specification, the crossover sends frequencies below 800Hz to one coil and frequencies below 3500Hz to the other (including 800Hz and below). Apparently this allows, with careful design considering the interaction between the coils, better control over the bass response. Whatever the reasoning behind it, the CR20's bass is not over-emphasised and is relatively clear and well articulated. Some might prefer speakers with more bass, which would probably tend towards boominess. Not me, however: for its size, the bass output of the CR20 is quite adequate for nearfield purposes.

The cabinet is of the bass reflex variety, with two ports rather than one, which seems to be quite fashionable at the moment. The reasoning behind the bass reflex design is that the resonance of the cabinet can be set a little lower than that of the low-frequency drive unit and thus enable the loudspeaker as a whole to reach lower frequencies than its size would suggest — often at the expense, however, of a little 'boominess'. FAR, on the other hand, claim to have chosen to moderate the *quantity* of bass their monitors produce, to place the emphasis on *quality*, which can't be a bad thing.

The two drive units are mounted centrally, as close together as physically possible. This is exactly as it should be for vertical mounting, since whatever your position in a horizontal plane in front of one of these speakers, your ears will be equidistant from both woofer and tweeter. Mount them horizontally, however and, as with almost all nearfield monitors mounted in such a way, you'll be locked into a single 'hot spot' where cancellation effects will be at their minimum.

Although the CR20s were supplied as a pair, there doesn't seem to be any internal difference between the left and right speakers. The corners of the cabinets are slightly rounded (though not as rounded as some cabinets I've come across), which should reduce diffraction effects.

LISTENING TESTS

There is no studio equipment, other than microphones, perhaps, where the listener's subjective judgment is more important. The CR20's frequency response is listed in the brochure as 40Hz-20kHz (±3dB), which does seem rather optimistic for a small cabinet, and the published graph would seem to indicate that the bass starts to roll off significantly below 60Hz. There is a small peak in the response at around 3.5kHz, which is exactly where the ear is most sensitive.

One of my favourite test CDs at the moment is Stephen Still's *Manassas*, first released in 1972 (but I only discovered it this year). This CD has a big sound, but realistically big — over-emphasised, and with a lot of detail in the individual instruments. I found that the CR20s were up to the task, producing a sound much bigger than their size might suggest, and revealing an impressive amount of detail in the mix, but not to an over-analytical extent. In fact, they revealed that some of my mixes, although they have plenty of low bass, are embarrassingly lacking in upper-bass punch. Used in the close field, these monitors are good for fine-tuning reverb parameters, and should be useful tools for bringing out the best qualities in any instrument or voice.

The best test of a pair of monitors is to use them for their intended purpose: making a recording and mixing it. Unless you intentionally compensate for any defects the monitors might have, your mix will have defects in the opposite direction, which will be audible when that mix is played on the system you're most familiar with. The clarity of the bass provided by the CR20s is such that it is possible to differentiate quite precisely between the low-frequency components of the instruments in a mix. However, the slight peak at around 3.5kHz could be a little worrying, since it tends to bring out the articulation of words more clearly — so in the mix that goes down to tape, it might be more difficult to make out the words unless you took care to over-emphasise them. This isn't a serious problem, just something you should bear in mind.

VERDICT

The FAR CR20s are solid, well-made, and will give quite an accurate aural picture of your mixes. During one of my favourite loudspeaker tests (how long can I listen at a high level without my ears getting tired?), I was pleased to note that they also exhibited no tendency to induce listening fatigue. Monitor choice will always be subjective, and I'd always recommend that you listen for yourself before purchasing, but I believe the CR20s to be a serious option in the nearfield monitor market. SOS

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CONTINENTAL SELECTION: THE FAR RANGE

The FAR company is based in Liege, Belgium, and was founded by Pierre Thomas, who made his name designing the internal acoustics for studios around Europe. His designs included his own large monitors, individually produced for each studio, which proved popular, and when customers began to ask if smaller ones were available, the decision was made to go into commercial production. FAR have been established for eight years, and have been making monitors commercially, which are apparently selling well on the continent, for about three years. The range currently comprises:

- **CR10 compact 2-way nearfield: £499**
- **CR20 nearfield (7-inch LF driver, Kevlar cone): £799**
- **CR40 (8-inch LF driver, mainly supplied as rear pair in a FAR surround system, but can be bought as monitors in their own right): £699**
- **DBW80 (twin 6-inch drivers, 3-inch soft-dome mid, 1-inch tweeter): £1485**
- **DBW100 (as above, with twin 7-inch drivers and a bigger cabinet, recommended for use as main or midfield monitors): £1995**
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Double Take

HOW TO RECORD SINGING GUITARISTS

Most budding engineers will, at some time, have to tackle a performer who wants to sing and play guitar at the same time. Mic type and placement can make a big difference to the quality of the result obtained, as HUGH ROBJOHNS explains...

I once read a humorous definition that stated 'Art is a Science with more than seven variables!' Some people do indeed approach recording music as a scientific experiment, while others see it as as an artistic experience. I think the truth lies somewhere in between — there are definitely elements of physics involved, which are wholly predictable, but there are also those unquantifiable artistic elements which can make the difference between a good recording and a great one.

Possibly one of the most common recording challenges is the singing guitarist. I'll bet every reader has had to record this combination at one time or another — but how many have actually achieved the kind of high-quality results that are possible even with simple equipment? I've seen it all too often: a couple of unselected mics are just plonked in front of the guitar's sound hole and the singer's mouth, both mics are faded up on the mixer, and then great fistfuls of EQ are needed to try and sort the mess out. The end result is usually a muddy and lifeless combination, often with poor control and separation. So what's going wrong and what could be done to improve the situation?

THE BASIC PROBLEM

Every recording session must start with a question: what are you trying to achieve? This decision is not yours alone, of course — you must consider what the musician is trying to do too.

Consider our notional singing guitarist:

- Do we want a recording of the solo performance as it stands, or do we want to record the individual elements in isolation, so that they can be re-balanced with other instruments which might be recorded at some other time (before or after this session)?
- If it's the performance we're after, are the acoustics of the environment appropriate, or will artificial reverberation have to be used?
- If we want isolated recordings, can we record each instrument (guitar and voice) on separate passes by way of overdubs, or will that destroy the 'performance' aspect of the piece?

The next question concerns the quality and characteristics of the instruments themselves, and this introduces a concept that may be new to some — what is the polar response of each instrument and how does this change with frequency? In other words, how does the sound of the instrument change as you move around it, and where is the optimum balance of characteristics? These questions can only be answered by carefully listening to a rehearsal of the material in the recording room.

Many engineers never bother to take the time to walk around the performer to learn about the environment's acoustics, what the performance is about, and the characteristics of the instruments. The whole essence of recording is capturing the performance — not what you think the performance *should* be. Of course, if there's something wrong with the performance or environment in some way, then it becomes the recordist's job to try to fix it — ideally by sorting out the problem at source. This might mean moving the performer to a different part of the room, finding a more suitable recording location, or using screens to modify the acoustics. It might even mean persuading the performer to use a different instrument, or to change playing style! It will often require you to modify the microphone technique, and as a last resort, there's always equalisation — but this really is a last resort. I know some recording engineers who feel that using EQ is an admission of failure — failure to get the right microphones in the right place, in the right venue! It might be an extreme point of view, but it is worth bearing in mind; if you don't start off with a good sound, you'll never be able to create one with the EQ — or any outboard processing, for that matter.

A fascinating insight into how musical instruments radiate sounds is given in chapters three and four of a book called *Acoustics and the Performance of Music* by Jrgen Meyer, ISBN 3 920 11256 3. It's quite an expensive book, so I suggest you persuade your Lending Library to track it down.

ANALYSIS

Experienced engineers can very quickly gather all the information they need about instruments, venue and technique, but this only comes with

practice. I've always found the best approach is to get the performer in the studio and rehearsing straight away, while I listen carefully to the performance, and wander around learning about the instrument's characteristics. (Many people find it easier to perceive what a microphone will capture by sticking a finger into one ear. It might look silly, but if it helps, do it — people will remember the brilliance of your recordings, not your strange antics in the studio!).

In the case of an acoustic guitar, you might typically expect the low-frequency content of the sound to be emphasised as you move around towards the base end, and the high-frequency harmonics and finger-board noises to become more dominant towards the neck, but every guitar is different and the amount of variation in sound quality can be surprising. Also listen to the reflected sound within the room. There are several questions you could ask yourself:

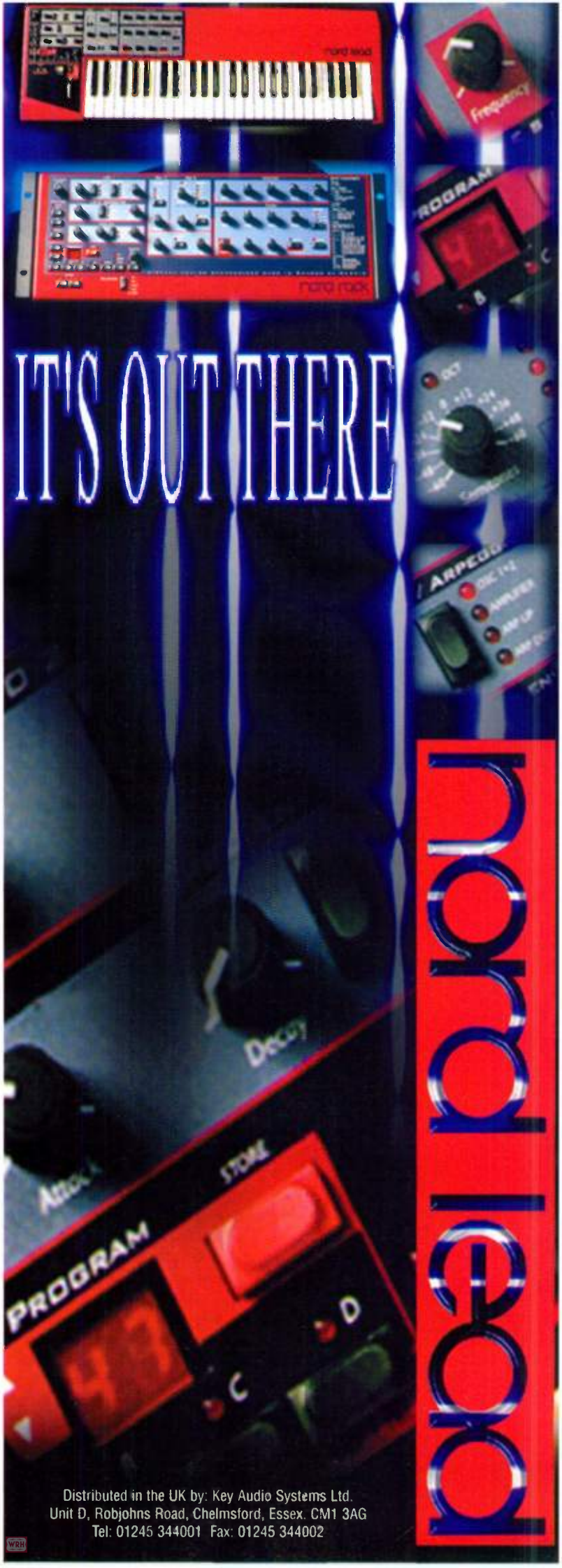
- Are there any detrimental reflections in the room?
- Would it be better if the performer was seated somewhere else?
- What is the guitarist's technique like? Does it create a lot of finger noise, for example, or is the instrument played to deliberately emphasise the upper harmonics? Your recording technique might have to reduce or capture these attributes appropriately.

A SIMPLE TECHNIQUE

Let's assume that we've followed the suggestions above and have a good idea of how the environment, the instrument, the technique and the performance work with each other and what we're trying to achieve with the recording. The next thing is to select and position the microphone.

Let's assume that we want to capture the solo performance as it stands. The simplest solution is to use a single microphone, carefully positioned to get an appropriate balance between voice and guitar. (If the venue had particularly good acoustics, you might choose to use additional distant microphones to capture the natural reverberation. If not, you'd have to create something appropriate from a reverb unit).

In this case, because the microphone will have to be a few feet away from the performer so that it can 'see' both voice and guitar, the polar response of the microphone will probably not be particularly critical — the only sound you might want to reject is the room's own acoustic. Most engineers would use a microphone with a cardioid pickup pattern, but it would be worth experimenting with an omnidirectional mic, as this would give a different balance ▶



HOW TO RECORD SINGING GUITARISTS

between the performer and room acoustic.

The electrical operating mode of the microphone will have an affect on the quality of the resulting sound. Ribbons, electrets and capacitor mics will tend to capture a lot of the upper harmonics and transient attack of plucked strings. Moving coils tend to have a duller and slower sound quality. These aspects will influence your choice of microphone, or, if your choice is limited, where you position the mic to compensate for its inherent qualities.

The optimum position of the microphone is the point where the guitar has the sound quality you want, as does the voice, and the two have the perfect balance relative to each other. Obviously, moving the microphone upwards favours the voice and down favours the guitar. Moving the microphone towards the base of the guitar reduces its upper harmonics and string noises, and often increases body and warmth. Poor vocal technique is unlikely to be a real problem in this situation, as the microphone is probably going to be two or three feet away from the mouth, but if the singer looks around or down at the finger board while singing, the balance will be affected. One trick which often works is to put up a dummy vocal mic, which will keep the vocalist's head facing in the right direction when they sing!

This single-microphone approach will produce a mono sound source, of course, but this will sit very comfortably within a stereo room acoustic or artificial reverberation. It has the potential to sound very natural and clear, is well suited to a surprisingly wide range of recording situations, and you will undoubtedly learn a great deal about the characteristics of the instruments and microphones involved by using this setup. However, if you want to process the voice and instrument separately, you'll need to use a different technique.

MULTI-MIKING

A common requirement is to record the singing guitarist's voice and guitar at the same time, but with the aim of producing isolated sounds, so that independent signal processing may be applied. This might be compression on the voice, or a chorus effect on the guitar, for example. You may also want to pan the voice and guitar to separate positions in the stereo image. Whatever, the reason, the key point here is that we need isolation between the two sound sources. Clearly, a minimum of two microphones will be needed (and possibly three, if a stereo guitar track is preferred).

So what tools might you have at your disposal for achieving separation between the recorded sounds? The best one, naturally, is physical separation, but unless the guitarist has extendable arms, you're unlikely to be able to achieve this. The ideal solution, of course, would be to record the guitar in isolation and then overdub the voice, but this often destroys the 'performance', so I'm ruling that out!

The next option out of the bag is acoustic screens, but trying to arrange one horizontally between the guitar and the singer's head is likely to be a bit problematical — so it's all going to have to be done with microphone choice and placement.

What each microphone needs is lots of the wanted sound, and very little of the unwanted sound — it is the ratio between the two which is critical. In other words, the guitar microphone should not 'hear' the voice, and vice versa. There are two ways of controlling how much unwanted 'spill' reaches a microphone.

- The first is to place the microphone as close as possible to the wanted sound and as far away as possible from the unwanted sound.
- The second technique is to use directional microphones, so that you can position the polar response null(s) (to reject the unwanted sound. This latter point is the single most important aspect of using a directional microphone: where the polar response null is pointing is almost more important than where the front of the mic is pointing!

POLAR PATTERNS

What kind of microphone polar pattern is going to be best for each microphone in this situation? Consider a microphone positioned close to, and facing, the guitar's sound hole: this will capture lots of guitar sound, but where is the voice coming from? Almost directly above it, at pretty much 90 degrees, in fact.

> "One trick which often works is to put up a dummy vocal mic, which will keep the vocalist's head facing in the right direction when they sing!"

If you were using a cardioid microphone in front of the guitar, on-axis to the sound hole, the voice would be arriving at right angles, in a place where the polar response would be about 3dB less sensitive than the front. Even taking the distance between mouth and microphone into account, the voice would only be perhaps 6dB quieter than the guitar, which is certainly not enough separation to allow independent signal processing! With a similar setup for the voice, the result is the classic situation where there's almost ▶

MIC PICKUP PATTERNS

You can mic instruments and performers more effectively if you know how your mics pick up and reject sound.

• OMNIDIRECTIONAL: This is the most basic mic pickup pattern, and is often abbreviated to omni. The term means that the microphone picks up sound equally well from all angles, and not just from in front of it. Omni mics arguably give the most accurate representation of a sound, but because they pick up equally from all directions, they may pick up some sounds that we'd rather exclude.

• CARDIOID: This term means 'heart-shaped' and refers to the appearance of the pickup pattern of this type of mic when plotted on a circular graph. A cardioid mic is directional, which means that it's most effective when picking up sounds from in front, though the pickup angle isn't narrow like a torch beam, but may be 90 degrees or more. Outside this angle, sounds are picked up less and less efficiently as the sound source moves towards the rear of the microphone. The least sensitive spot in a cardioid mic's response is right behind it.

• FIGURE-OF-EIGHT: This type of response is so called because its response graph looks like a number '8'. This means that the mic picks up sound equally well from in front and behind, but is relatively immune to sound arriving from the sides. This type of mic was popular in the '60s for backing vocals, because two vocalists could share the same mic, one singing into the front and another singing into the back. *Paul White*

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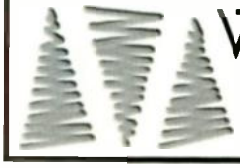

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HOW TO RECORD SINGING GUITARISTS

as much vocal on the guitar microphone as there is guitar on the vocal microphone. There are two faders on the mixing desk, neither of which controls the sound you think it's controlling, and as their relative balance is altered, so the sound quality changes — sometimes rather dramatically!

The solution is to find a microphone polar pattern that rejects sound from 90 degrees, so that the on-axis sound will be the guitar, and the rejected sound will be the voice. There's only *one* microphone polar pattern which fits this description, and that's the often-ignored figure-of-eight. There are dedicated figure of eight microphones available (the BBC uses a lot of Coles 4038 ribbon microphones, which are fantastic in this application), but most people will probably only have access to this polar pattern as an option on a switchable studio capacitor mic, like the AKG C414, the Neumann U87, or more modern equivalents.

Remember that the rear lobes of figure-of-eight microphones are the same size as the front and of opposite polarity. This is unlikely to be a problem in the studio, because there will be little sound reflected off the walls which the rear lobes could capture. However, it might be significant in a live-sounding environment, where the figure-of-eight mics could sound more distant than they really are.

Neumann's M149, top, and AKG's C414, right, are both examples of mics with switchable polar patterns, making them more versatile in a range of miking situations.

POSITIONING

Positioning the guitar microphone properly requires a little thought and experimentation. The microphone has to be reasonably close to the guitar to maximise the level difference between guitar and voice, which means that it will only 'see' a small area of the instrument. The consequence is that moving the microphone a few inches one way or the other will have a pronounced effect on the instrument's sound quality, in terms of the balance between fundamental and harmonics. So the first thing is to locate a position which gives the sound quality you're after. Something to beware of is a guitarist who likes to swing the instrument about — not only is there a risk of hitting the microphone, but with such a close mic technique, changes in distance will alter the sound quality noticeably. Figure-of-eight microphones also suffer huge amounts of bass tip-up (proximity effect) when used close, so you will probably not want to place the microphone towards the base of the guitar.

Once you've found the guitar's 'sweet spot', you need to angle the mic carefully to optimise the position of the side null. The easiest way I've found is to route the guitar mic through to the studio headphones, and then adjust the microphone for minimum voice pick-up while the performer rehearses. To give you an idea of the separation possible with this technique, using Neumann TLM170s and U87s, I have consistently achieved separation of about 24dB between guitar and voice, on each microphone. This is more than enough to allow independent stereo panning and processing, and even allows one part to be overdubbed without worrying about spill off the original recording on the other track. If you want to record the guitar in stereo, this technique can be extended to use a pair of figure-of-eight microphones, either in a coincident arrangement or a spaced arrangement, depending on the type of stereo presentation you're after.

Using a figure-of eight microphone on the voice is sometimes not so successful as the guitar, not for lack of separation, but because of poor microphone technique. The figure-of-eight is especially prone to wind-blasting problems, and there is the proximity effect to consider too, where small changes of distance between mouth and mic have a significant effect on the bass content of the recording. If you have a good signer who can regulate the distance between their mouth and the mic, and who can avoid plosive popping, great! Unfortunately, however, this is rarely the case.

The solution is to use a well-shielded hyper-cardioid mic for the voice. Again, this will suffer from both popping and the proximity effect, but nothing like as badly as the figure-of-eight. Its polar response nulls are at about 135 degrees to the front, so careful angling should allow decent amounts of guitar rejection to be achieved.

THE BOTTOM LINE

Clearly, these techniques are not well suited to live stage recordings where the singing guitarist is part of a band. Often, in this situation, there's a greater need to reject spill from other closely-sited musicians and the foldback monitors! However, these ideas do work extremely well in the controlled environment of a studio (professional or at home) and allow much more accurate balancing and post-production than could ever be achieved with a two cardioids.

If you have never tried it, I thoroughly recommend giving the single-microphone approach a go first. Most people are amazed at the quality that can be achieved, and it certainly reinforces the view that the fewer mics the better! It will also teach you more about acoustics and microphones than any book.

Remember to always consider the direction from which unwanted sounds are approaching the microphone, and then angle the null(s) to reject them. Getting things right in the studio always works better than fiddling about with EQ and outboard in the control room, and someone who understands what they're doing can always produce better results with a single mic straight to tape than an idiot with the biggest SSL, the entire Neumann catalogue of mics, and walls full of outboard gear!

Above all, enjoy the session and have the confidence to experiment. If it sounds right, it *is* right — and if it doesn't, go back into the studio and try something else!

Hugh Robjohns is a lecturer at the Centre for Broadcast Skills Training at BBC Wood Norton. The views expressed in this article are the author's own, and are not necessarily those of his employer.

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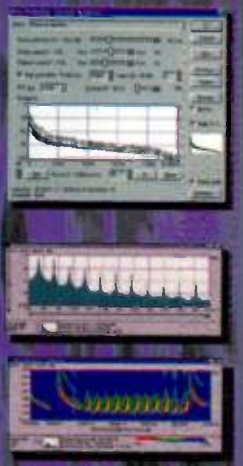

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PLUGGING INTO DIGITAL

DIGITAL INTERCONNECTION STANDARDS EXPLAINED

Every studio musician knows at least enough about analogue connections to get a standard recording system up and running. When it comes to digital, though, we're often in the dark about what will work with what. HUGH ROBJOHNS raises the digital standard...

There can be few readers who do not already own at least one piece of equipment which records or processes audio in the digital domain, even if this is only a reverb unit or sampler. Cassette- and tape-based recorders are being usurped by MiniDisc and hard disk recording systems, virtually all reverberation and signal processors are now DSP (Digital Signal Processor) based devices, and digital mixing desks are now becoming much more affordable, with the likes of the Yamaha ProMix 01 and 02R, the Korg 168RC (reviewed in this very issue), and the Soundtracs Virtua.

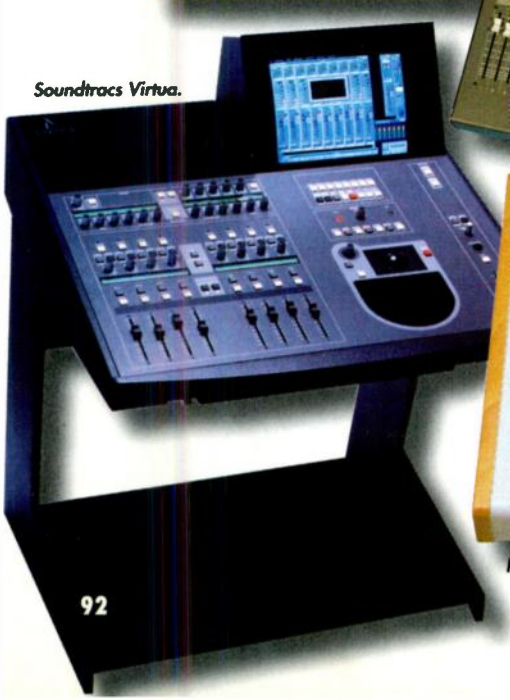
So it makes good sense to start connecting all this stuff together, to keep the audio signals in the digital domain, rather than continually converting between analogue and digital formats. In principle, this is not a problem (although it is certainly not as straightforward as analogue interconnection), but there are a number of issues which you should be aware of.

Yamaha ProMix 01.

Now that digital mixers are becoming more affordable for project studio owners at various levels, it's becoming more important to understand digital formats and interconnections.

Yamaha 02R.

Soundtracs Virtua.



Korg 168RC.

ANALOGUE INTERCONNECTION

We're all used to connecting various bits of analogue equipment together, and I'm sure everyone has had to make up 'bodge leads' at some time, to interface various non-standard bits of equipment.

Analogue audio can be balanced or unbalanced, can operate at nominal +4dBu or -10dBV signal levels, and uses a variety of connectors (XLRs, jacks, phonos). However, most interfacing problems can be solved by little more than wiring up a connector in a suitable way. Occasionally, we might have to use a transformer or a resistive pad to convert between balanced and unbalanced systems, or to match signal levels, but this is relatively rare. In other words, analogue interfacing is usually a matter of simple mechanics or basic electrics and is generally well understood.

Digital interfacing could not really be described as simple, and is not very well understood at all. In general terms, digital interface problems cannot be solved with a soldering iron and suitable connectors, but need carefully designed, sophisticated high-speed electronics to convert between data formats and protocols. Such boxes are available, of course, but they are often fairly expensive, and it would make sense to avoid the need for them by buying equipment which shares a common interface format where possible.

DIGITAL INTERFACE FORMATS

A digital interface is rather more complex than an analogue one, because of the discrete nature of digital audio. Not only does the interface need to pass audio data on one or more audio channels between source and destination, but it also has to ensure that the data is decoded correctly when it gets there.

The sort of problems that emerge between different interface formats concern more than just what type of physical connector is used. Common problems include considerations like how many bits are described by each sample (16, 20, 24?); whether the digital data stream is encoded LSB (Least Significant Byte) or MSB (Most Significant Byte) first (does it send the left-most or right-most digit of the sample word first); where each sample starts and ends; and which part of the data stream is carrying the left audio channel and which the right.

In the early days of digital audio, each manufacturer designed their own interface, so that purchasers were locked into buying other equipment from the same

manufacturer. There were basically three interface formats: Sony, Melco (Mitsubishi), and Yamaha, although only the Sony (SDIF) and Yamaha (Y1 or Y2) formats are still common today. As you might expect, these are all incompatible with each other — the SDIF-2 system is unbalanced over three BNC connectors (left, right and word clock), sending up to 20 bits, MSB first. The Yamaha format uses an 8-pin DIN socket, and transmits balanced serial audio data (left-right-left-right) with up to 24-bit resolution, LSB first. Its balanced word clock is arranged to identify both the start and end of the audio samples, as well as indicating left and right channels (low for left and high for right).

STANDARDS: WE HAVE LOTS

To introduce some form of standardisation, the Audio Engineering Society (in America) and the European Broadcasting Union designed a connection format which would suit the needs of everyone — at least as far as *stereo* audio transfers were concerned. They came up with the AES-EBU format, which sends a single, balanced data stream over 3-pin XLR connectors. The data stream is a combination of left and right audio with an embedded word clock, and the audio data segments carry additional information such as pre-emphasis modes and sampling rates.

The AES-EBU format was subsequently modified to form another standard for use in domestic applications like CD players and DAT machines — the S/PDIF (Sony/Philips Digital InterFace) format. This is an unbalanced version of AES-EBU, using phono connectors and carrying slightly different status information. This same data format is also transmitted optically using Toshiba's Tos-Link connectors on many domestic CD players.

In the world of digital multitracks, there is still no standard interface format. Sony designed a version of SDIF for their early 24-track DASH machines; this uses D-sub connectors to carry 24 channels of audio as individual, balanced, signals (broadly conforming to the RS422 standard). The latest 48-track DASH ▶

DIGITAL DOWNER 1: JITTER

The worst thing you can do when plugging up a digital system is use an unstable source as the timing reference for the entire system (see 'Problems' section on next page). It's easy to do — you might have a domestic CD player you want to connect, but it has no external reference clock input. So you might connect this to a mixer input and configure the mixer to lock to the CD player's output, with all the other equipment being clocked from the desk. In this situation, any variation in the CD player's clock timing (called Jitter — the digital version of wow and flutter, if you like), will be passed through the complete system, corrupting the master recording.

Jitter can be caused in other ways, too, the most common being poor quality or excessively long cables. All cables have capacitance between the signal conductors and the earthed screen, which will tend to absorb high-frequency energy from the signals being passed through the cable. Cheap cables tend to have high capacitance (ideally, you need something with 40pF/m or less for digits) which will tend to make the effect worse. Since digital signals are basically rapidly-changing square waves with harmonics which run up to several tens of megahertz, cable capacitance will soak up these high frequencies, so that the nice square signal entering the cable falls out the other end as rounded or triangular shapes. This sloping of data edges can cause confusion in the decoding circuitry, which results in the data being reconstructed at the wrong time. The audible effects of Jitter include an increase in high-frequency noise (often mistakenly identified as extra brightness) and unstable or muddy stereo images.

S/PDIF signals struggle to get through more than a couple of metres of even the best cable, and the standard give-away Tos-Link optical leads are no better. AES-EBU can survive a couple of hundred meters down decent low-capacitance cable, but every connector causes some internal reflections, so avoid linking lots of short lengths together. Multitrack connections often run at much higher rates than simple stereo connections, so the problems of cables tends to be even worse. The best advice is to keep all digital connections as short and direct as possible, and always use decent cables.

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BLUE SYSTEMS

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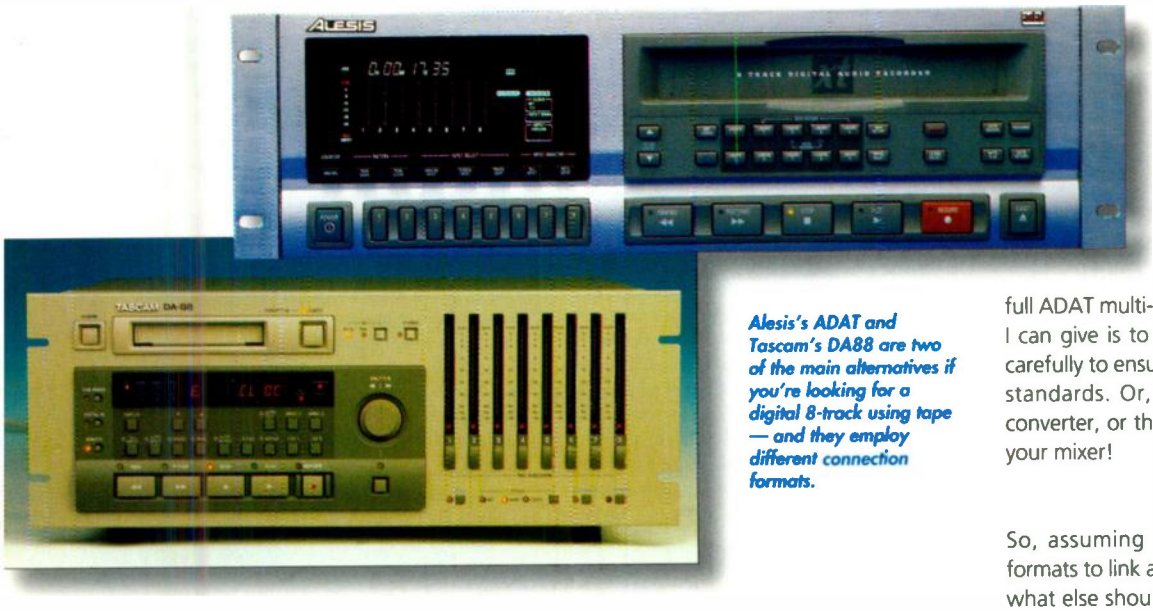

Alesis's ADAT and Tascam's DA88 are two of the main alternatives if you're looking for a digital 8-track using tape — and they employ different connection formats.

machines from Sony and Studer are normally connected using a version of the AES-EBU system called MADI, which transmits 56 audio channels down a single co-axial or optical connection.

Coming closer to earth, the two popular digital multitrack formats, ADAT (from the Alesis ADAT digital 8-track tape recorder) and DTRS (as found on Tascam's competing DA88 8-track) also have incompatible connection formats. The ADAT uses a pair of Tos-Link optical leads to carry record and replay feeds down separate cables. Eight channels of audio data are multiplexed over each lead. The DTRS format uses a D-sub connector to transfer data, employing an 8-channel format called T-DIF.

PRACTICAL INTERFACING

You should now be able to see the enormity of the task of connecting various items of digital equipment together. Typically, digital multitracks will either use ADAT or T-DIF formats (top-end systems might use SDIF, PD — Mitsubishi's Pro-digi format — or MADI). But many of Yamaha's systems still use only a proprietary system. Stereo equipment is generally interfaced using the co-axial or optical versions of S/PDIF (for semi-pro and domestic equipment) or AES-EBU (for professional devices). Yamaha equipment can often make use of the Y2 format for interconnection between mixer and effects units.

Fortunately, most digital mixers are capable of providing some level of format conversion, even if this is through optional modules or add-on units. For example, the Soundtracs Virtua has, as standard, facilities for stereo AES-EBU in and out (for mastering) and 16 channels of ADAT optical interfaces. Optional units are available to convert the ADAT format to either T-DIF or AES-EBU. Similar facilities are available for Yamaha's O2R desk and all of the high-end digital consoles. If greater format flexibility is needed, various manufacturers offer dedicated format converters — Otari, for example, have a very flexible 24-channel unit which converts between SDIF, T-DIF, ADAT, PD and AES-EBU, and Spectral's Translator Plus offers ADAT, T-DIF, Y2 and AES-EBU.

Hard disk editing systems vary in the digital connection format offered. The Studio Audio & Video SADiE system, for example, uses AES-EBU and S/PDIF, Sonic Solutions uses S/PDIF over Tos-Link, and many Digidesign Pro Tools systems are equipped with full ADAT multi-channel interfaces. The only advice I can give is to choose your items of equipment carefully to ensure they share compatible interface standards. Or, failing that, invest in a format converter, or the additional interface modules for your mixer!

PROBLEMS

So, assuming we've found suitable interface formats to link all the equipment together digitally, what else should be considered?

Without a doubt, the most critical thing is timing. Everything must be clocked at precisely the same time, so that audio samples are exchanged when the equipment is ready for it. Failure to do this will result in occasional clicks and 'splats' in the audio. Most of the current interface formats actually have a word clock embedded with the audio data, but it often pays to use a separate BNC lead to carry the word clock between the source and destination equipment to make sure.

This introduces another problem: which machine should clock which? Professional digital studios normally have a single central word clock generator, and its clock signals are distributed to all the other equipment (mixer, effects units, CD and DAT replay devices, ADCs (Analogue-to-Digital converters), sample rate converters, and so on) so that everything is running at precisely the same rate. In a smaller installation, the mixer is often the best clock reference, and the other equipment should be synchronised to it by distributing its word-clock signal. Although clocks can be daisy-chained between equipment, it is much better to use a word clock distribution amplifier.

Digital recorders connected to the desk do not usually require separate clocks, since they automatically lock to their inputs during recording. However, be warned that many hard disk, MiniDisc and DAT machines use their internal clock systems during playback and cannot be locked to an external reference — check before you buy.

TIMECODE

If you're using timecode in your system, it's absolutely essential that it is locked to the sample rate in the same way that it is locked to a frame rate. The rules for digital audio state that there must be a whole number of samples in a video frame, and therefore in a timecode frame. If you're using timecode generated from a digital mixer (for automation purposes) or from a DAT machine, timecode and sample rate will be automatically locked, but if your timecode comes from elsewhere,

DIGITAL DOWNER 2: CLOCK HOWL-ROUND

Another problem which can catch out the unwary is clock howl-round. If you configure the digital mixer to lock to a DAT machine's output, and then plug the mixer's digital outputs to the DAT machine and start recording, you have a clock loop. The mixer is locked to the DAT, but while recording, the DAT is also locked to the mixer — they start to chase each other's tails! There are a number of possible symptoms, the most obvious being that the system just stops (many mixers will just shut down until the loop is removed); you might also encounter very loud howl-round noise! In either case, it's pretty clear that your last connection was not a wise one and the problem can be solved.

Unfortunately some systems behave in a much more underhanded way, by gradually speeding up or slowing down until clock frequency limit is reached in one piece of equipment. This can be hard to spot, because unless you're replaying familiar pre-recorded material, you might not recognise the gradual change of speed. However, when you replay the master DAT, it will be all too obvious. Keep an eye on the sample-rate indicators of each machine to make sure everything is running at the rate you think it should be.

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WRH

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SPIRIT
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▶ make sure it's locked to the same reference as the rest of the digital system. Often this means using a video reference (off-air BBC 1 is about as stable as it gets), to lock the timecode generator and master word-clock generator together.

SAMPLE RATES

There are two basic options: 44.1 and 48kHz. If you are producing material for commercial release, it should be at 44.1kHz, whereas sound for film or video should be at 48kHz. Many professionals prefer to run hard-disk editing systems at 44.1kHz because of the extra 8% storage time over 48kHz, even if this means having to sample rate-convert for video lay-backs. If you do not have a sample rate converter, do not worry — I have yet to find anyone who can spot a single analogue transfer using the decent modern A/D and D/A converters of most DAT machines or hard-disk systems. At the end of the day, you have to take a pragmatic view of the world, and analogue audio is *the* universal sample-rate converter!

NON-STANDARD STANDARDS

One of the most frustrating aspects of digital audio is in connecting equipment together using non-standard AES-EBU. It is surprisingly common to find domestic S/PDIF data appearing on professional-looking AES-EBU sockets on CD players and DAT machines. This is because S/PDIF output chips are plentiful and cheap, whereas AES-EBU devices are not! Another related situation is that because the basic data structure of the S/PDIF and AES-EBU formats is identical, as is the receive sensitivity, it is possible to wire up a lead to convert between the S/PDIF phono plug and the AES-EBU XLR connector, with successful results. In either of these cases, connecting between S/PDIF and AES-EBU format equipment will usually be successful in terms of audio transfer, but the extra hidden data can play annoying tricks.

Professionals have no need for copyright flags, because they all pay for the privilege of using protected material, but there are at least two different pre-emphasis standards in use which need to be identified. On the other hand, there is only one domestic pre-emphasis system, and copyright material must be identified to prevent illegal copying. All this information is transferred using the same chunk of status data within the audio data stream, and so is open to misinterpretation. The most common problem is for a professional unit to be indicating no pre-emphasis in use, while a domestic recorder interprets the data as copy-prohibited, and consequently refuses to go into record.

The more frustrating problem for many is SCMS (Serial Copy Management System), which was designed to reduce music piracy. All domestic digital recording equipment has SCMS chips, which will allow one digital copy to be made from a copyright source, but prohibit further copies from the second-generation tape. The problem is that many systems erroneously impose a copyrighted status on original recordings, which is a continual source of frustration for home musicians trying to overdub or make dub-edits.

It's often possible to configure equipment such as mixers and hard disk editors to modify their output status data to overcome these kinds of problems, or alternatively there are specialised units on the market which can analyse and change the data as it passes through. Some 'mastering processors' also have this kind of facility, which often helps to justify their purchase! It's worth studying your existing equipment handbooks to see if these facilities are available, or ask the questions when you are looking at new equipment. SOS

Hugh Robjohns is a lecturer at the Centre for Broadcast Skills Training at BBC Wood Norton. The views expressed in this article are the author's own and are not necessarily those of his employer.

DIGITAL GLOSSARY

• **BALANCED/UNBALANCED:** When any signal is represented as a varying voltage, there must be some reference point from which measurements can be taken. In unbalanced systems, the reference is ground (or earth) at Zero volts, and it is passed between machines on the outer screen of the interconnecting cable. Unbalanced operation is cheap but is prone to interference if the cable runs are long or the signal is small, and hum loops, where the reference signal can pass between equipment via multiple paths. Balanced signals do not require a separate reference point — instead an equal but opposite copy of the wanted signal is used as the reference. This system has the advantage that interference tends to be rejected more efficiently, and hum loops cannot be created, but requires more complicated cabling and interface circuits. Most professional analogue equipment uses balanced connections, and the same is now becoming true for digital interfaces too (AES-EBU is balanced, S/PDIF is unbalanced).

• **BIT RESOLUTION:** The number of bits (Binary digiTS) used to describe an audio sample determines its quality. The more bits, the less the quantisation noise and the better the end result, but the greater the demand on storage space and processing power. CD and DAT use 16 bits, but there is increasing pressure to master at 20 bits or more. The holy grail of digital audio mastering is a 24-bit system which would be able to capture the dynamic range of real life (144dB) without the need to set levels first!

• **DASH (DIGITAL AUDIO STATIONARY HEAD):** This is the default standard for large open-reel digital multitrack recorders, originally developed by Sony, but now also produced by Studer and Tascam. The format covers everything from 2-track machines up to 48-track, with the standard sampling rates and resolutions up to 24 bits on the latest machines.

• **MSB/LSB:** The most and least significant bits. The least significant bit is worth a count of 1, whereas the most significant bit is worth a count of 32768 (in a 16-bit system). Some early systems transferred data MSB first, but most modern interfaces are LSB first, which makes the number-crunching easier and faster.

• **PRE-EMPHASIS:** In the early days of digital technology, A/D and D/A converters were relatively noisy. One way to overcome this problem is to boost high frequencies before A/D conversion (pre-emphasis) and then reduce them by the same amount after D/A conversion (de-emphasis). In this way, high-frequency noise from the converters will appear to be reduced too — a broadly similar technique to that of Dolby B noise reduction. De-emphasis facilities are incorporated into all CD and DAT machines, but very few modern recordings or DAT machines make use of them these days, because converter technology has improved dramatically.

• **SAMPLE RATE CONVERSION:** The process of mathematically converting between digital data streams at differing sample rates — for example, from a DAT recording at 48kHz to a CD production master at 44.1kHz. Sample rate conversion is theoretically a perfect and lossless process, but requires some serious digital signal-processing to perform the task in real time!

• **TIMECODE:** SMPTE/EBU timecode is an audio signal of modulated 1kHz and 2kHz square waves. The modulation process encodes timing information related to picture frames (standard rates are 24, 25, 30 and 29.97 frames per second). Timecode is also available within the MIDI system, and as a sequence of black and white dots at the top of a picture frame in many professional video systems (vertical interval timecode, or VITC). There must be a fixed relationship between picture frames, timecode and the digital audio sampling rate.

• **WORD CLOCK:** Often abbreviated to WCLK. The word clock is normally a square wave running at the sampling frequency. It provides the means of breaking a continuous binary sequence down into the correct 16-bit sample chunks, and also of identifying which samples describe the left channel and which describe the right in a stereo system. An analogy might be to equate its function to thespaces between words. Without spaces, itisverydifficulttomakesenseofthe completesentence!

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Dynamic Duo

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Ever fancied having a separate compressor, noise gate and fader automation on every channel of your mixing desk? The latest modules from PreSonus offer all of this and more, bringing that elusive 'SSL sound' within the reach of even the most basic consoles. DOMINIC HAWKEN puts the new units through their paces.

Over the past few years, a number of mid-priced mixing consoles which set new standards in sound quality and signal-to-noise statistics have hit the market. These desks have effectively bridged the gap between the high-end systems in use at some of the top studios, and the budget desks that are usually the only option for home and demo users. Silicon technology has made possible low-cost, low-noise equipment capable of producing master-quality recordings for a fraction of the price paid by the artists of yesterday. The number of hit records and soundtracks mixed on affordable consoles — produced by the likes of Allen & Heath, Mackie and Soundcraft — is on the increase, as the dividing line between home and professional studios becomes ever finer.

The professionals, however, always seem to remain one step ahead of the rest. Given the choice, most producers would opt for SSL, Neve or Euphonix consoles to master their recordings on, as they offer a clarity and separation that still outclasses the less expensive consoles. It is also true that if a record company has invested large sums of money in a new act, they tend to feel a lot more comfortable if the final recordings are mastered in a high-end studio, and this logic is usually rewarded with superior-sounding results that cut across the competition.

One of the main reasons that the more expensive desks tend to produce better mixes lies in their inclusion of individual signal processors within each channel. Every discrete sound entering the console can be compressed for extra punch or control, and gated so that extraneous noise can be eliminated, cleaning up the overall sound. They also have comprehensive automation facilities, logging fader movements and channel mutes into a central computer that can play back or edit entire mixes at the touch of a button. Couple these facilities with a solid equalisation section and a good stereo compressor across the entire mix — something that the SSL, in particular, is noted for — and you have the tools to create a sound to rival any of the productions around at the moment.

But there's hope yet for those people forced to master their recordings with a more basic setup. The lack of a comprehensive EQ can be overcome to a large degree by using good source sounds, and final stereo compression can always be left to the cutting room. The basic limitation of the inexpensive mixing desks on the market lies in their lack of individual channel compression and gating. Until now, it's been pretty impractical to ▶

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PreSonus Dynamics Processors

pros & cons

PRESONUS DCP8 £749 & ACP8 £599

pros

- Excellent sound quality.
- Smooth and quiet automation with the DCP8.
- DCP8 has capacity for controlling multiple inputs, to cover more than eight tracks.
- External gate/trigger side-chain option on the ACP8.
- Switched line level on each channel.
- Great value for money.
- Very compact.

cons

- No external gate trigger/side-chain option on DCP8.
- Level indication only available as an optional extra on DCP8.

summary

Both these units are excellent accessories for any studio with aspirations to professional-sounding recordings.

SOUND ON SOUND

buy separate outboard units to cover each input. Even if you had the space available, it would be far better to spend the money on a new computer system or keyboard and put the change down as a deposit on a house in the country!

That was until PreSonus came on the scene, with their launch of two new rack modules designed to complement any console fitted with the necessary insert points. The DCP8 is a digitally-controlled analogue compression and gating system, with signal limiting and level automation built in as standard. Its cousin, the ACP8, is an analogue version, adjusted via front-panel controls rather than MIDI information, and both units are capable of handling eight channels of audio simultaneously. At last, a cost-effective way of transforming your mix quality.

ACP8 FEATURES

Taking up only 2U of space in a studio rack, the ACP8 is controlled completely from its front panel. This is split into eight sections, each identical and covering an individual channel of sound. Unlike the DCP8, the ACP8 provides no automation facilities, and is therefore more likely to find favour in both live and studio-based environments; it would certainly be a useful addition to any rack of multi-channel outboard. Each of the eight sections offers a comprehensive compressor and gate, as well as an overall level control and a number of switching options.

The compressors each feature full control of the signal threshold, compression ratio (adjustable between 1:1 to 20:1), attack, release and gain. The gates feature threshold, release and attenuation. External connections to the unit are via rear-panel sockets, and the system accepts both balanced and unbalanced signals for input and output. There is a side-chain jack on each section, allowing spectral and effect processing (see 'Side-chain Spectral Processing' box), and a key input for each of the gates, which allows the signal to be 'cut' against a separate audio trigger. Buttons select hard/soft-knee compression, peak and auto limiting, bypass, and channel linking — whereby any individual channel (apart from the first) can be linked to the channel on its left for smooth stereo or multi-channel processing.

Balanced signals are delivered via stereo jacks, which revert to unbalanced operation when a mono plug is used. Side-chain connections also use stereo jacks (on the same format as most standard insert sockets), and the gate key is via a mono jack.

DCP8 FEATURES

The DCP8 crams all of its functionality into 1U of rack space, and offers the same audio specifications as the ACP8 (with the exception of a side-chain option or trigger inputs). The extra cost of the unit is reflected in the inclusion of a comprehensive automation system that allows full computer-based control of all internal settings and features. Ideally suited to a MIDI-based studio environment, the unit is also designed to plug into the insert points of your mixing console, and adds compression, limiting, noise gates, and full level/muting control on each of its eight channels.

The front panel features a number of buttons, and an LCD display to show the current status, as well as a data wheel and a separate program number LED to show the currently-selected patch. Up to 100 audio 'scenes' can be named and stored within the unit for instant recall — very useful for live situations. It is also possible to access and adjust all the internal parameters without the need for a computer, by using the control buttons on the front of the unit. To change a gate threshold, for instance, you press the Gate button, cycle through the available channels using the Up/Down buttons, and then adjust the value with the control wheel.

Where the DCP8 really excels, however, is with its automation facilities. Each parameter can be adjusted remotely via MIDI controller messages — easily sent from virtually any MIDI sequencer. Mixer maps are already available for both Steinberg's *Cubase* and Emagic's *Notator Logic*, and it's possible to customise your own automation screens within most software packages. Running the unit in this combination, with the sequencer locked to timecode and synchronised with a multitrack, the user has a complete mix automation system at their disposal.

The processing is done entirely in the analogue domain, with levels adjusted via a high-resolution

COMPRESSION & GATING

• **COMPRESSION:** In essence, compression is an audio process that reduces the output level of an audio signal by a fixed ratio, relative to the input. Effectively, if a loud signal is sent into a compressor, it pulls down the level sent to the output to keep the signal within reasonable limits. The higher the compression settings on the front panel, the greater the reduction in output level.

This is useful for controlling the dynamic range of an instrument or vocal, making it easier to record without distorting the input of the recorder. It can also assist in the mix process, reducing the amount of level adjustment needed for a particular instrument. How severely the compressor reduces the signal level is determined by the compression 'ratio' and 'threshold'. A ratio of 2:1 or lower is considered mild; ratios in excess of 10:1 are considered 'hard limiting'. Limiting, in this case, refers to the point at which the signal is restrained from going any louder at the output. The level of input signal at which the output is reduced is determined by the compression threshold. As the threshold is lowered, more and more of the input signal is compressed.

It should be noted that using too much compression will destroy the dynamic response of a performance, rendering it bland and flat. There are, however, exceptions to this rule, and some engineers use masses of compression on individual sounds as an effect, often with great results. Just take a listen to the drums on the last Prodigy record for a good example of this technique.

• **NOISE GATING:** This is the process of automatically turning down or muting the output signal when the input signal is below a certain level. The level at which the gating occurs is known as the 'gate threshold'. Noisy guitar tracks are often gated to remove unwanted buzzing and clicking between wanted parts of a performance, and in this case the gate threshold is adjusted so that it is higher than any background noise, but lower than the sound of the played guitar. Care should be taken when using noise gates across sounds that decay slowly, as the gate may kick in before the sound has had enough time to finish, resulting in an abrupt ending. Once again, this potential limitation can also be utilised to produce interesting effects, the classic Phil Collins-style gated drum sound being a good example.

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SPECIFICATION

Input Impedance	13KΩ, balanced
Maximum Input Level	+18dBu
Signal to Noise	92dB
THD + Noise, non-weighted, 0dB	0.01%
Dynamic Range	>115dB
Gate Threshold Range	-90dB to +20dB
Gate Attenuation	85dB
Gate Attack Time	100µs
Gate Hysteresis	1.5dB
Compressor Threshold Range	-50dB to +20dB
Compression Ratio	1:1 to 20:1
Compression Attack Time	200µs
Compression Release Time	Programme dependent
Mute Attenuation (DCP8)	95dB Mute
Rise/Fall Time	600µs
VCA Level Control Range	-85dB to +10dB
Level Scaling	Logarithmic
Fader VCA Type	THAT4301
Nominal Output Level	+4dBu or -10dBu
Output Impedance	51 Ohms, balanced
Maximum Output	+22dBu
MIDI Connections (DCP8)	In, Out, Thru
Memory Size	100 Programs
Digital Control Resolution	12-bit (4096 steps)

▶ VCA with 4096 steps of resolution. This means that any level can be set to one of 4096 different steps for smooth and comprehensive control — compare this with the standard SSL console, which has a resolution of only 128, and you begin to realise the true power of the system.

Fader grouping is a common feature of most automation systems, and the DCP8 is no exception. Multiple faders can be controlled by one master for simple signal management — for example, two faders controlling a stereo signal can be grouped so that their relative levels remain consistent. The DCP8's grouping feature is adjusted using the Level control. After setting up a group, adjusting the level of any fader within it changes the levels for all the others. Up to four groups can be set, and grouping information is stored as part of the current program within the unit, for easy recall.

In addition to fader grouping, the DCP8 goes one stage further, with the inclusion of stereo linking. Using this facility, pairs of channels can be linked so that their compressor thresholds, ratios and gate thresholds remain exactly the same. Altering the settings of one channel in the group correspondingly alters the settings of the other, for true stereo consistency. Levels are not automatically linked in this way, but level linking can be achieved using the grouping function discussed above, which has the added advantage of allowing different relative levels to be set for stereo source sounds.

DCP8 MIDI AUTOMATION

Automated control of the DCP8 is achieved by using MIDI program and Control Change information, and setting up the unit to achieve this is a relatively simple affair. Pressing the Setup key and selecting 'MIDI Setup' allows the user to assign a MIDI receive and transmit channel to the DCP8, on which controller information can then be sent or recorded. These channels can be set to identical values, or different ones can be used to facilitate the recording of new adjustments on the transmit channel, whilst previous information is played back on the receive channel. Entire audio 'scenes' can also be loaded using MIDI program change data, in the same way that new patches are selected on a master keyboard. Whenever a new scene is selected using the front panel of the DCP8, a program change command is also sent via the MIDI output of the unit, which can be recorded by a sequencer ready for playback.

MIDI Control Change data is used to adjust the settings of individual parameters within the unit, so that the compression and gate settings can be adjusted in real time when mixing. Overall channel muting can also be set using these controllers; to take full advantage of the automation system, a special mixer map template is needed for your current sequencer. As mentioned earlier, programs like *Cubase* and *Logic* both support mixer maps, and copies for these particular sequencers are already available from PreSonus. As the MIDI receive channel of the DCP8 can be set internally by the user, up to 16(!) units could be used in combination on any single MIDI port, and each would then be capable of playing back its own unique mix information.

IN USE

Patching in either of the units in a studio environment is a simple affair, and is achieved by running jack cables to the unit from the insert points on each selected channel of the desk. Audio is then automatically routed through the system prior to entering the main signal path of the console. Both the ACP8 and DCP8 can be switched to operate at either +4dB or -10dB levels — on a per-channel basis — to correctly match your existing system. This is an especially useful feature if your console is operating at pro level (+4dB), and your recorder is operating at standard line level (-10dB). ▶

SIDE CHAIN SPECTRAL PROCESSING

The inclusion of a side-chain insert on each of the channels of the ACP8 opens up a number of processing possibilities. One common use for this facility is to configure the unit as a de-esser, for removing any nasty sibilance from an audio track without having to use overall equalisation to remove the brightness across a whole channel. This is particularly useful when recording or mixing vocal tracks.

The side-chain socket effectively provides an insert point into the signal chain, feeding the input of the compressor but not interrupting the actual audio signal passing through the unit; it's thus possible to modify the sound feeding the compressor, without modifying the source sound that is being processed. If you route the side-chain signal through a graphic equaliser, then boost all the high frequencies and cut the lower ones, no frequency changes will be made to the sound passing through the compressor, but the actual compression system will be fed by the signal from the graphic, causing it to compress only when high frequencies are present in the original source signal. The system will thus compress any high-frequency transients and ignore any low-frequency ones, effectively de-essing the source sound. The same principle can be applied to other frequency ranges, simply by adjusting the settings of the graphic equaliser.

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"Both these units perform their tasks quietly and efficiently, and boast a sonic quality that is quite superb for systems of this price."

▶ The unit can then be configured to run all channels at line level, dropping the audio by just the right amount to interface correctly with your recorder.

The analogue ACP8 makes excellent use of LED indicators to show compression levels and threshold points. Each channel has its own bargraph to display the amount of compression currently in use, and two further indicators light to show whether the current input signal is above or below the threshold point. High-quality rotary controls are featured, and the overall feel is of a professional and solid product, perfectly capable of withstanding the rigours of a modern recording environment.

The audio quality produced by the unit is superb. There is no discernible increase in background noise levels when the ACP8 is connected and working, and the controls have been tailored to cover a wide operational range that is capable of processing virtually any signal you're likely to be working with. The compression system is accurate and punchy, with an adjustable ratio that is capable of squashing sounds to an almost ridiculous extent when set at its maximum limits. The attack control is also more capable than most available on units within this price range — setting it to 0.1 milliseconds really does cause the compressor to act on the first available transient, and some excellent effects can be achieved.

The individual gates also perform well, with no obvious noise or flutter. Drum and percussion tracks, in particular, benefit from being gated to quieten the channels between sounds, and it's quick and easy to set up the ACP8 to perform this function. During my tests, the instruments processed by the unit took on a new dimension and quality, seeming to be separated from those using the unprocessed channels, and with their perceived positions within the mix pulled forward. Sounds began to 'jump out' from the monitors when they had previously sounded leaden and relatively uninspiring. It was a simple matter to tighten up a kick drum without losing any of the bottom end, and hi-hats and shakers took on a new clarity and cut.

The DCP8 offers the same sonic quality and functionality as the ACP8, although the lack of a side-chain option is a shame. Gate trigger inputs are also not available, although users can overcome this lack to some degree by using MIDI automation to adjust gate or level settings remotely. As with the ACP8, the unit is virtually noiseless in operation, and when automating mixes, the quality of the VCAs are immediately apparent, with none of the 'zipper' noise associated with some other systems on the market. With some units, it's often possible to hear the steps of a VCA as it is adjusted, either as small jumps in level, or as quiet clicks as the values are changed. Thankfully, none of this is apparent on the DCP8, and level automation is achieved with the same accuracy as is possible when using a high-quality analogue fader.

Although PreSonus didn't send any MIDI mixer maps with the review unit, I found that it was easy to design custom ones for a sequencer. Both *Logic* and *Cubase* offer a 'learn' facility, which monitors any incoming data and assigns control information to custom sliders and buttons accordingly. As the DCP8 sends out the appropriate MIDI information whenever any changes are made via the front panel, it's a simple process to set up a screen full of controls, and define their MIDI functions automatically. Having done this, remote operation of the DCP8 is easy, and the recording and playing back of control changes is smooth and efficient, with no discernible delay or errors in communication.

Although it must be said that I still prefer the physicality of adjusting real controls on outboard equipment, rather than computer-based ones, operating the DCP8 remotely soon becomes second nature. The power offered by the system is excellent, and having such fine control over fader levels makes mixing vocals especially easy. Unlike the ACP8, however, there is no on-board level indication, which makes setting the initial levels somewhat harder. To overcome this problem, PreSonus have also launched the MB8 Meter Bridge, a visual display unit that packs level indication for each of the eight channels into another 1U rackmount module. The meter bridge connects to the DCP8 via a single interface cable that also supplies power to the system. For anyone currently considering purchasing the DCP8, the MB8 is very useful addition and makes the system easier and faster to use. It would also be useful if PreSonus could make available a switching unit, to allow a single meter bridge to function with more than one DCP8, thus keeping the purchase costs down.

CONCLUSION

Both these units perform their tasks quietly and efficiently, and boast a sonic quality that is quite superb for systems of this price. The quality of the DCP8's level automation in particular, with its 4096 steps of resolution, is stunning, and makes it a worthy competitor to some of the more expensive consoles on the market. Adding the luxury of individual compression and gating across specific console channels has transformed the quality of the mixes coming out of AL Digital's studio by a noticeable degree. To combine this facility with level and mute automation (not to mention the overall automation of the compressors and gates as well), and to then release the results in a package that retails at well under £1000 is a remarkable achievement. The ACP8 offers a cost-effective method of adding punch and clarity to your desk, across channels that do not need heavy automation (keyboard inputs are ideal). The DCP8 is a truly innovative product, and highly recommended if your current mixes lack that indefinable sparkle. SOS

info

E ACP8 £599; DCP8 £749; Meter Bridge £299. Prices inc VAT.
A Music Connections Chelsea, 202 New King's Road, Chelsea, London SW6 4NS.
T 0171 731 5993.
F 0171 731 2600.
E musiclondon@dial.pipex.com

Dominic Hawken is a songwriter and programmer, whose recent successes include tracks by East 17 and Ant & Dec. He is also a director of AL Digital, whose current projects include the development of a Digital Satellite Radio Station for Sony and Time Warner.

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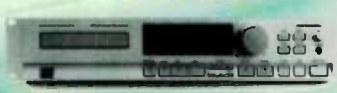

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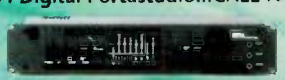

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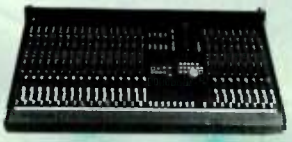

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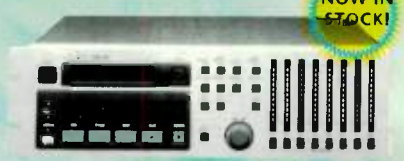

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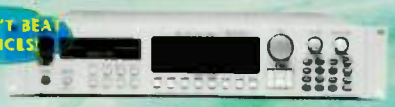

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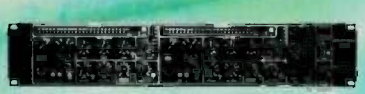

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Talking Shop

PETE GLEADALL • PROGRAMMING & RECORDING PET SHOP BOYS' *BILINGUAL*

High-profile synth programmer, remixer, and recording artist Pete Gleadall is a man of many talents. MATT BELL talks to him at his studio about his part in the making of the new Pet Shop Boys album, his work for George Michael, and the role of the modern programmer.

Pete Gleadall is a successful programmer who has worked with U2 and Tina Turner, and toured the world with the Pet Shop Boys. Ever in demand, he has recently acquired further fame as a key member of the group 4thright, the first production team to be given *carte blanche* by George Michael to remix his songs in any way they saw fit. On first-name terms with both Neil Tennant and Chris Lowe, as well as 'George', there is no denying that as far as the music business is concerned, Pete has cracked it. And yet... it could all have been rather different. As Pete admits while looking back on his highly successful career so far, "it was really a classic case of being in the right place at the right time".

TECHNOLOGY: THE PASSPORT TO SUCCESS

Such modesty belies Pete's talents, but at the dawn of MIDI and before, people who could operate hi-tech recording equipment in the studio were in demand, and there were fewer people attempting to satisfy that demand than today. Originally a violinist, Pete became interested in guitars first, and then synths, drum machines and sequencers at the turn of the '80s, as the price of these items began to fall to levels (just) within reach of the non-professional. When the Roland MC500 sequencer and Akai S900 sampler were released, Pete became a competent user of both. Around this time, he met the reggae band Aswad who were keen to make use of MIDI on their next album, so Pete ended up as their MC500 and S900 programmer. Then came the stroke of luck: "One day, I got a call from the band. They were in Sarm Studios with George Michael's producer Chris Porter, who had been called in to produce them. Chris had seen Aswad live on stage with a 13-piece band, and was expecting a full band in the studio — and they were expecting him to be up with the kind of MIDI sequencing and sampling they'd been doing with me, which he wasn't at the time. So they rang me up and got me to go down to program for them. Chris Porter then got me the work with George Michael when George needed a programmer for his *Faith* tour."

Pete's never looked back, landing the job of programmer on the Pet Shop Boys first live tour in 1989 on the strength of his handling of the *Faith* tour. The success of this tour in turn ensured a permanent place for him in the Pet Shop Boys entourage. He also programmed and co-engineered the 1993 Pet Shop Boys album *Very*, sharing the latter credit with previous PSB engineer Bob Kraushaar, with whom he struck up a successful working relationship. Now, in 1996, the engineer/programmer team of Kraushaar and Gleadall has completed work on the new Pet Shop Boys album *Bilingual*, recently released. Meanwhile, Pete has continued his association with George Michael, having programmed several tracks on the *Older* album, and remixed Michael's 'Spinning The Wheel' and 'Fast Love' as part of the aforementioned 4thRight. I visited Pete in his London studio, Hoedown City II (HCII), to discuss these recent projects and talk technology.

WELCOME TO THE HOEDOWN

HCII is a project studio to be reckoned with. An Apple Mac running Emagic's *Logic Audio* and a Pro Tools system form the heart of the setup, while modular pods containing synth modules and samplers — the hardware tools of a programmer's trade — dominate one side of the room. I began by asking Pete to describe his tasks as a programmer.

"It depends on the job. With the Pet Shop Boys, I'm a sound library — I don't actually play much. I get sounds up for them, record what they do in *Logic Audio*, and manipulate it for them. I fly vocals in, or tune them. Recently, Neil [Tennant, Pet Shop Boys vocalist] said he wanted that Babylon Zoo vocal sound, from 'Spaceman', and I had to get that. Chris [Lowe] will give a very specific list of things he wants: a French horn, a Russian choir, an exploding boiler. He can be quite specific about the *kind* of sounds he wants, too — he might say 'Let's have a 909 bass drum, a house loop, some vibey congas, and a tambourine' — or he might do it by referring to another record.

"I'll find what he wants, and then, if we're starting with a rhythm loop, I get that in time at the tempo he wants, and sit there recording everything he does.

"With someone like George Michael, I generally do what I do with the Pet Shop Boys, only I play *very* little. He gets musicians in to play stuff he can't play himself. He doesn't use them for their ideas, as he generally has a very clear idea of what he wants. With him, it's just recording what he does, and then rearranging what he's played according to his instructions.

"With some people — DJs, for example, who can't play a note to save their lives — they'll tell me what they want, and I'll make the record: actually play everything. I've worked with the three DJs in 4thRight for four years now, so they've learnt part of my language, and I've learnt part of theirs. They'll bring me records or tapes, and play me sounds they want. One of them has got *Cubase*, an Akai, and a Mackie mixer, and he acts as our 'translator' at times. So programming can range from making the whole record, to just getting some sounds up for someone."

With such a wide range of possible jobs to cover, I wondered how Pete worked in conjunction with ▶

Pete Gleadall

The Apple Power Mac 7100/80 running Logic Audio and Pro Tools forms the heart of Pete's digital audio recording system. Also visible to the right are Yamaha NS10M and Dynaudio ppm2 monitors, and Pete's much-loved Allen & Heath GS3 desk.

▶ other producers and engineers, with whom his reponsibilities would often overlap. "That depends too. You get some very technical producers, who are engineers or programmers or musicians, or you get some people who go by feel, and don't have much of a clue technically. Some engineers *do* have a problem with programmers who are recording things that musicians do, as engineers often see that as their job. If you've got a good team, everything's so much easier, and that's what I like about working with the Pet Shop Boys; myself and Bob Kraushaar make a good team. If I bring up a sound and Bob doesn't like it, he'll tell me, and I won't mind, because with him I know there's a *technical* reason why it won't work. He's got this knowledge of sounds and things that will make sounds work, in maybe the same way that I've got a knowledge of synth sounds that will work together."

SOUND ADVICE

Pete elaborated on this point, explaining that he doesn't just create sounds in isolation, and leave it to Bob to make them fit together technically, but considers how they will blend together. "Sometimes you create sounds, and you realise there's a problem with them later — sounds with a lot of sub-bass on them, for example, which you only realise when you get them on a big system.

"It doesn't hurt to be aware of what things go with each other. For example, if you use two sounds off the Korg M1 in a track, you'll have a bit of a battle, because all the sounds have got very similar frequencies. On the other hand, I could do a track with just a Juno 106 and a sampler, because you can have a Juno bassline, pad, synth sound and top line, and they will each take up their own space in a mix.

"Piano sounds are the bane of most engineers' lives. Neil likes the piano sound from the Emu Proformance Plus, because it's quite mellow. Whenever Neil digs that one out, Bob throws his hands up in horror, and tries to make it work another way. He's very good at stacking piano sounds, like a bright piano off the Roland JV1080 with the duller sound of the Emu. He'll manage to get the attack of the Roland with the body of the sound from the Emu, and put that to tape."

THE PRE-PACKAGED OPTION

Although a keen synth programmer, Pete sees no shame in using presets — in fact, he strongly advocates their use in a commercial environment. "I'm not embarrassed to say I use presets a lot. When I first started programming, I was an eager beaver, and I thought I had to fill the memory of each synth I had with my own patches, programmed from scratch. I spent hours doing this — but 90% of my patches were *never* used in the form I programmed them. Not many people have got the time, budget, or inclination to have sounds programmed from scratch for one song or project; what most people want to do is flick through a box of ready-made options and say 'Ah, that's nice — but can you get rid of the reverb?' or 'Can you lengthen the delay time a bit?'. In other words, you end up editing patches anyway, so now I mostly just start the editing from the presets. And with the quality of synths nowadays, like the Roland JV1080, it really is getting to the point where the sounds are *so* good, why bother trying to better them from scratch?"

"I used to be generally much more precious about sounds and samples than I am now. Now, I'm happy to give almost anything away, unless it's closely associated with a specific artist's record, like the sync sweep off the MKS80 that's on the Pet Shop Boys' 'Was It Worth It?', for example. If somebody asked me to give them that sound, I wouldn't, but I would give them a selection that was similar.

"I also use sample CD-ROMs a lot. For a programmer, the English music scene is now so fluid — one minute jungle's in, the next it's history — that if I've got a project to do and I don't think I've got it covered, soundwise, I'll buy a sample CD. I think they're absolutely fantastic, because when I first started sampling, I had to borrow, beg, buy or steal people's records or CDs to get the sorts of things that are now available.

"What I have suggested to a couple of sample CD manufacturers, though, is a mix and match option. There are some great sample CD-ROMs and some bad ones, and for most people, who aren't as fortunate as myself or the people I work with, spending, say, 250 quid on a sample CD-ROM is a serious investment. For example, I've got Peter Siedlaczek's *Orchestral Colours*, which was £249, and there's just one patch I use. It's a damn good patch, but it ought to be for £250! If you could take only the partitions you wanted from a selection of CD-ROMs, and have the manufacturer burn a composite CD for you, I know sample CD-ROM sales would increase. You could then pay for the partitions you've chosen on a *pro rata* basis — so if one of the partitions you've chosen was 20% ▶

BOB KRAUSHAAR — VOCAL GENIUS

"Bob puts things to tape pretty much as they're going to sound. He EQs vocals savagely before he records them, which I would never do — I'm not confident it's an area I'm good at. But he's got ears like a bat, and having worked a lot with Neil, he knows the problem frequencies with his voice — he would never use a Neumann U87 on him for example, because Neil has a naturally sibilant voice, and a U87 accentuates that. Instead, he uses a TLM170, and that's perfect for Neil, because it's bright, but doesn't have the sibilance. Neil really loves recording vocals with Bob; he's very good at getting a great vocal sound, and that can make or break a record."

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"I bought the Best Service *Hallelujah* choir CD-ROM for the Pet Shop Boys, because I thought they'd like it, and we got quite a bit of use out of it for *Bilingual*. On the track 'Red Letter Day', specifically, we mocked up the Russian choir using samples from that CD. Then the samples sounded better than the real choir, so in the end, we used both — the real thing to give you the character and the samples to make it sound big. Neil and Chris often do the same thing with orchestral parts."

DEMOING *BILINGUAL*

To write 1993's *Very* album, Pete had set Neil Tennant and Chris Lowe up in a demo studio, where they recorded to analogue tape. This time around, it was different, as Pete explains: "We went through the same demo process, but for 90% of *Bilingual*, we recorded into *Logic Audio*. On *Very*, Neil used to sing a guide vocal, and if we changed the tempo or key, he'd have to re-sing it. For this album, we were able to just record into the computer, and then alter vocals or fly them about if we changed the track tempo or key. With one track, 'How I Learned To Hate Rock And Roll' we just recorded it *all* into the computer. We got so bored with tape — again, it's all about speed. Chris had done the backing for that one, and Neil re-jigged the structure, but as soon as he'd done that, he wanted to do some vocals, and as we didn't already have some pre-striped analogue tape on the multitrack, they just decided to do it straight into the computer, rather than wait about while I cleaned heads and so on, which would have lost them the creative impulse.

"The only drawback with hard disk is that you can't drop in and out quickly at all. If you try and drop in a line or a word of a verse, it's a disaster, as there's about half a bar's pause while it goes into record, and mutes the audio already on the track. That's why I've got an ADAT here, so that anything acoustic I need to record here which might need a lot of drop-ins can go onto that, and then I shunt it into *Logic Audio*.

So with Neil, we'd do complete hard disk takes, and then compile a finished version, with maybe the first line from one take, the rest of the verse from another, and the last line from a third."

RECORDING

• 'DISCOTECA'

The original plan for the album was for it to have a big South American feel. This is still apparent in a couple of places, such as 'Se a vida é' and 'It Always Comes As A Surprise', with its cuicas and percussion sounds, but overall the album changed radically between conception and realisation. No track illustrates this better than the opener, 'Discoteca', as Pete explained: "We started on that song, but then they kept writing new sections, and eventually Neil wrote a new song over the end, which became the second song on the album, 'Single'. It started when they went out to the States to write some demos in New York, but it sounded a bit dull, so we sampled a few things off it: the noise at the start, the brass that survived to the final track, and some of the percussion. We added some percussion ourselves, and a conga loop, and then they got Sheboom in [a Scottish woman's collective]. They make their own drums; they just buy the heads and rims, and make the rest of them themselves. We miked them up with ambient mics, and they made a splendid racket, with bass drums, military-type snare drums, shakers, and some big ones like timbales which we recorded separately doing fills. I then chopped all the resulting sections up in *Logic Audio* later, and took the best bits of each section and looped them — though when I say loop, we're easily talking eight bars. Me and Bob Kraushaar then spent a while assembling a coherent track. Neil and Chris came in the next day and tweaked it a bit, which was where *Logic Audio* was so good, as we could totally rearrange this live drum track in minutes.

"When the Sheboom tracks were finished, we added much more to the track, until we had a full 48-track master with a lot of track sharing. It was then mixed and cut, but Neil decided it still wasn't quite right; he liked what we had, and didn't want to change it, but he wanted to add more percussion. So we flew the 'final' EQ'd production master into *Logic Audio* digitally, sync'ed it up with the original song, and put it onto a fresh multitrack tape, so that Latin percussionist Robin Jones could add loads of new tracks of percussion, which I then flew back onto eight tracks of *Logic Audio*. That all went so well that we decided to add some more vocals! Neil got some Latin singers in, and the new vocals were also flown back into *Logic*. So, in the end, I had the original master on a stereo pair in *Logic Audio*, eight percussion tracks, and four tracks of new vocals. When it was all finished, we ran the whole piece out to DAT again. All fairly simple, really!"

• 'IT ALWAYS COMES AS A SURPRISE'

"Neil played the guitar on this into *Logic* from a Yamaha TG500. I used *Logic* to print out a score from that, and a real guitarist used this to track the synth guitar. There are no cymbals on this track; we relied on high-frequency percussion instead, like bell trees, and ancient analogue drumboxes. These are all from a sampler patch of mine, with Roland CR78s, Boss DR55s, and Korg KPR77s. The bass sound was from the Juno 106 and was a total accident — I switched it on one day, and when the Juno powers up, its first setting is the current front panel. I don't know who set it up like that, but I stored the sound straight away. This song is one of my favourite tracks on the album."

• 'UP AGAINST IT'

Chris started this one off at home — he's got an

REMIXING

"I'd been making dance records with 4thright and on my own for four years, and I realised I'd never tried mixing records together. I learned to mix on vinyl, but I've got more CDs than vinyl, so I got the Pioneer CD deck. When you try mixing, you realise why there's a minute and a half of boring drums at the start and end of each dance track — it's just basic beats for the DJ to mix in on. It's no good putting an orchestral beginning on and having the bass drum come in afterwards, as a DJ will just skip the beginning and cue up the track where the beat starts. Likewise, if you try putting a light bass drum on a track, it won't get played. There's a set of rules, and you've got to try and bend them, push at the boundaries of what's acceptable. Generally, musicians put too many parts in club records, and DJs don't put enough in. You have to be prepared to completely rebuild the track; for George Michael's *Fast Love* we used the vocals only. The track was 75bpm, and our mix is at 127; we slowed his vocals down to 63.5bpm using *Logic Audio* — it's fantastic for that — and then doubled the tempo of the track. Now, because it's tough enough, DJs will play it, and then when the vocals come in, the girls go mad, because they know it's George, but he's being presented in a way that they can dance to. If you gave them the single version, firstly, it just wouldn't get played; secondly, it'd take your head off in a club, because it's so bright; and thirdly, if you've got too many chord changes, you can't get that trancey element of repetition going. The hard thing in making a good club record, specifically with vocals, is to get rid of as many chords as you can, and have as few notes and chords as possible, but leave enough variation so that it isn't completely dull."

Club Corner! Pete Gleadall with some of his front-line dance gear (left, top-bottom): Oberheim Xpander and Roland JV1080, Juno 106, and JD800 (sometime master keyboard). To the right are Pete's TB303 and Oberheim OB8, and the Roland TR909 is just visible behind him. Also located in this corner is the Pioneer CDJ500II CD turntable.

Apple PowerBook with *Logic*, a Roland SC88, and a PC200 keyboard, which he uses to write at home. He wrote most of the basic track, and then Neil massaged the basic structure idea into full song format, so that he could fit his lyrics in. The song was recorded at Bunk, Junk and Genius, and has got Johnny Marr [ex-Smiths guitarist, now with Electronic, and regular collaborator with the Pet Shop Boys] playing on it. He used the Roland VG8, the physical modelling guitar, which was really good, because often it's hard to blend real guitar in with synths. It's got a slightly unnatural sound, but it still sounds really good; there's no delay, because it's not a MIDI guitar. It's very good at following all his bends and runs. The bass is a combination of Moog and a TX81Z sample, and there's an Oberheim Xpander doing sixteenths."

• **'SE A VIDA É'**

The Sheboom drums on this were recorded at the 'Discoteca' sessions, and then I timestretched them up a few bpm, so that they would fit with this track and beef it up a bit. This has a four-on-the-floor programmed rhythm, too; they like doing stuff you're not supposed to do, and you're not supposed to do four-on-the-floor at 104bpm or whatever, so they did! Chris Porter produced this track, and was particularly fond of the arpeggiated phrases in the middle eight, which were created in *Logic* by feeding Neil or Chris [Lowe]'s pad chords into the onboard arpeggiator using the Environment window. Chris Porter is a big *Logic Audio* user, too, though more on the audio side. So I tended to do the MIDI and he'd handle the audio.

"Of the people I work with, Neil and Chris are possibly the hardest and yet the most fun to work with, because they have very specific requests. You've got to try and look ahead and anticipate what people want, or are going to want, in the future. It's very hard with the Pet Shop Boys, because it might be 'right, let's mix it', or it might be, 'right, let's scrap it'!"

TOP GEAR

A programmer such as Pete needs access to good sounds all the time, which, as he explains, is why HCII is so stuffed with synths and high-quality outboard. "Some people come in here and say 'how come you need all this gear?'. It's because each instrument here has a few sounds that it does well, and that's all I'll use it for. Yes, it's an expensive way to work, but it's all paid for, because for years I invested everything I earned back into this equipment. For that reason, I made sure it was stuff I knew would be useful to other people!"

As Pete goes on to explain, sounds are the thing — he's not too bothered how they're generated: "I don't care how any of my kit makes its noises, whether it's mice in a wheel at the back or candles burning — the question is, is it useful? They're just tools to get the job done". However, this doesn't mean he has no preferences. Circling the studio, he points out his favourite gear. "I couldn't make a record without an Akai sampler of some description, the Roland Juno 106, and *Logic Audio*. *Logic* is the best program I've ever come across; it makes my jaw drop with amazement. It's also amazingly stable. If there's any performance aspect to an analogue synth line — tweaking knobs on a TB303, say — I'll record it into a couple of audio tracks." Likewise, to get multitimbral ▶

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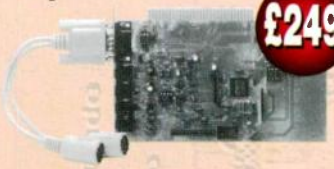

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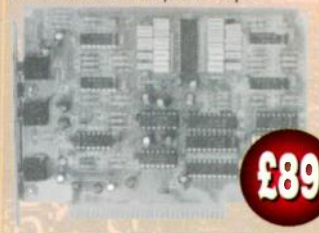

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operation out of a monosynth or synth with limited polyphony, Pete reaches for *Logic Audio*.

"Until the Akai S3000 came out, I didn't really use samplers for anything musical: just drums and percussion, because you lose too much bottom end off those earlier Akais, and because the filters weren't so good. But when the S3000 came out, with its resonant filters, I spent a lot of time sampling my Prophet 5, and for about six months, my S3000 acted as a multitimbral Prophet 5. I sampled sounds with the filter deliberately open brighter than I would use usually, made a loud and a soft sample, and spread it over a few octaves. Then I could always back off the filter effect in the sample using the S3000's filters. This meant that I could have several Prophet sounds running at once if I wanted. Apart from special cases like the Prophet, though, I don't generally keep synth sounds in the samplers.

"Of the rest, you can get more enthusiastic about some tools than others. One of the synths here generates all the Pet Shop Boys' string pad sounds — they wouldn't like me to tell you which one, though — and cost £350. For that price, it superseded an Emu Emulator II plus a load of samples of a Roland MKS80. That synth never changes its preset — they do like that one!

"My current favourite is the JV1080, because it's got the sonic size that we were looking for in the studio, that Roland's synths used to have. You see, if you want to make a sound smaller, you always can, but if you've got a really thin sound, it's hard to make it bigger. The 1080 has also got top end without sounding too thin. Most of its sounds are really useable, so it's one of the few synths I use multitimbrally. I think it's the best thing Roland have done for years.

"I like the Korg Prophecy quite a lot too, and it's easy to edit sounds, but it's harder to program a sound from scratch, because you've got all the layered pages to plough through. I agree with what Liam of The Prodigy said in *SOS*, though — the distortion's great [*see September's issue — Ed*]. I can get the 303 patch in there sounding angrier than my real 303.

"I also love the Quasimidi Quasar, but I wouldn't dream of taking it along to a George Michael session, because it's not bright; it's dirty and low-bandwidth. It's got real punch, though, that sound. It's rubbish for anything sparkly or hi-fi, but it's great for gritty stuff; the 303 sound on it is almost as tough as the real thing.

"You can't be without a TR909 if you're doing dance music — it's really tight, which, sadly, the Novation DrumStation isn't. What that *is*, though, is a really good sound source — it's great for programming up patterns and then flicking through the kits. I would recommend it to anyone who wants a 909 and can't get one — but I *have* got one, and it definitely sounds tougher and tighter than the Novation. I don't program it, I play parts into *Logic* and run it over MIDI.

"I like to pan things in stereo, so they're flying all over the place, and the Waldorf Miniworks' autopanner is good for that; you can get it moving so fast that you get some very weird effects which sound great in clubs. And given the current vogue for filtering everything in dance music, the Miniworks is good for that too. With the Pet Shop Boys, we borrowed the big synth that the Miniworks originally came from, the Waldorf Wave, to experiment with. I would have bought it if I'd been them — the potential it offers is massive — but it's only got 200 sounds in, and of those only five were actually useable. I can understand, though, because if they were going to spend £6000 on a synth, they'd want at least 100 of the 200 sounds to be useful. With the Pet Shop Boys, when we're sitting in Sarm studios or whatever, we haven't got time to program sounds from scratch. It would have taken too long to program enough sounds up to be worth it.

"My Studio Electronics MIDIMoog is a permanent fixture in my programming rack. The tuning's stable and it's generally very reliable. I

Pete's portable programming racks, including (left, top-bottom): Yamaha TG500 & TX802, Emu Proteus 1 XR, Quasimidi Quasar, Korg M1R, Yamaha TG33, Roland MKS70 & MKS80, Emu Vintage Keys & Morpheus; (right, top-bottom): Akai S3000, Studio Electronics MIDImoog, Oberheim Matrix 1000, Akai S1100 & S1000. Note also the Korg Wavestation master keyboard below the pods and a certain well-thumbed hi-tech recording magazine right at the bottom of the pic...

Pete's recording and processing rack, including (left, top-bottom): Waldorf Miniworks and Peavey Spectrum analogue filters, Panasonic SV3800 DAT, Digidesign Pro Tools hardware and 882 digital I/O interface, Opcode Studio 4 multiport MIDI interface, and Roland M12E mixers; (right, top-bottom): Tubetech EQ, Valley compressor, Lexicon PCM80 effects, Drawmer DS201 noise gate, dbx 166 compressor, Aphex Expressor, Alesis Microverb II reverb, Sony HPRM5 effects, 2 x Lexicon LXP1 reverbs, Zoom 9010 effects, Aiwa DAT, Technics tape deck, 9 x Signex CP44 patchbays, Alesis ADAT. Note also Pete's trusty Massenberg EQ at the very bottom of the right rack, with the coloured knobs.

THE PET SHOP PARTNERSHIP

"When the Pet Shop Boys are writing, it's generally just myself, Neil and Chris. Both Chris and Neil have got *Logic* at home, but they just put down the barest ideas; Chris a bit more than Neil, because Neil likes to write a lot on his guitar. That explains why their chords are often so nice, because Neil voices his keyboard chords exactly like the guitar inversion — so because they're not played from a keyboardist's point of view, you get these very interesting chords. Neil is also very good at structure and melody, while Chris is more aware of rhythmic elements. That's not to suggest that Chris isn't aware of chords, but his priority is rhythm. He's a mine of ideas, and the hard thing with him is keeping up with his output; he can put a track together in minutes. That's also why I record everything he does. He'll often say 'just let me rehearse this', but the first couple of times he tries something, he'll come up with something brilliant that you wouldn't get again if you didn't record. All it takes is a tap on a space bar with *Logic*, and you can always get rid of it if it's no good.

"On the track 'It Always Comes As A Surprise', the weird chord at the beginning and end of this track came about when Chris was looking for a way to end the song on his keyboard, and said 'oh, this needs something like *this*' — and spread his fingers and just hit as many keys as he could. I was in record as usual, and so it was captured. Neil thought this was a great idea, and rewrote the chords at the end of the song so that they flowed properly into the chord Chris had played. In the end, Neil was so fascinated by the strange sound that he put it at the start of the song as well.

"When I record Chris, I cycle everything around eight or 16 bars in *Logic Audio*, and he'll play stuff in over the top, say percussion, drums, bassline and some chords — until he's finished a section. At this point, Neil will listen to what Chris has done, and maybe ask to hear the chords in a different order to the way Chris has played them, so I'll do that for him; or he might re-voice the chords. That might then inspire Neil to write another new section... Their songwriting partnership is very collaborative.

bought it after I hired one to do a track with Chris Porter, and I was having trouble getting a bass sound. I had stacked loads of synths up to try and create a really big sound, but in the mix it either sounded too loud or it was really mushy, because all the attacks were happening at slightly different times. Then the Moog arrived; I switched it on, and straight away, we all went 'wow! listen to that!'. It was clear, big, fat, *and* you could put it at the proper level in the track. It was £1500, which is a lot of money, but if I added up the cost of all the synths I'd stacked trying to get a bass sound, it seemed worth it. I don't just use it for bass — I've discovered loads of other good sounds on it.

"The Pet Shop Boys have got one of these too, which we use extensively for bass, because you don't have to do an awful lot to make it sit in a track. And it sounds very different to mine, which is typical for a Moog! This one's rounder, whereas theirs has a thinner, more Clavi-like sound, though still with plenty of bottom end, so it occupies a very specific space in the mix. I read in your interview with Steve Rodway [see *SOS* June '96] that he samples his Moog to lose the sub-bass, and I've done that too, to try and thin mine out a bit.

"If you're ever in doubt about a mix, get an SSL stereo compressor in, set a slow attack and fast release, with a ratio of 4:1, put the threshold knob at about the 'quarter past' setting, and it'll sound great. I'm buying one of these soon; I've hired one so often, I could have bought one by now!"

Sitting at the bottom of Pete's recording rack is an expensive Massenberg EQ. "That's a big part of how I get things to sound good here; it's permanently sitting over the desk's output to EQ a complete mix. You shouldn't be afraid to EQ an entire track — after all, that's what they do at a mastering plant. That goes into the SSL compressor when I'm mastering. On cheaper desks, you can't get clean top end, whereas with that thing, I've got about 5dB at 16kHz, and it just adds sparkle, no distortion or phase-shifting. If you've got a mix that sounds brilliant, but is all too bright, it's a five-second job to dull it off with that, rather than go through every desk channel trying to do it that way. A couple of the Sarm engineers swore by it, and mastering rooms have it, too, which put me onto it. Then, one day, I walked into a shop and saw this one going second-hand, but they didn't know what it was, so I got it for about half-price!

"My Alesis Microverb II is really good for a nasty, cheap reverb sound. I've got a Lexicon PCM80 for expensive-sounding reverb, but it's like I was saying about the Quasimidi Quasar — if everything's spangly and pretty, it sounds horrible, just as it sounds horrible if everything's dirty and grungey: you have to find a blend. I use the Microverb II a lot on drums, just for a bit of ambience. The PCM80 I use on vocals, and my Lexicon LXP1s are for general-purpose reverb. I can recommend the Sony HRMP5 — that's a great little box, and it's only 299 quid at the moment!

"I'm about to replace my Allen & Heath GS3. It's not the cleanest desk in the world, but I do love the sound of it — it distorts brilliantly. I think if you turn up the gain, a desk should distort in a musical fashion, and this makes things bigger and fatter. The MIDI muting is also really handy, as I can mute things from my master keyboards, either the Wavestation or the JD800. You can gate things interestingly that way, or experiment with arrangement by muting channels from the keyboard. The Pet Shop Boys have now bought an Amek Big by Langley as their main desk, and that's the most Marshall-sounding desk I've ever heard! The Amek Big is what I'm going to buy next."

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Tascam, the originators of the Portastudio concept, which is now almost 25 years old, have taken a fresh look at the format for the '90s, substituting the digital MiniDisc medium for the analogue tape which has served home recordists so well, and adding a clutch of brand-new features. HUGH ROBJOHNS indulges in a little 4-play...

Discworld!

TASCAM 564 4-TRACK DIGITAL PORTASTUDIO

Whatever did we do before Tascam invented the first Portastudio? Fully integrated 4-track recorder-mixers seem such a fundamental part of so many home studios these days that it makes you wonder what we would do without them. Of course, the cassette-based systems have always had their limitations, with restricted dynamic range and frequency response, and the inevitably rapid build-up of tape noise, but these have all been gradually improved over the years.

However, the widespread use of Compact Discs and the popularity of NICAM television have made us all aware of the benefits of digital audio, and have created new expectations of quality and convenience, which the humble cassette recorder can not really fulfil. However, the digital MiniDisc medium certainly can, and with the Data Disc format, it becomes almost a straight plug-in replacement for the 4-track analogue cassette, but with a host of extra advantages thrown in.

The idea is not entirely unique, of course — you'll recall that Yamaha's MD4 digital multitracker was reviewed in the September issue, and Sony are planning to release a similar product shortly. But, as always, Tascam have some unique angles which they hope will give their new product, the 564 Digital Portastudio, the edge over its rivals. The good news is that the specifications for the MD data format are quite rigorous, so a session recorded on the 564 should be playable on the other manufacturers' machines: it may thus be possible to exchange disks and add your expert overdubs to your friends' recordings!

CONCEPT

The basic design of the 564 follows the familiar pattern of previous Portastudios. It has four input channels (two with insert points) capable of accepting microphone or line-level signals (electronically balanced on XLR and jack), all with 3-band EQ and two post-fade effects sends. It also has two stereo inputs with 2-band EQ, and two simple stereo effects returns (quarter-inch jack connections). The monitoring system has facilities for a 2-track stereo monitoring return (phono sockets) for easy checking of your master recordings.

The 564 has ample output facilities too. The stereo outputs from the mixer's master fader and the monitoring sections (all on phonos) are accompanied by outputs from the two effects sends, a headphone socket, and a cue signal output (all on jacks), plus the four discrete outputs from the MiniDisc transport (phonos again). The latter will allow mixes to be made through an external mixer, of course. There's also an SPDIF socket at the back, which provides a digital output from tracks 1 and 2, and the familiar trio of MIDI connections.

The mixer section of the 564 is very much par for the course, but what about the MiniDisc transport — what does that offer? Well, fundamentally it can be thought of (and used in) exactly the same way as a traditional cassette system, except that the recording time is rather longer, at 37 minutes (with a maximum of five separate song recordings per disk), and there's no waiting around for the tape to rewind. There's also no need to sacrifice a track for timecode, because the system has built in MIDI timecode and MIDI clock facilities which are derived directly from the ATIP (Absolute Time In Pre-groove) track information embedded within every blank MiniDisc.

Tascam's MiniDisc mechanism is capable of very fast track access, which means that it is possible to make it hop about replaying isolated sections of recorded audio in any order you choose. This is an extremely useful facility because it allows sections

of a song to be marked with index points (verse, chorus, bridge, and so on) and then replayed in any order, in a similar way to how a hard-disk editing system works. When you've found the best sequence and combination of sections, it's even possible to copy, move and insert the relevant material to create a new physical recording of the complete song elsewhere on the MiniDisc.

This process of bouncing audio to a different part of the disk is called 'Bounce Forward' in the Tascam vocabulary, and it is a rather powerful feature. In addition to the song-construction process just described, it also allows a sophisticated version of overdubbing: once you've recorded four tracks of material, these can be sub-mixed to a stereo pair of tracks, which are copied in real time to a new part of the disc (no need for dubbing off onto another stereo cassette!). Two extra tracks can then be added and the process repeated. The disk, with a capacity of 140Mb, will hold up to five songs at a time, so in theory you could build up a 12-track recording with the signal never leaving the confines of the 564.

In fact, once you're happy with your bounced-forward mix, you can erase the original song, allowing almost unlimited bouncing and overdubbing within the five-song capacity of the disk. One point to bear in mind, though, is that although the MiniDisc is a digital format, it is not immune to generation loss, because in order to get 37 minutes of 4-track audio onto the disk, a 'lossy' data-reduction system called ATRAC (Adaptive Transform Acoustic Coding) is used. To cut a long and complicated story very short, this process tries to work out what can and can't be heard by the 'average' listener (taking into account frequency and temporal masking effects), and discards the bits of the sound that it thinks we won't miss. In general, the system works well, but most people can hear a small difference in a straight A/B comparison between some original material and the ATRAC-recorded version. This is unlikely to be a problem in the context of typical home studio multitracking projects, but repeated song and track

PROS & CONS

TASCAM 564 £1099

pros

- High sound quality.
- Fast and easy to use.
- Superb editing facilities.

cons

- Takes a while to master the menus and detailed operation.
- Some mixer facilities missing (for example, level trims for the stereo return, and an EQ bypass).
- ATRAC data reduction limits ultimate production quality slightly.

summary

The Portastudio for the '90s, with some very clever features and facilities. The leading machine in the MD format at present. Easy to integrate into a MIDI setup and works well as a MTC system controller. Excellent sound quality, editing facilities, safe overdubbing mode and convenient format.

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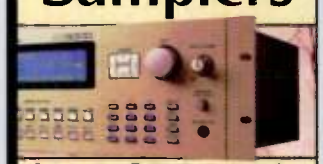

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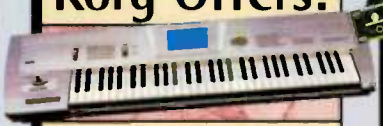

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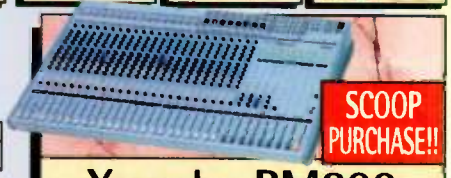

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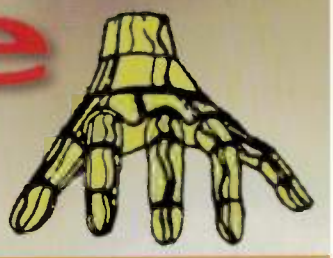

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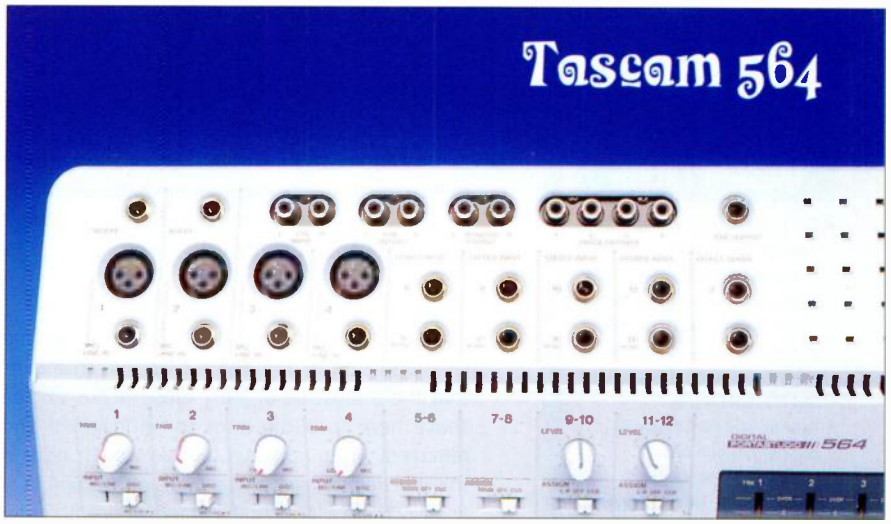


bouncing will cause noticeable degradation to the earliest recordings after about four or five passes. The most obvious artifacts are a rise in the noise floor (better than, but similar to that of a cassette system), loss of low-level detail (don't record reverbs, if you can help it, on the early generations), a gritty harshness and, depending on the material, a loss of the highest frequency extremes.

Don't get the wrong idea here — the perceived quality of the MD system is streets ahead of any analogue cassette multitracker, but it is not in the same league as a linear hard-disk system or a full-blown Sony 48-track DASH machine! Then again, neither is the price...

OPERATION

Using the 564 is pretty intuitive, although some of the editing commands can be a little confusing — for example, my colleague managed to erase a section of a song without even realising it until it was too late (bet he won't do it again, though)!

Setting up the mixer side of the machine is trivially simple. The balanced XLR and quarter-inch jack sockets are wired in parallel, so either can be used for signals between -65 and -10dBV (there is no provision for phantom power). The input amplifiers are possibly not the quietest I have ever heard, but are perfectly up to the job of handling close-mic'd voices and acoustic instruments. Unfortunately, the faders are not marked with a unity gain position, and this can cause problems when bouncing tracks, as the overall gain can creep up or down, risking overload or extra noise respectively.

A slide switch directly below each input gain control selects what signal source is passed through the channel strip. When the switch is set to its left position, the input is the mic/line socket, while in the centre position, it handles the corresponding replay track from the MiniDisc, for mixdown purposes. When the switch is in the rightmost position, the channel still controls the MiniDisc replay, but the mic/line socket (after the gain trim control) is routed directly to the main stereo output fader, allowing extra tracks (MIDI keyboards, for example) to be incorporated during mixdown.

The EQ sounds OK, with sensible turnovers for the high and low shelf bands. The mid-band is sweepable over the range 250Hz to 5kHz, covering the most critical part of the spectrum nicely, but unfortunately there is no EQ bypass switch to allow comparison between the original and equalised sound. The two auxiliary sends are fixed as post-fade effects outputs.

At the bottom of the strip is a pan control which routes the signal to the stereo master fader. The MiniDisc will either record in stereo track pairs from the master stereo mix buss (i.e. left buss to tracks 1 or 3, right buss to tracks 2 or 4), or all four tracks directly from the first four channel faders.

The two stereo input channels (inputs 5&6 and 7&8) are similar to the first four inputs, except that there's no input level trim control (rather frustrating!) and the EQ is simplified to just top and bottom shelf bands. The pan pot is replaced with a proper balance control, and the routing switch is different, in that it routes the signal to either the main stereo master fader, or the cue mixer. The latter is a separate mixer section which has individual level controls combining the outputs of the four MiniDisc tracks for monitoring purposes. By routing the stereo channels to the cue mixer, you can audition MIDI keyboards (or other 'virtual' tracks) alongside the pre-recorded acoustic tracks. A third position of the switch simply mutes the stereo input channels.

The stereo effects returns are very simple, but do boast a level control, unlike the stereo input channels! The routing is identical to the main stereo inputs, except that the output to the master fader is labelled L-R, instead of Main (as it does not pass through the fader).

Monitoring is flexible and obvious, with buttons to select monitoring of left or right stereo mixer busses (pressing both gives normal stereo), AFL buttons for the two effects sends, a cue mix monitor button, and a 2-track return. These buttons are not interlocked, so you can listen to everything at once if you want to!

To sum up, setting up the desk for recording is simply a matter of adjusting levels and EQ for the acoustic instruments ▶

"The process of bouncing audio to a different part of the disk is called 'Bounce Forward' in the Tascam vocabulary, and it is a rather powerful feature."

MIDI

The 564 would probably normally be integrated into an existing MIDI system as a master controller; MIDI sequencers would be set to slave to either MIDI timecode (all the standard flavours are here, from 24fps up to 30 drop or non-drop frame) or a simple MIDI clock. In the case of the latter, the 564 allows full tempo-map editing, with up to 32 signature changes per song! Alternatively, the 564 understands MIDI Machine Control and can be remotely operated from any suitably-equipped system, with its MIDI timecode output as a position reference.

TASCAM TRIVIA

- TEAC, the parent company of Tascam, started life as the Tokyo Electro-Acoustic Company, and is now a billion dollar business with the bulk of its turnover derived from the manufacture of floppy disk and CD-ROM drives.
- Tascam is a very musical company, since many members of the senior management, R&D engineers and sales teams have a musical background of one sort or another.
- The popular Tascam DA88 digital multitrack recorder derived its transport from earlier TEAC-designed data recorders and military aviation flight recorders.
- The MiniDisc mechanism in the 564 digital Portastudio is the same unit as that installed in the Tascam MD801 studio MiniDisc recorder, and is capable of accessing data up to five times faster than any other MiniDisc transport currently on the market. Being able to read and write data to different parts of the disk so fast allows true insert editing to be performed on the recorded data, which is another feature unique to the 564.

▶ and vocals, routing the MIDI keyboards and drums to the cue mixer, doing the same for the reverb and the like through the effects returns, and then arming the appropriate tracks to record.

THE TRANSPORT CONTROLS

The MiniDisc mechanism itself is mounted on the left-hand side of the 564's case, which means that there must be at least three inches of free space here to allow discs to be inserted and removed. Although it would have been nicer if this mechanism was at the front of the 564, it is actually quite a large unit and would not fit under the front because of the control surface 'raking'.

At the top of the front panel are bargraph meters for the four MiniDisc tracks and the stereo main outputs. The meters all cover a 45dB range, but the resolution is poor, as there are only seven LEDs in each bargraph. The four meters associated with the MD tracks each have a red Record LED, to show when each track is actually recording.

Below the meters are Safe/Direct/Bus slider switches which determine the record source for each track. Direct picks up a feed from the corresponding input channel's fader, while Bus picks up the left or right stereo output. The Safe position is actually the output of the corresponding track, as when the disk records, it has to re-record all four tracks simultaneously, by replaying the original material and then either re-recording it in the same place, or replacing it with new audio material.

At the front of the control surface are a set of transport keys, including Stop, Play, Record, and Index skips to jump forward and backwards or return to the top of the current song. To the right of these is a jog/shuttle wheel, where the outside ring is used either to confirm menu actions or to scroll through the contents of an MD (although I found this very hard to use because of the characteristically garbled soundbites — similar to a spooling DAT). The inner wheel is the jog wheel, and this is used for data selection on the menu pages and to locate and trim editing points and index markers.

Falling nicely to hand around the wheel are four buttons. These are used to set, Trim and Clear index marks, and to control the non-destructive song-editing mode. The remaining buttons are used to control the various operational modes, such as repetitive looping between index marks, varispeed, punch-in and out points (with a rehearsal mode), and so on. When any function is activated, by pressing one of these buttons, a help screen is presented on a clear two-line LCD panel immediately above the jog wheel, and the instructions make it very intuitive to set the machine up to do whatever you want. In the few cases when I didn't quite achieve what I wanted the first time, a little trial and error quickly solved the problem and I didn't really need the manual at all (although it's very thorough and clearly written in the usual Tascam way).

> "The 564 is a wonderful machine — I'd forgotten how much fun a Portastudio could be."

The automatic punch-in system is intriguing. The system allows in and out points to be defined (and trimmed) and then performs rehearsal cycles between these points to allow the punch-in to be perfected. To record the punch-in, the user must select a take number first; up to five takes can be recorded and stored separately, assuming that there is sufficient space on the disk. These takes can then be auditioned and compared, the best one being retained and the rest discarded — a very handy facility indeed.

Another particularly nice feature is the ability to trim and then name index marks so that, when a song has been recorded, each section can be identified accurately (there is a limit of 20 index marks per song). Trimming an edit is very simple, although it takes practice to make sense of what the short looped burst of audio around the current Index mark actually is! When you've found the correct start point, the end can be marked in the same way and the section given a name. The system has a selection of useful preset labels, such as count-in, intro, hook, verse, bridge, and so on, although you can also type in your own legends.

These labels *should* be really useful in Index Programme mode, where the indexed sections can be copied and moved around non-destructively. In this mode, the top row of the LCD window shows the current step in the programme with the number of the selected index, while the bottom line displays the complete song running time — but nowhere is the name of the selected section displayed. So unless you carefully noted down the section names and their associated index numbers, you wasted

your time in labelling them in the first place! I have to say that I was rather disappointed with this aspect of the software design.

Assuming that index points are marked accurately, the index editing mode is brilliant (I found that marking indexes on the fly produced perfectly acceptable results, and was often more accurate, and certainly much easier, than scrubbing the audio). In all the edits I made, there were never any clicks or holes, and after I bounced the audio down to another song, it was impossible to tell that the material was originally in a different order! This facility is excellent and allows lots of experimentation and creativity in constructing a song.

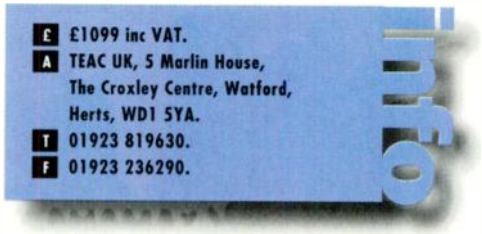
SUMMARY

The 564 is a wonderful machine — I'd forgotten how much fun a Portastudio could be! It makes an excellent 'musical notebook': just like the original Portastudios, but with the advantage that it can potentially make recordings of a high enough quality to copy straight onto a professional system! The audio quality of the MD format is a major attraction in itself (at least in the context of its price and the alternative cassette-based systems), as are the virtually instant locate times, the bounce-forward overdubbing system, and the non-destructive song editing functions. The bounce-forward technique for overdubs is a very safe and simple way of building up recorded parts, and the ability to instantly go back to the previous version(s) and start again is likely to be very useful indeed.

There are some shortcomings in one or two areas of the mixer — such as the lack of an EQ bypass button, no level trims on the stereo inputs, no unity gain marks on the faders — but on the whole, the mixer is well designed and does its job without problems. The control menus and general operation are very easy to understand, and the menu system guides the user through most operations smoothly. It's a shame that the song section labels cannot be seen when making sequence edits, since this is when they would be most useful, but apart from that, the function itself is excellent and the editing facilities in general are superb.

Overall, this Portastudio deserves to do extremely well, and I'm sure it will meet the needs of a huge number of home recordists perfectly. Definitely one to check out at your local music store. SOS

Hugh Robjohns is a lecturer at the Centre for Broadcast Skills Training at BBC Wood Norton. The views expressed in this article are the author's own and are not necessarily those of his employer.



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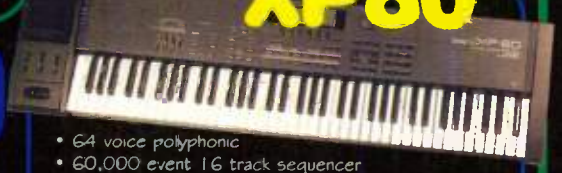

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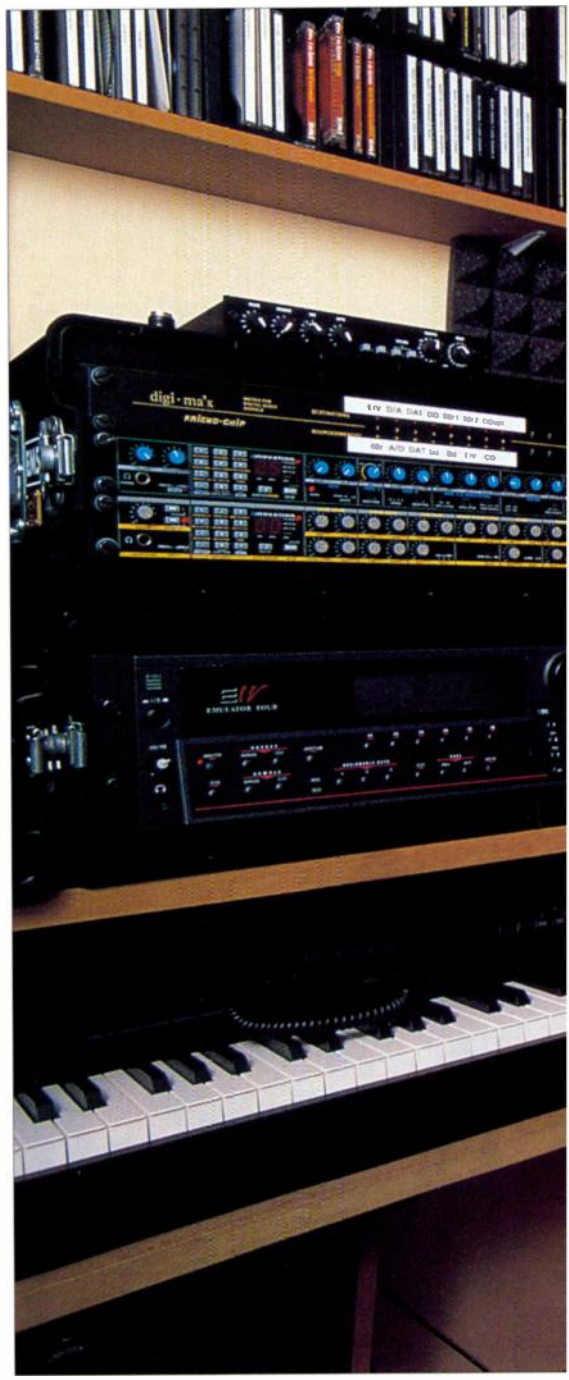
DIGITAL MASTER

The *Guinness Book of Records* invents some curious categories, like airplane eating or pole sitting, so that they can cram as many names as possible into their fact-packed pages. A category like 'greatest sales per square foot of selling space' may not quicken the imagination quite as much, but it got the excellent hi-fi chain Richer Sounds a mention for their achievements at their London Bridge branch. By these standards, the British producer/engineer Steve Levine is a prime candidate for entry in Guinness too. All the makers of the book have to do is invent a similar category, perhaps 'professional recording studio with the greatest amount of gear per square foot', and it would almost certainly mean a spectacular number one entry for Levine's studio. For in a back room of his residence somewhere in West London he has managed to cram a top-level 32-track digital studio in a space that's about the size of a luxury toilet. Its exact dimensions are 10 feet by 6 feet 10 inches, and somewhere between four ADATs, a Yamaha 02R digital mixer, and racks and racks of outboard gear and sound sources, he's even managed to find space for human presence, with a bit of clear floor space and two swivel chairs.

Sitting in one of these chairs in this tiny space, with gear towering above one's head in all directions, is a slightly unnerving experience — yet it feels cosy rather than cramped. Steve Levine sits about two feet from me — he can't really move any further away — and the combination of a youthful, boyish face and grey curly hair give his appearance a curiously timeless quality. Levine (38, as it turns out) talks fast and has strong and well-argued opinions about many things, with a special affection for what he appropriately calls his "studio in a box. I can do almost everything here: pre-production, overdubs of vocals, acoustic guitars, percussion and so on, editing, pre-mastering, and since I got the Yamaha 02R, also mixing. Years ago I had a private digital 24-track studio in London, but because the equipment was so much bigger, I needed much more space and had to house it in an industrial unit. I've long wanted to do everything at home in as compact a place as this, and it's only really been possible since this year, when the 02R came on the market."

Levine continues, explaining that most of the acts he currently works with are up and coming, and that working in his small but perfectly equipped studio saves them a lot of money, and gets both sonically and artistically top-level results, because the artists feel they can relax in the welcoming surroundings of Levine's home.



"Initially I thought I'd just do pre-production work in here on the computer and hard disk, but then we tried recording some vocals and got better results than in a commercial studio. The artists really liked it here. So I now have this booth that I can set up in the adjacent room, and it becomes the perfect recording room. It's the size of about two phone boxes, and whilst we have no eye contact, it's possible to record pretty much anything in there, with the exception of a full drum kit. And equipment hasn't only become much smaller, it's also become very portable. Everything in here is fitted in flightcases with wheels. I can dismantle things in seconds, fit them in my car, and set up somewhere else in two hours. I often do this when I want to record drums or a whole band. After doing pre-production here, I go to a cheap studio with a good-sounding room, record things on my own equipment, and come back here to edit, overdub and mix."

DIRTY HANDS

The above illustrates the basics of the Levine Method of Recording and Producing, with central themes such as the versatility and high quality of modern equipment, the idea that small and cheap are beautiful and not necessarily of lesser quality, and his fondness for working with young artists. The seeds for Steve Levine's (not to be confused with colleagues Ian Levine or Stewart Levine, who are no relation) 'method' were clearly sown during his early days at CBS studios in the mid-'70s, when he started as tea boy and gradually made his way upwards via the then-stereotypical route of tape-op, assistant engineer, engineer and eventually producer. He quickly got himself noted: it was as early as 1976 that The Beach Boys' Bruce Johnson spotted Levine and told him that he'd make a good producer. Johnson's statement proved prophetic, for 20 years later Levine is one of the most successful UK producers around, with credits such as Culture Club, The Beach Boys and Gary Moore, and with a special talent for "bringing out the seed that is there" in unknown artists.

Levine's talent for working with up-and-coming bands can be traced to formative events that clearly made a big impression on him: "CBS had a great policy, which I wish would still be practiced today. Studio 3 was their junk room, containing all the shit gear that was left over from the other studios, and when they had just signed or wanted to try out a new band, they gave them two days of free recording time in Studio 3 with a junior engineer. That was a fantastic thing. It gave bands experience in working in a studio, and engineers could learn a lot and feel at ease, because it wasn't that important if you made a mistake. The band members were usually the same age as you and didn't worry about you being a junior engineer. It gave me tremendous experience in

"My fundamental aim is to help an artist achieve his or her best."

Steve Levine

working with young artists, and it's a real problem that studios don't do this kind of thing any more, and that the studio industry in general doesn't give opportunities for people to get their hands dirty in a studio and really learn the ropes."

So worried is Levine about this problem that he is working with RePro (see box) on finding rememedies for a situation where most people learn to engineer in the isolation of their own home, leading to "the sound quality of finished records going down" and "people asking me very fundamental questions at workshops I do." His apprenticeship at CBS, he says, "was a hugely successful background. I was the last generation that really went through that process, from tea boy to engineer, to producer. Every day that I work now, I draw on that wealth of experience. I worked on every single type of music, rock, jazz, classical. Sometimes I had to set up the studio for 9 o'clock in the morning, and then we did a jingle in one hour flat, recorded, mixed, and out, everything done. That kind of regime is very, very good for you."

> "Digital has made my job much easier and much more cost-effective."

FUNDAMENTAL

Levine's hugely succesful background and his talent for bringing out the seed in a new artist manifested themselves very quickly in his work with Culture Club in the early '80s. After having completed his apprenticeship at CBS, he started work as a freelance producer-engineer. He soon found himself working with a then-unknown band called Culture Club, and fell headlong into staggering success, with his productions of million-selling singles like 'Do You Really Want To Hurt Me?' and 'Karma Chameleon' and three best-selling albums, *Kissing To be Clever* (1982), *Colour By Numbers* (1983) and *Waking Up With The House On Fire* (1984). Levine remembers: "Drummer Jon Moss wanted to have the effect of a dual rhythm, and so we got my LinnDrum to play the backbeat of the tracks and he played over that. That was the beginning of the sound of Culture Club, even though 'Do You Really Want To Hurt Me?' was done with a CR78 drum machine, rather than the Linn."

Culture Club made Levine's reputation as a hit producer, and he soon found himself working with a wide variety of artists, ranging from The Beach Boys, Ziggy Marley, Deniece Williams, Gary Moore and China Crisis to America. But he never strayed too far from the core talents that brought him so much success with Culture Club: getting the best out of young artists, having an ear for high-quality, chart-friendly pop music, and also getting an excellent vocal sound (see 'Recording Vocals' box). Levine: "I suppose I do pop music best, but that covers such a wide range. The more diverse the things I do, the better I like it. I don't want to be known for just one thing. But everything I do is held together with a common thread, and that common thread is that I really know my onions when it comes to making a record. I really know how to get the best out of an

Part of Steve Levine's mic collection.

RECORDING VOCALS

"I've been really fortunate to have been able to work with some of the best vocalists in the world, and many people say to me: 'you know what I really liked about your music? The way the vocals leap out at you and the quality of the vocal sound that you get.' That's a label that other people have put on me over the years. Recording good vocals is down to a combination of things: the choice of microphone and microphone preamp, the way the artist feels, the right foldback balance, the right atmosphere. So I create an environment within which we can achieve the best results, both sonically and emotionally. I think that the way the vocalist feels creates most of the sound. It's so important. I've seen too many people set up a situation where the singer isn't comfortable, or where there is little time to do the vocal. But vocals get the song across, so I really believe in spending a lot of time with a singer to get the best results. I will always make sure that I have many tracks available, so that the vocalist can do as many takes as he or she wants, and I'm happy to keep recording until it is right. Because when it's right, a vocal jumps out at you.

"The right environment is phenomenally important to singers. Without exception, lead vocalists always insist that the other band members aren't there when they do the vocals. Ironically, they tend to be very shy and nervous people. They like to do it on their own, sometimes even with the lights off. Here in my studio it's great: I can't even see them when they're singing in my vocal booth. Most singers prefer to sing with headphones on, but when they want to sing with speakers, I will put the foldback out of phase. It's a very handy trick that will get rid of the most offensive spill. Using a fairly directional mic prevents much spill in the first place. The actual microphone I use will depend on the voice, but normally I have a choice of three: the Sanken CU41, Neumann TLM170, and if I want a valve sound, the Gefell U92S. If I'm doing stereo vocals, like a choir or backing vocals, I'll have a Sanken CMS2 stereo mic, which is also very good.

"They are all very expensive microphones, but I've learnt over the years that good microphones make a big difference. A good cheaper microphone is the Rode NT2. I don't like the AKG 414 very much, because I find the high end synthetic and it's really hard to get rid of the sibilance. I much prefer to use something like a Sanken, which is absolutely true, and then use the GML or Focusrite to increase the high end. If you boost at 18K, you get that sheen on the top end, but no sibilance. My choice of mic pre-amps will depend on how loud or quiet the vocal is and what kind of track I'm doing. I mostly use the Focusrite 215, and when I want compression I have quite a lot of choice here. The Innovix is an old compressor from the mid '70s, and there's the Summit, which is fantastic, and a dbx, or the GML. And now of course, there's the Focusrite Voicebox and the rest of the Green range."

artist. I can find the thing that needs to be brought out. And I don't take over, or play everything myself. I don't believe in that. I program things to save people hassle, because I'm a good programmer, but my job is to help people, not to *be* them. My fundamental aim is to help an artist achieve his or her best."

By the end of the '80s, Levine had shifted part of his focus to composing music for film and television. Amongst other projects, he scored movies such as *Mr Frost* (with Jeff Goldblum and Alan Bates) and *Eversmile New Jersey* (with Daniel Day Lewis), and composed the music for 20 episodes of the US TV series *She Wolf Of London*. Filming and production initially took place in the UK, but when it was moved to California halfway through the year-long project, Levine followed, in early 1991. He ended up living there for three years, and came back in late 1993, weary of riots, earthquakes, floods and the other surprises that sunny California had apparently delivered him and his family. On coming back to the UK, Levine found that it was very much a matter of "starting again." Unsurprisingly, with a track record like his, this hardly meant twiddling thumbs and chasing work. Instead, he opted to build once more on the original inspiration of CBS Studio 3. When I spoke to Levine early this autumn, he was working with (or had just worked with), over half a dozen up and coming artists and bands, including Eddie Lloyd, Akira, Darling! and The Emotionals. The only well-known exception was a 'pop' album with The King Singers.

FOCUSRITE GREEN RANGE

In the main body of this article, Steve Levine talks about the necessity of having top-quality analogue equipment before digital equipment. Levine has recently done some recording workshops organised by Focusrite, and one by-product of this collaboration was that he had early access to Focusrite's brand new Green range, consisting of a dual mic preamp, a mic preamp with parametric EQ, and the Green Voicebox (for a review of the latter, see *SOS* November 1996).

Levine:"The Green range comprises very price-conscious products that are intended to make Focusrite technology affordable for home recording studios, post-production facilities and so on. The Voicebox is a one-stop solution for recording: microphone in one end, completed vocal out the other. It's different from the other stuff I have, but it sounds really good and is very good value for money. It would still be phenomenal at twice the price. The EQ mic preamp is fully featured. It's primarily designed for vocals, but it can also handle guitar or bass. The 2-channel microphone preamp is a plain, classic box for getting whatever you're recording as clean to tape as possible."

PHENOMENAL

Levine thus now generally works on projects with smaller budgets, and his small but top-quality home studio is the ideal tool. Perhaps it's time to examine the gear that's packed into Levine's tiny room. Levine: "I've built this selection of equipment up over many years. I've refined it to exactly what I want. My synth collection had grown to enormous proportions at one stage and has now shrunk back to the things I decided I really need. Technology moving on helps: I used to have three Akai S-series samplers, and now just one Emu EIV with 128Mb ▶

▶ of RAM and a 1Gig Jaz drive does the same job. The Emu is a brilliant machine with great filters. Many people don't program or process their sounds any more these days, through inexperience or laziness. It does take some patience, but I think it's very satisfying when you make a great, new, fresh, sound. The other day I created a pad sound that sounded vaguely like an evolving Wavestation patch, a looped and filtered 15-second sample of a river and a nondescript breathy flute-like sound from an old CD-ROM. It was a fantastic surreal pad sound. So it does pay to experiment." Levine is known for having a large sample library, and he's even made some sample CDs.

"The O2R is one of the best things I ever bought, and I can't describe how happy I am with it."

Steve's O2R digital mixer.

The master keyboard in use in Levine's studio is a Yamaha KX88, and other sound sources include Roland U220 and D550 synth mdoules, Roland R8M drum module, Ensoniq ESQ1M synth module, Korg Wavestation AD and Yamaha TX802 synths. Right next to them is an Atari Mega 4 with hard drive. Levine: "In all honesty, I can do everything on the Atari that my Mac with *Notator Logic* software upstairs can do. I have the Atari in my studio because the majority of people I'm working with use an Atari, and it's absolutely fine for sequencing and synth editing. Unless you want to do hard disk recording there's no point in getting rid of your Atari. My hard disk recorder and editor is still the Akai DD1000, because of the instantly-removable cartridges. I record all my audio onto my ADATs and then use the DD1000 for editing real drums or guitars and cleaning up things, or making vocal comps."

The two centrepieces of Levine's studio are the Yamaha 02R digital desk and his four ADAT machines with BRC (Big Remote Control). The small size of the desk is in itself a breakthrough, for it means that he can have a top-quality desk in his tiny room to mix on. Before the Yamaha, Levine had a Mackie 3204 desk, which was only used for monitoring, but not for recording, let alone mixing. Levine says about the Yamaha: "It's fantastic. I don't mind the 'page' system, because in practical terms you only use very few. Having a meter bridge does help, though — it means that you can look at two things at the same time. This desk is one of the best things I ever bought, and I can't describe how happy I am with it. It may not be perfect, but for the money it's amazing. You're looking at a man who once spent £220,000 on two Sony 3324 24-tracks, plus £28,000 on a DDA desk with £20,000 Optifile automation. All great gear, but the Yamaha costs only £10,000 fully loaded, it sounds great, and I can do top-quality mixes with it. It's connected to my ADATs with fibre-optic cables, which results in a phenomenal S/N ratio."

SOLUTION

And so onto the ADAT machines. Levine is aware of the recent discussions, with some people saying that ADAT is not an entirely reliable format (see, for example, the interiew with David Lord in *SOS* November 1996), but he reckons that they're as reliable as any other professional format, "as long as you service them properly. I have them routinely serviced before and after every project, and given a full tweak every 500 hours. Looked after like that, they haven't given me any more trouble than my Sony 3324 did. So whilst they're not trouble-free, in the real world they're a lot less trouble than hard disk computer recorders, which seem to crash all the

LEVINE & REPRO

Alarmed by the impression that the quality of finished records is going down, because there is insufficient emphasis these days on giving trainees hands-on recording experience in major studios, Levine has been part of recent moves by RePro, the producers' organisation, to create a new platform through which the know-how of the older generation can be passed on. Levine: "We've lost the mechanisms to train people in the real world, rather than at colleges. Most studios can't afford to employ people any more to go through the old apprenticeship of tea boy — or tea girl, we need more women in engineering — assistant engineer, engineer, producer.

"Repro is trying to address this problem and is considering dropping its membership fee dramatically to encourage as many young people as possible to join. The idea is to create a community where everybody is helping each other, so that if, for example, a young engineer needs to mic up a drum kit in a session and has never done so before, he can call somebody and get support and information. We're also trying to launch the idea with record companies that they should re-introduce production teams, and/or an executive producer, so that younger and older engineers and producers can work together more. Now record companies have a tendency to hire more and more inexperienced people, who then make a mess of something and then someone more experienced has to come in and do a rescue operation, and those kind of situations aren't good for anybody."

RePro is currently also engaged in looking after the rights of producers and engineers in the brave new digital world, in which mechanical copyrights will become less and less important as music is spread more and more by digital cloning, radio and satellite broadcasts, and the internet. Repro was a founding member of PAMRA (Performing Artists Media Rights Association), set up in 1995 in anticipation of a law that will come into being on December 1st this year. This new law will give performers the right to receive revenue from broadcasts and internet transmission of their music. Producers are expected to receive part of this revenue. Another important and related area is ISRC (International Standard Recording Code), which is a code by which every digital recording can be identified, and which is intended to protect the copyright and performance revenues of performers and producers.

info

T For more information, contact Jackie da Costa of Repro. 0181 876 3411.
F 0181 876 8252.
W http://www.repro.aprs.co.uk

SELECTED EQUIPMENT LIST

• RECORDING/MIXING
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Alesis ADAT digital 8-tracks (x4)
Alesis AI-1 AES/EBU interface
Alesis BRC (Big Remote Control)
Alesis RMB meter bridge
Mackie 3204 mixer and expander
Sony PCM 2500 DAT recorder
Technics SV260 portable DAT recorder
Yamaha 02R digital mixer with four ADAT cards and meter bridge

• COMPUTERS
Atari Mega 4 computer
Atari STacy laptop computer
Macintosh LC475, 20Mb RAM/180HD

• EFFECTS/OUTBOARD
dbx 165A compressor with modifications
Eventide H3000 Ultra-Harmoniser
Focusrite Green dual mic preamp
Focusrite Green preamp/EQ
Focusrite Green Voicebox
Focusrite stereo mic preamp/EQ
GML 8200 parametric EQ
Groove Tubes preamp
Ibanez SDR1000+ reverb
Orban compressor/limiter
Rockman Distortion/Sustainer
Roland GP8 guitar processor
Roland SN550 voice eliminator
Summit Audio TLA tube limiter
tc electronic TC2290 effects
TLA C1 stereo valve compressor
Yamaha REV1 reverb

• MICS
Bruel & Kjaer 4004 mic
Fostex ribbon
Neumann TLM170
Sanken CMS2 stereo
Sanken CU41 mic (x2)
Schoeps BLM 3/CMC-5 (x6)
Shure SM55
Shure SM98 (x4)
Sony ECM S5 stereo

• SYNTHS/SAMPLERS/PERCUSSION
Emu EIV sampler, 128Mb RAM
Ensoniq ESQ1M synth
Korg Wavestation A/D synth
Oberheim Drummer
Oberheim DSX sequencer
Oberheim Strummer
Roland CR78 rhythm machine
Roland D550 LA sound module
Roland R8M percussion module
Roland U220 PCM sound module
Simmons SDS V with MIDI
Yamaha KX88 master keyboard
Yamaha TX802 FM synth module
Yamaha TX816 FM synth module

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Encore Dobro guitar
Ibanez Blazer guitar
Starfield guitars (x2): custom green, humbucker pickups and custom white, stacked single-coil pickups
Stepp DG1 MIDI guitar synth

• MISCELLANEOUS
Apogee AD 1000E D/A converter
Axe 4-way DI box
B&W CM1 nearfield monitors
Denon cassette deck
FM Acoustics 214 line driver
Friendchip SRC2 SMPTE generator
Furman AR230 power conditioner
Furman AR-Pro power conditioner
Jeanius Electronics Russian Dragon
Real World MIDI Matrix (16-in/48-out)
Sony 5030 U-matic video machine
Sony CD 227 ES CD player
Sony magneto-optical drives (x2)
Syquest 44Mb rackmount hard drive

time. I still have the original ADAT machines, because my whole system is digital, so I don't use the A/D or D/A converters. Also, the use of the meter bridge on the remote is essential for me, and I don't necessarily need an increase in rewind speed. Another thing that's great about the ADAT is that I can send my tapes all over the world, for other people to work on, because so many people have one now. And the BRC provides me with a reliable time code and word clock master."

Levine is aware of the recent resurgence of valve and analogue equipment, with people arguing that the digital sampling rate and word length are too low, that digital's frequence response is too limited, and that it just sounds plain bad. Levine has his own view: "I agree with all that these people say. It would be great to have a 24-bit, 400KHz sampling-rate digital medium, but it wouldn't be practical with current technology; plus, in the real world, analogue will hardly ever manage to perform what it is theoretically capable of in laboratory conditions. Most analogue 24-tracks in the world are over 10 years old, and most of them will be well-worn and have worn heads. People travel from studio to studio with their tapes, and these different machines are often not quite compatible. Then there's the problem of tape wear when you use a tape over and over again, and when you bounce on analogue, you play from the sync head, and it sounds crap anyway. The point is that whilst analogue is, in theory, capable of delivering better sound performance than digital, in the real world it hardly ever does. In a normal working environment, digital wins hands down. There are no lining up problems, and even if it plays back with severe error correction, it will still sound better than a badly lined-up analogue recorder.

"My solution is to have top-class, well-serviced digital equipment, have a complete digital signal path, so no converters are used unnecessarily, and to have a top-class analogue front end. If you start with a shitty mic and a shitty mic preamp, and put things through a lousy A/D converter, and record all that at too low a level, that's when people hear things that are not pleasant. I have some of the best microphones that money can buy — Neumann, Sanken, B&K, Schoeps, Shure — plus an extensive collection of mic preamps, including Focusrite, GML, and TLA. I either use the A/D convertors of the Yamaha 02R, which are excellent, or my Apogee converters. My analogy is that using a good analogue front end is a little like shooting a film on 35mm and then transferring it to a video editing system. And I agree that good analogue equipment is a little bit like the film medium, in that it has a kind of masking effects that people like — things become better than reality. But digital has made my job much easier and much more cost-effective. I'll happily put my way of recording against real world-quality analogue and I bet that you'll be really hard-pressed to hear any difference at all." SOS

"Unless you want to do hard disk recording there's no point in getting rid of your Atari."

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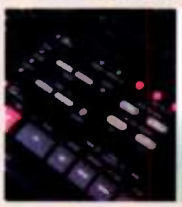

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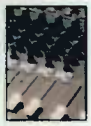

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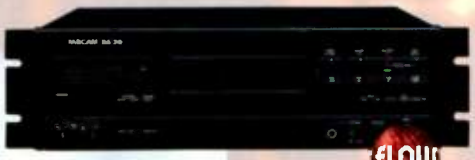

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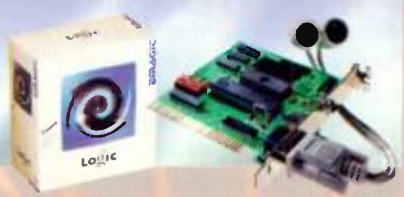

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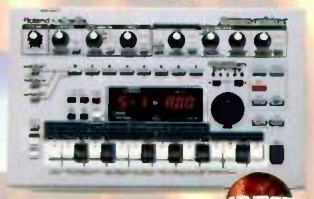

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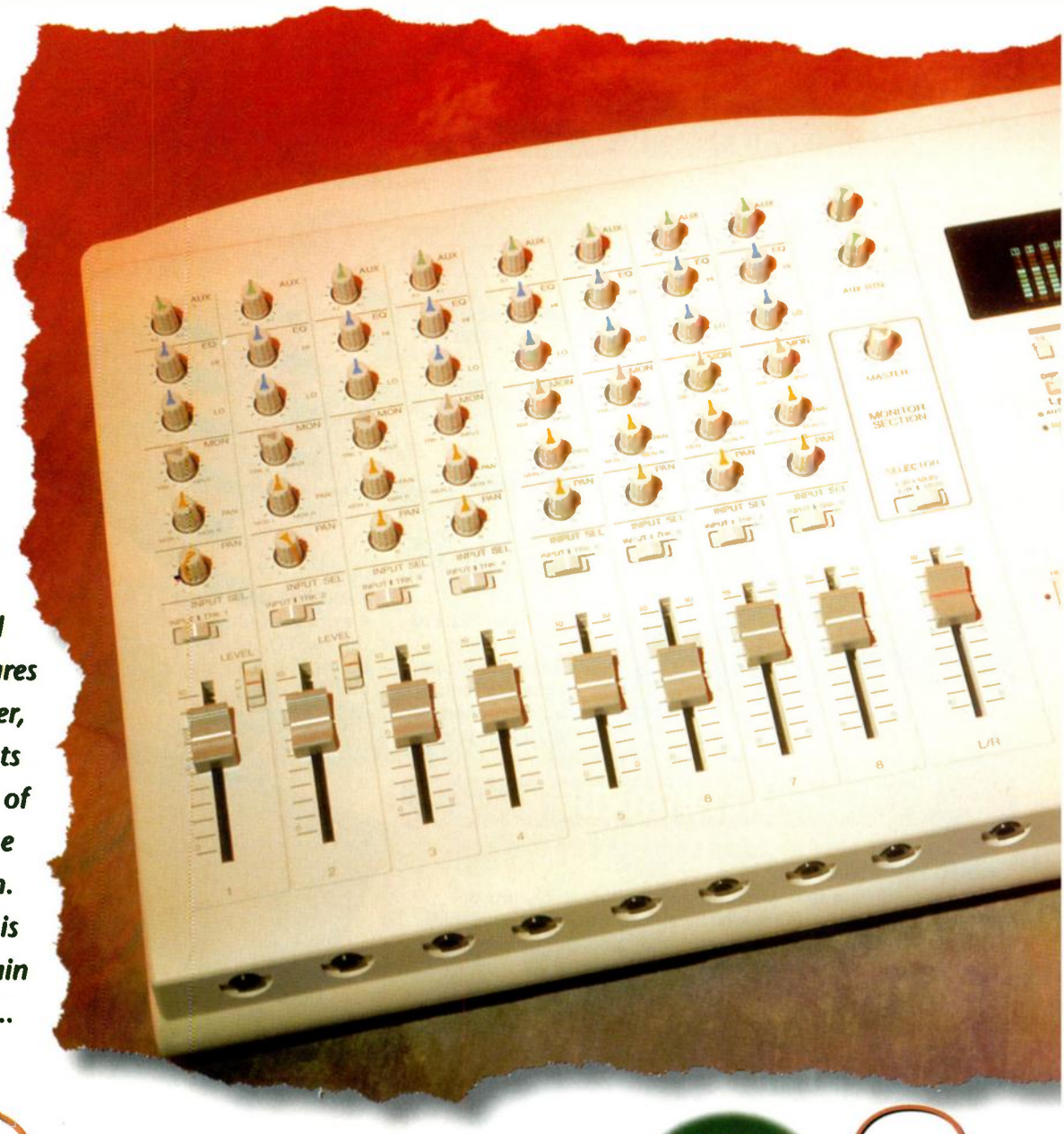
TOTTENHAM COURT RD

The Fostex DMT8 was the first affordable 8-track digital recorder with a simple cassette multitracker-style user interface. Now, there's the new DMT8VL, which costs less and has fewer features than its forerunner, but also boasts a couple of improvements to the original design. PAUL WHITE is determined to remain unconfused...



Super 8?

FOSTEX DMT8VL DIGITAL MULTITRACKER

If the Fostex DMT8VL looks in any way familiar, that's because it's based on the Fostex DMT8 hard disk digital multitracker (reviewed in last December's *SOS*). It seems that whenever an impossibly inexpensive piece of audio equipment appears on the market, a spin-off is destined to follow at an even lower price, and that's exactly what's happened here.

Fostex's DMT8VL is an 8-track, all-in-one 'mixer plus recorder' system in much the same way as a cassette multitracker or Portastudio, but instead of recording to analogue tape, it records to an internal hard disk using non-compressed, 44.1kHz sample rate audio — the same format as professional DAT and CD. A ready-formatted 540Mb EIDE internal drive is included in the price, giving around 12 minutes of recording time. To keep things simple, the recording process is very similar to what you'd expect from tape in so far as the overall recording time isn't doubled if, for example, you decide you only need four tracks.

Though the operation of disk is quite different to that of tape, if you visualise the disk as being eight physical tracks on a piece of 'virtual' tape, 12 minutes long, you won't go too far wrong — Fostex have tried very hard to make the DMT8VL behave and feel like a tape machine. Unlike tape though, hard disk offers the very real advantage of instant access, plus the ability to move or copy data from one part of a song to another. The total recording time may also be split into five Programs, so as to keep your projects separate. Programs

may be individually backed up to, or restored from, DAT via the optical digital I/O ports, taking around 45 minutes. For the benefit of those whose DAT machines have only phono S/PDIF digital I/O connectors, Fostex have the COP1 interface (costing less than £50) which converts co-axial to optical, and vice versa. It's also possible to digitally transfer data to or from any pair of DMT8L tracks.

SPOT THE DIFFERENCE

So far, then, the Fostex DMT8VL doesn't seem too far away from the original DMT8 — so what's the difference, and why is it so much cheaper? In spite of a few minor control button position changes, and the re-siting of sockets on the rear panel, the recording section of the Fostex DMT8VL is virtually identical to that of the original DMT8. The most important difference in the DMT8VL's recording section is that a maximum of only two tracks (as opposed to four on the DMT8) can be routed to the recorder at any one time. You can actually record all eight tracks at once if you like, but they'll all record the same material as tracks 1 and 2! For the musician working on solo projects, this restriction is unlikely to be a serious impediment, as most overdubs are added one or two at a time anyway.

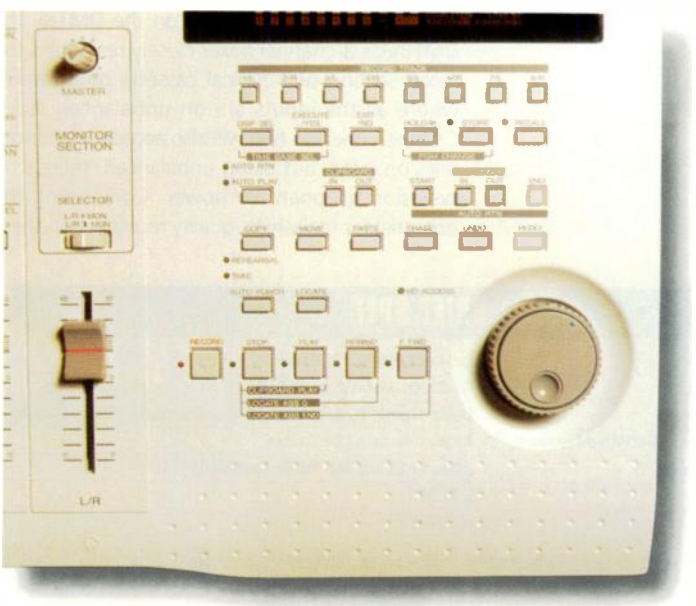
Perhaps more differences are evident in the mixer section; it is noticeably simpler than that on the DMT8, with only two of the eight inputs being capable of accepting microphones. The sweep EQ feature has been replaced by a fixed-frequency, 2-band shelving EQ, but if better mixing features are required while mixing, all eight track outputs are still available on phono connectors, enabling them to be routed to a separate mixer.

A further difference lies concealed behind a blanking panel on the right-hand edge of the machine. The plan is to make various interfaces available for additional drives — for example, a SCSI interface card is planned for early next year. It's also worth pointing out that the internal drive has been remounted so that it can be changed by the user rather than solely by a service technician, as was the case with the original DMT8. Sadly, neither of these useful improvements can be retrofitted to the original DMT8.

Another point to note is that although you can replace the supplied 540Mb drive with one of a larger capacity to provide more recording time, and fit it yourself, the DMT8VL is not supplied driveless; you must buy the unit including the 540Mb drive, then replace it with the size of your choice. This of course leaves you with a spare 540Mb drive, although it's worth talking to your dealer, as they may be able to fit a new drive and take care of the old one for you.

RECORDING CONTROLS

Central to the recording section of the DMT8VL is a large custom plasma display that incorporates the eight track meters, the stereo output meters, the time readout and various other relevant parameters. A 10-digit, 7-segment readout shows the current time position with a choice of ABS (Absolute Time), MTC (MIDI Time Code) or MIDI bars and beats derived from a user-programmable, 64-point tempo map. MTC is available in all the usual formats, and includes an offset capability. Other time-related functions include autolocating, auto return, auto play between two marked points, and auto punch in/out, where a 10ms crossfade is created to eliminate glitching at the punch in/out points. There's also a function to locate the ABS zero time or end time (the last recorded point), and in auto-punch in/out mode, ▶



pros & cons

FOSTEX DMT8VL £999

pros

- Generally very easy to use.
- Excellent sound quality.
- Supremely affordable.
- Separate track output sockets.

cons

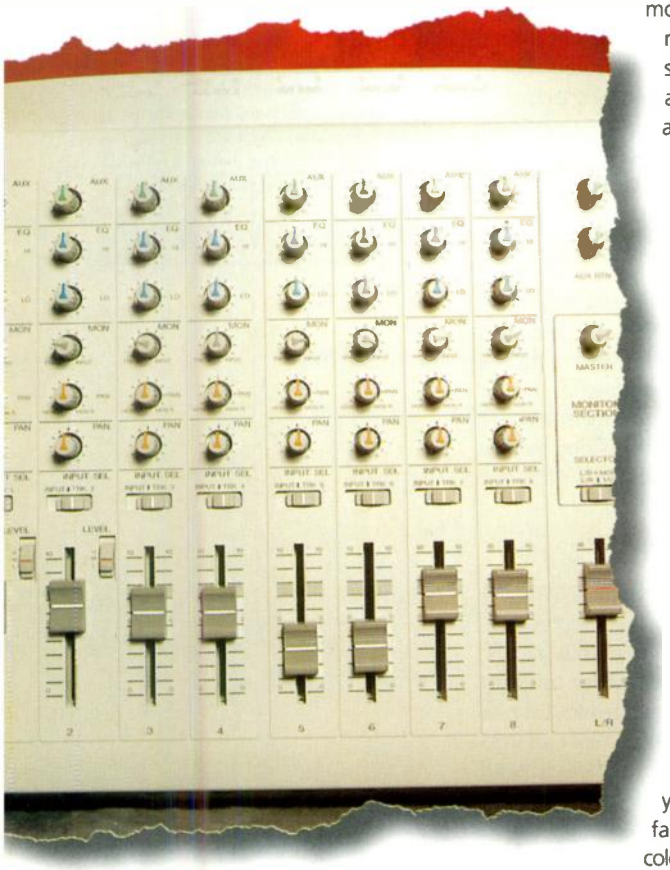
- No phantom-powered mic inputs.
- No insert points on the mic channels.

summary

Even in an age when we tend to take so much for granted, the DMT8VL is extraordinarily good value, and should appeal to musicians who like the cassette multitracker environment, but aspire to the quality and flexibility of digital recording.

SOUND ON SOUND

there's a rehearsal facility similar to those found on a sophisticated cassette multitrackers. A pre-roll value may be entered to give a suitable run up to a punch-in point. Also included unchanged from the DMT8 is the handy jog/shuttle dial, which allows audio cueing at up to 20 times normal play speed. The inner part of the wheel is for moving in fine increments, and repeatedly scrubs over a short section of audio as it's being adjusted. The outer wheel is also used for data editing.



Arming tracks for recording is accomplished using individual 'Record Ready'-type switches beneath the meter display, and no mixer routing is necessary (other than panning to odd or even tracks), as only two tracks can be recorded at a time. Because this section is very similar to that of the DMT8, there's no need to look at it in any more detail at this point; check out the DMT8 review from last December's issue for more detail. Nevertheless, I must say that I think some of the DMT8VL's switches could have been better marked. For example, the Execute/Yes and Exit/No buttons are the same size and colour as all the other buttons, yet you're likely to need them fairly often. A simple change of colour would have made this rather easier. Even the transport buttons are all the same beige colour — at the very least, the Record button should be red, as it was on the original DMT8. Admittedly, it doesn't take long to get used to where things are, but a little thought at the design stage would have made life easier for the new user.

THE MIXER

Fully analogue in design (as on the DMT8), the DMT8VL's 8-channel mixer closely resembles the mixer section of a typical cassette multitracker where all the inputs are on unbalanced jacks. Channels one and two will also accept unbalanced mics on jacks, but being unbalanced, there's no provision for phantom power. Considering the potential for really high-quality recording on these machines, the omission of a proper phantom-powered mic input seems curious, but a good, battery-powered, back-electret mic will work fine where extra sensitivity and top end is needed.

Unlike a stand-alone mixer (and the DMT8), the channels have no input gain trim control as such, though the two mic/line channels do have switchable High/Medium/Low sensitivity. There's just one post-fade effects send auxiliary positioned at the top of each channel, though closer inspection reveals that it is a centre-off control feeding Aux 1 when turned clockwise and Aux 2 when turned anticlockwise. This is followed by the two-band shelving EQ, which operates at 100Hz and 10kHz with +/-15dB of range. There's no EQ bypass switch, but the controls are centre-detented. Two stereo aux returns are provided, though there are no insert points on the mic/line inputs (another saving made in the conversion from the DMT8), so using a compressor while recording is made very difficult.

The Monitor section comprises a centre-off level pot and a pan control; when the Monitor control is moved anticlockwise, it picks up the track signal for monitoring during overdubbing. Moving it clockwise, on the other hand, picks up the channel input jack so that external inputs can be added to the mix when mixing down to stereo. An Input/Track slide switch above the channel fader is used to select the channel source as either the input jack or the correspondingly numbered recorder track. When recording, the source will be set to input, but for mixing, the source will be the recorded track.

The Master strip is so simple you could almost skip over it on your way to the recorder section — there are just two aux return controls, a master level control and a monitor output selector that offer L/R, Monitor or a mix of both. A single fader controls both left and right channels of the main stereo mix, and a headphone outlet is positioned just below the fader, on the front edge of the unit. No aux send level controls are fitted, but as effects units invariably have their own input level controls, this is no great loss.

USING THE DMT8VL

Straightforward recording is no different to its equivalent on an analogue machine — you select a track to record onto, set the recording level while monitoring the to-track level (this monitoring mode is entered by pressing the Record button once), and use the channel Monitor pot to feed some of the Track signal into the phones or studio monitor mix. In rewind, the instant access of the disk is deliberately slowed down a little to create the impression of an incredibly fast-winding tape machine.

Punching in is accomplished by holding down Play and then jabbing Record, and punching out by pushing Play or Stop. Edits made in this way are quite glitch-free, and don't suffer from the gaps, clicks or overlap problems of analogue tape. Auto punch-ins can be set up in much the same way as you would on a cassette multitracker — but unless you're really paranoid, doing the job manually is nearly always faster. Musicians working alone can ▶

BRIEF SPEC

Recording Medium	3.5-inch, 540Mb EIDE drive
Sampling System	44.1kHz, 16-bit linear (A/D: 18-bit, 64 x oversampling, Delta Sigma; D/A: 2-bit, 128 x oversampling Delta Sigma)
Recording time with 540Mb drive	Approximately 12 minutes
Frequency Response	20Hz to 20kHz (no limits specified)
Dynamic Range	192dB
THD	0.008%

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Fostex DMT8VL

- use a standard momentary footswitch to control punch-ins and -outs without interrupting their performance.

Marking a section for copy and paste editing is done using the Clipboard In/Out keys and the Store button, and can be done either 'on the fly, or by using the jog dial to locate the precise point. The system works fine, but for marking sections on the fly, I feel there are too many button pushes required — ideally there should be just one button to store the In point and another to store the Out point. As it is, you have to enter Edit mode, press Store once before hitting In, and once again before hitting Out — and then you have to press Copy to put the data onto the clipboard.

Data may be copied from any track to the same track or to any other track or tracks (using the Record Ready buttons as track selectors), but you have to be careful if the source data and the destination overlap, as the action of pasting will change the original source data. This is quite 'legal', but if the manoeuvre goes wrong, you need to undo it rather than simply erasing the clipboard, otherwise there's no way to get back to your original situation. That's the downside of destructive editing (see the box, left).

Using the digital I/O, data can be recorded onto selected tracks entirely in the digital domain, and using the same digital ports, mixes or track pairs can be transferred to DAT via a digital link rather than from the mixer's analogue outputs. Whether there is any benefit in transferring your mix digitally depends on the quality of the converters in your DAT machine — if the DMT8VL is better, then it's better to come out digitally, but if not, you may be best using the analogue output. Either way, you don't get a true all-digital mix, because the DMT8VL's mixer is analogue. The other purpose of the digital I/O is to archive or restore mixes to and from DAT for backup purposes. This feature does not work with data-compressed media, such as DCC or MiniDisc.

As I'm sure the designers intended, the DMT8VL operates almost exactly like a cassette multitracker, but with the added flexibility offered by cut, copy and paste editing. When it comes to sound quality, the recorded results are superb, and although the mixer isn't very sophisticated, it does have a short enough signal path to keep the signal clean. What's more, you can take all eight track Outs to an external mixer if that suits your needs. No code track is required if you need to sync up a sequencer — you can feed MIDI Clock or MTC direct from the MIDI Out socket to use the DMT8VL as a master, but there's no provision to use the DMT8VL as a slave other than to a DMT8 (provided it is version 2 or later) or a D80 (Fostex's rackmount version of the DMT8, reviewed *SOS* June '96). This means that you can't, for example, sync the DMT8VL to timecode on a video machine. MIDI Machine Control, however, is catered for, which makes for easier integration with a sequencer.

When using MIDI Clock, an internal tempo map must be set up, and up to 64 tempo changes are allowed for, but if you can use MTC, you're not obliged to create a tempo map, unless you want to see the elapsed time readout in bars and beats.

CONCLUSIONS

By any yardstick you choose, the DMT8VL is a lovely piece of home recording kit, and the fact that it isn't bristling with quite so many features as some of its competitors is mitigated by its very straightforward cassette multitracker-style operating system and its relatively low cost. The limited recording time of a little over 12 minutes means that you either have to discipline yourself to getting one project finished before you start another, or resign yourself to backing up to DAT over lunch, but at least the DAT backup option comes as standard — assuming you have a DAT machine.

During the course of this review, I've criticised one or two minor features, such as the long-winded clipboard procedure and the lack of coloured buttons in the recording section, but I make no apology for this, as these are things that could have been sorted out without adding to the cost. Perhaps the only significant technical limitations are the lack of phantom-powered, balanced mic inputs and the lack of insert points on those channels. On the plus side, the operating system seems rock-solid, and the footswitch option makes it ideal for single-user operation.

I haven't really made too much of the price yet, and that's the most staggering thing about this product — an 8-track digital recorder plus mixer for under a grand — it's almost an impulse credit card buy! Of course, the price of the original DMT8 has also fallen to £1199 — so there's now only a couple of hundred pounds between the two machines. Discerning users might feel that the extra cost for the DMT8 is worth it for the ability to record four tracks at once and for the better EQ, but the recording power the DMT8VL package places in your hands for so little money should not be overlooked. Lock up a MIDI sequencer to it and you have a complete recording studio on a tabletop, capable of professional audio quality. SOS

NON-DESTRUCTIVE EDITING — OR *IS* IT?

From reading the manual, it appears that the DMT8VL's Copy, Paste, Move, Cut and Erase functions are non-destructive, but as far as I'm concerned, this is a misuse of the term non-destructive. While it is true that the previous edit can be undone or redone, providing there is sufficient disk space to store the undo file, edits do actually involve moving and changing data. A true non-destructive editing system works by placing sections of recorded material into a playlist, so that they can be played back in any order without changing the original file. With the exception of one stage of undo, edits made using the DMT8VL are permanent, and are carried out by means of a 'clipboard' onto which the data to be edited is effectively copied; data may be played back from the clipboard to confirm you've captured the right thing before you commit yourself to copying, moving or erasing it.

info

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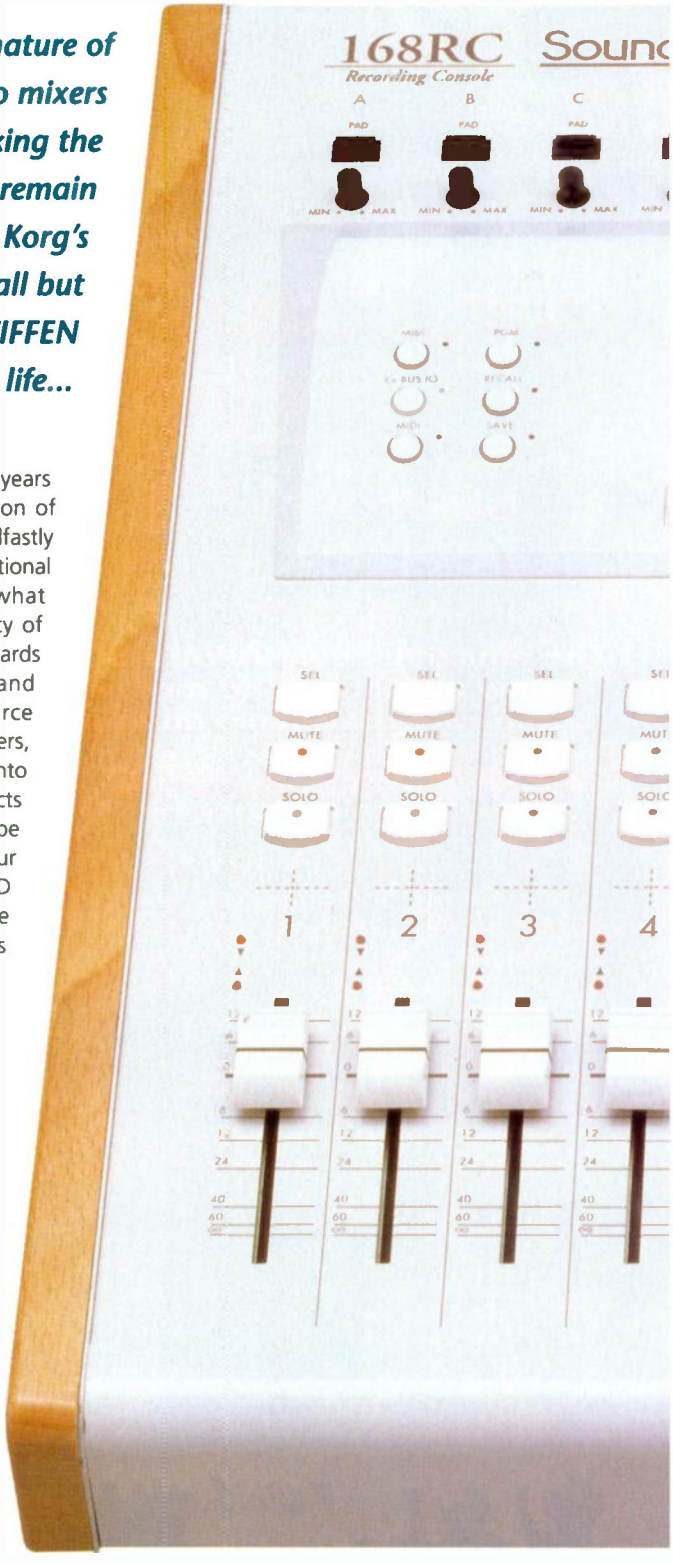
Roland D10	£299	Kawai K1m	£99 & £125
Ensoniq ESQ1	£349	Kawai K4r	£299
Eko P15	£49	Emu Proteus 1	£249
Roland S1109	£199	Emu Proteus 3	£299
Roland SH101	£225	Evolution EVS1	£149
Crumar Trilogy	£299	Peavey SX sampler	£99
Korg DSS1	£399	Casio VZ8m	£149
Roland Saturn SA-09	£99	Oberheim Matrix 1000	£249
Fender Rhodes Stage 73 MKII	£299	Yamaha TX802	£399
Korg M1	£549	Yamaha EMT10	£99
Yamaha DX7	£299	Yamaha TX7	£149
Roland D50	£399	Yamaha FB01	£85
Ensoniq SQ2	£599	Yamaha TG300	£249
Yamaha DX711D	£349	Roland MT32	£99
Yamaha KX88	£699	Alesis MMT8 (8 Track sequencer)	£149
Roland A80	£699	Casio SZ1 (4 Track sequencer	£85
Roland Juno 6	£199	Roland MT100	£149
Casio VZ1	£325	Roland R8m + Card	£349
Roland D5	£249	Hammond DPM48	£149
YamahaCS60	£499	Alesis HR16	£149
Yamaha CS70m	£549		

WRH

The Missing Link

KORG SOUNDLINK DRS 1.68RC AUTOMATED DIGITAL RECORDING CONSOLE

Though digital technology has transformed the nature of synths, effects, and even multitracks, project studio mixers have largely remained steadfastly analogue, breaking the chain which, if complete, would allow your music to remain in the digital domain from sequencer to master. Korg's 168RC forms the heart of a system designed to all but eliminate the analogue signal path, and PAUL WIFFEN wonders where it's been all his life...



It's about time. For the last 10 years I've been assembling a collection of digital audio gear which I steadfastly refuse to put through a conventional mixing desk, simply because I hate what happens to the clarity and transparency of digital audio once you start going backwards and forwards between the digital and analogue domains. You know — source sounds sampled into high quality-samplers, then turned back into analogue to go into the mixer, then re-digitised into an effects unit, then back to analogue for the tape return, then back into digital to for your final mix to DAT... However good the A/D and D/A converters on each item in the chain, I hate the 'blurriness' which creeps in after several conversions. The situation has become worse since everyone started to use PCM-based synths, because everything has been digitised once before you even start.

So instead of recording through a conventional mixing desk, I've spent the last 10 years moving audio around, in the digital domain, between samplers, hard disk recorders and effects units, without the flexibility of mixing multiple channels of audio in real time. Obviously, the amount of real-time mixing and effects processing possible within software has increased phenomenally over that time, from off-line EQ and normalising of stereo in the original *Sound Designer*, to the automated eight channels of 3-band parametric EQ I currently enjoy in

pros & cons

KORG 168RC £2495

pros

- Full MIDI automation of all digital parameters, plus Program-based recall of snapshots.
- 16 digital inputs as standard — more than any other mixer on the market.
- Eight high-quality (18-bit) balanced analogue inputs with insert loops and phantom power (on 1 and 2 only).
- 16 digital outputs, ideal for cascading 168RCs or using the mixer as an 8-input device for Falcon, or Korg PCI card.
- Two high-quality effects processors.
- S/PDIF output for direct-to-DAT mixdown.

cons

- Faders not motorised.
- No S/PDIF input.
- No EQ or faders on channels 13-16.

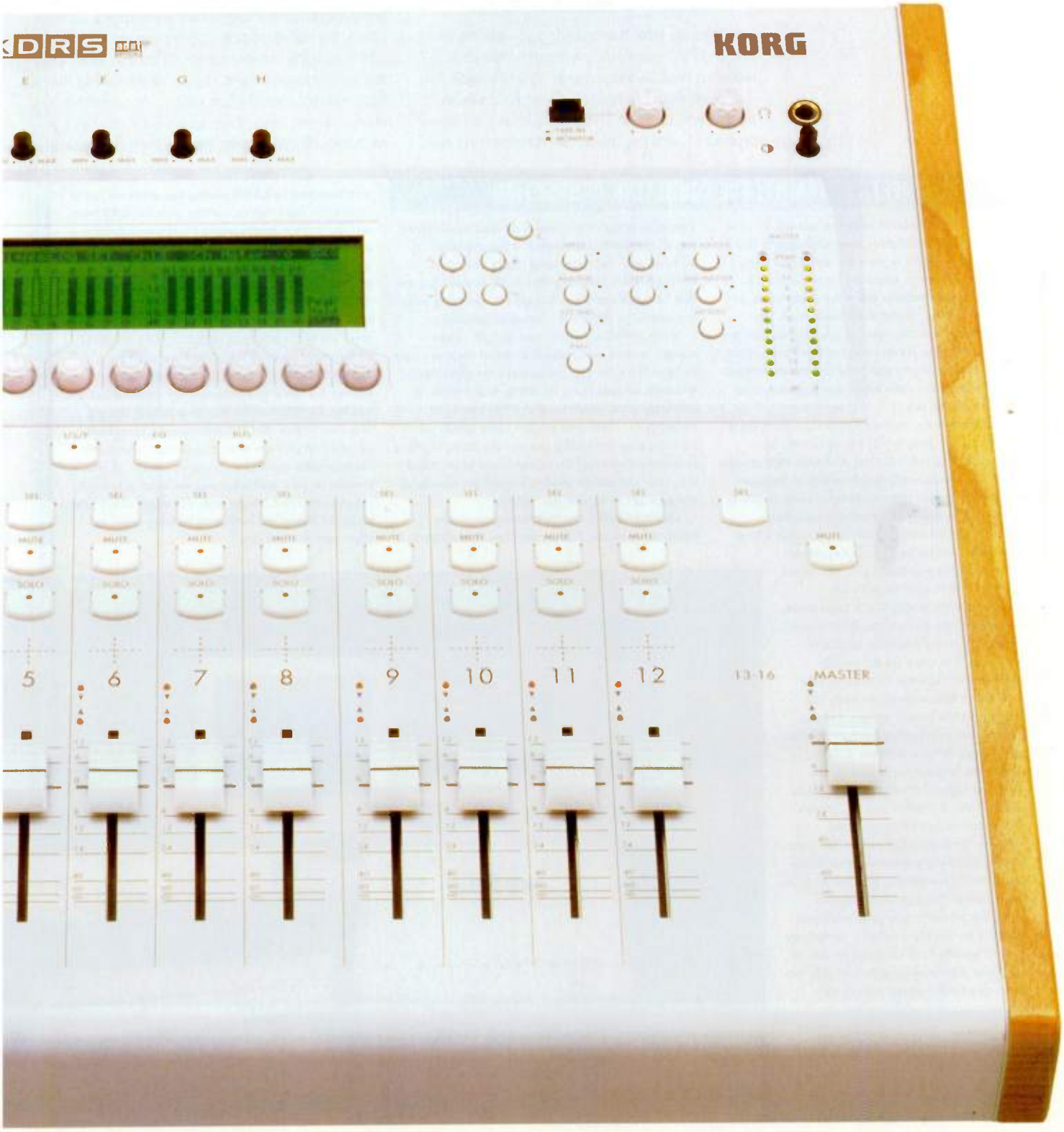
summary

At last, a digital mixer with digital inputs as standard at an affordable price. Perfect for anyone with ADATs or a hard disk recorder with ADAT I/O, especially as it could save you a fortune on 8-input/8-output expansion boxes. Could get a bit expensive if you need more analogue inputs, in which case you'll need to add the cost of at least one 880AD. But for the user who is already working in the digital domain, this is the only choice under £7000.

SOUND ON SOUND

Cubase Audio on the Falcon. But, as I found earlier this year, when a friend let me mix down one of my *Cubase Audio* recordings on his Yamaha 02R via the ADAT-format optical interface, there really is no substitute for a proper hardware mixer, especially when the mixer has the quality of effects and automation that the 02R has. The only thing standing between me and the mixer of my dreams was that little thing called money. Of course, if your music is your livelihood, the 02R is a very sound investment, but unfortunately, I've never been quite able to get the knack of making money out of my musical efforts. In Germany, there are several companies modifying ProMix 01s (more in my price range, and an excellent mixer apart from its lamentable lack of digital I/O) for S/PDIF, AES/EBU and ADAT input/output, and I was able to use one of these for some Frankfurt Musikmesse Falcon demos I did. I seriously looked at the possibility of bringing one of these back to the UK, but the warranty and service issues become so complicated when you export units from one country to another that I had to give it a miss.

So imagine my joy when I discovered that Korg were planning the mixer I had dreamt of: an automated (with snapshots or MIDI-controlled ▶



automation) digital mixer/effects package that not only had the capability for multi-channel digital I/O, but came with the ADAT interface as standard, not an optional extra! (The problem with optional extras is that they often take a product within your budget outside of your budget.) Of course, I wanted some analogue inputs on this mixer — microphones and analogue synths can't be interfaced digitally — but what interested me was not one, but two ADAT inputs, *and* two ADAT outputs.

ADAT I/O WITHOUT ADAT?

I can already hear many among you asking what use an ADAT interface is without an Alesis ADAT recorder. Well, as much use as S/PDIF (Sony/Philips Digital InterFace) without a Sony or Philips product. Just as you can use S/PDIF to connect a Roland product to a Fostex, so you can connect a Kurzweil synth or an Emu sampler to a Yamaha mixer using the ADAT interface. More and more companies are using the ADAT interface for multi-channel digital interfacing, and there is absolutely no reason why there has to be an ADAT in the setup (unless you want to record to it, that is).

"But", I hear you cry, "why use the ADAT interface instead of S/PDIF or AES/EBU?" The answer to that, my friends, lies in the term 'multi-channel'. Unlike AES/EBU, which sends stereo down XLR-terminated cable, the ADAT interface sends eight independent channels of digital audio down the same optical connection with which S/PDIF can only achieve stereo. Of course, much of the time you only need stereo, when taking the final mix to your DAT machine, or sampling a stereo drum loop, but when you connect a multitrack digital recorder (tape or hard-disk based)

MEET THE FAMILY: THE SOUNDLINK CONNECTION

Undaunted by the patchy reception accorded to the original Soundlink, a rather novel approach to the combination of MIDI sequencing and digital audio, Korg have chosen to adopt the same name for a whole family of products which are designed as a unified system for digital audio production. The 168RC Mixer is at the heart of this system, with the ADAT interface as its arteries, but there are several other products which need to be at least mentioned to put some of the more innovative features of the 168RC into context.

The brain of the Soundlink system is designed to be a computer (Mac or PC) equipped with the Soundlink 1212 I/O PCI card. While the CPU of most of today's computers (a fast PowerPC or Pentium chip) can generate large numbers of audio tracks by raw power, meaning that hard disk recording products can be software only (like *Cubase VST* or *SAW*), the Achilles heel of such systems is the analogue and digital I/O. The sound quality of the PowerPCs (with the exception of the 9500) is still targeted at multimedia applications (Apple's famous statement, to the American magazine *Keyboard*, that there are not enough musicians in the world for them to take their needs into account obviously still stands). At the time of writing, the only way you can improve the quality of *VST* on current PowerPCs is with the £700 Digidesign Audiomedia III card, which gives you high-quality stereo analogue in and out, plus S/PDIF in and out; there's no way to add further ins and outs. However, for around £350 more, the Korg 1212 I/O (£949) has the same analogue and S/PDIF connectivity, plus the ADAT in and out (with Word Clock in and out) giving you an easy route to an additional eight inputs and eight outputs, something the Audiomedia card will never be able to do. These eight analogue ins and outs can be via the 168RC mixer, exactly as described in the main review with the Falcon, giving you all the additional benefits of the phantom-powered mic- and guitar-level inputs as well as normal line-level ins, all with EQ. My sources tell me that both Steinberg and Emagic are beavering away to support the 1212 I/O as soon as possible.

If the 168RC is outside your budget, or you already have an analogue mixer which you can't bear to be parted from, you can achieve the eight inputs and eight outputs using the 880A/D and 880D/A converter units, which retail at £799 and £699 respectively. These give you the same quality 18-bit conversion as the 168RC and use the ADAT interface to transfer their eight ins or eight outs to the 1212 I/O. They can also be used to expand the number of analogue ins or outs on the 168RC.

Like the 168RC, the first two inputs on the 880A/D are on mic XLR connections. The 880A/D also functions as a 16:8 routing box, allowing you to switch the eight signals coming in on its ADAT input and the eight analogue inputs to different channel numbers. This helps a lot when you have combinations of analogue and digital ins entering the 880A/D, both needing to be routed to the mixer (or 1212 I/O card). Similarly, the 880D/A acts as an 8:16 router, for routing the incoming eight digital channels to the analogue outputs and/or the ADAT digital channels to digital effects, for example.

The final two components of the Soundlink system are the RMA240 Reference Amplifier (£699) and the RM8 Reference Monitors (£399). Korg's literature states that these have been specifically designed to give the most transparent sound with the Soundlink system, avoiding coloration so that you can be sure that what you are hearing is what you are recording. These were not supplied with the mixer for review, so I will have to leave them to other ears to evaluate.

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to your mixer in the digital domain, wouldn't it be great if you didn't need half a dozen cables and connectors to do it?

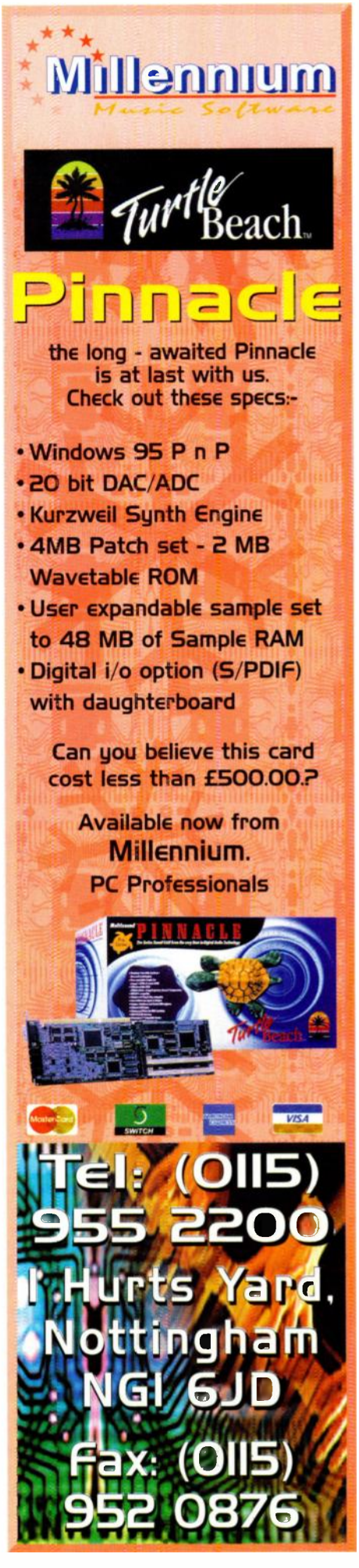
This is exactly what the ADAT interface gives you. Eight channels of audio down one filament of optical cable — unbelievable when you first think about it, maybe, but then "any sufficiently advanced technology is indistinguishable from magic", as Arthur C. Clarke put it. The first time you get eight channels from your digital audio recorder independently EQ'd and mixed on the separate channels on the desk in front of you, when they're only connected by a single insignificant optical filament, it's a pretty spooky feeling. Of course, we've been sending 16 channels of MIDI down a single MIDI cable for years but that's a lot less information than eight channels of 44.1kHz 16-bit words.

"For me, the ADAT optical link is the most exciting interface since MIDI, and I think it will revolutionise the way audio is moved around studios in the very near future..."

Once you've got your head round the concept, you'll realise how incredibly useful this is going to be. Not only can you get shot of all that spaghetti from the back of your gear (analogue looms start to look like antiques), you can also stop worrying about earth hums and buzzes (optical cables isolate equipment electrically, eliminating the differences in potential between units which cause earth loops, and which occasionally blow gear up and kill people). Once you have a surfeit of digital connections on a mixer instead of a dearth of them (and digital outputs as well as inputs), you can start using them as effects send/returns and inserts, as well as straight inputs and outputs.

For me, the ADAT optical link is the most exciting interface since MIDI, and I think it will revolutionise the way audio is moved around studios in the very near future, especially home and project studios based on digital recording. I'm pleased to see Korg making it the audio interfacing standard for all their digital products (see sidebar on the Soundlink family) and I hope that other manufacturers will follow this lead. There are already signs of this happening, with Akai, C-Lab, Digidesign, Emu, Kurzweil, Roland and Yamaha all shipping ADAT interface options for various digital audio products, but I can't wait for the day when this interface is fitted as standard rather than an option (remember the days of MIDI upgrades?).

The 168RC has two optical inputs and two optical outputs, giving a total of 16 channels of digital input and 16 channels of digital output. The 16 digital inputs (together with the eight analogue inputs) can be freely routed to the 16 channels (ie. they're not hard wired 1-1, 2-2, 3-3, and so on) and to the aux returns. The first set of eight digital channels (the first ADAT Out), is used to output the eight busses the mixer features (which allows multiple 168RCs to be cascaded). The second set is freely assignable for channel outs and aux sends. Korg's engineers haven't forgotten S/PDIF completely, though; the main stereo output of the desk is also available on a co-axial S/PDIF connector, so you can mix digitally direct to DAT (as there aren't many DAT players out there yet with ADAT inputs).



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"...for those using computers for hard disk recording, the eight analogue inputs of the 168RC can be used for digital audio devices which don't have their own multiple inputs."

ANALOGUE INPUTS: WHY SO FEW?

Conventional mixer users may be shocked to learn that the 168RC only has eight analogue inputs (complete with inserts). This might seem like a bit of a shortcoming, and certainly, if you only have analogue gear to record, this makes the 168RC on its own a little limiting. However, if you read the sidebar on the new Soundlink family, it will become clear how you can expand the 168RC to be a 24 analogue input desk using two 880A/D racks.

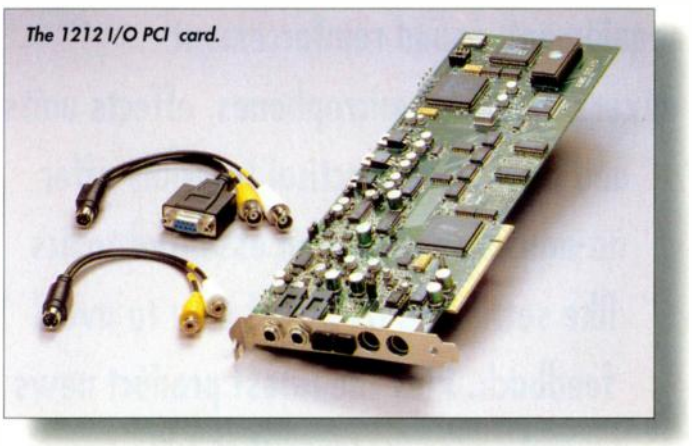
The reason for keeping the number of analogue inputs down is a simple one: cost. These days, the most expensive section of any digital device is the Analogue-to-Digital Converters (A/Ds). Each analogue input requires its own A/D converter. So by restricting the number supplied as standard, Korg have been able to keep the starting price of the 168RC below £2500. If you need 16 analogue inputs, it will cost you £3294 including VAT (24 will set you back £4093). Of course, because of the digital interfacing, if you have other equipment with high quality A/Ds, you may well be able to use these and save yourself some money. If you own an ADAT XT, for example, you already have eight 18-bit A/Ds which you can use to supplement the eight on the 168RC. Of course, this sharing approach works the other way too. For example, you might use the 168RC's converters to improve on the quality you can record to tape with the original ADAT recorder, by using the second ADAT output to route the eight analogue inputs of the 168RC to the ADAT's digital input. Suddenly, this digital interfacing starts to make real economic sense, allowing us to share expensive A/D converters and upgrade the quality of our recordings without making old gear redundant.

More interestingly for those using computers for hard disk recording, the eight analogue inputs of the 168RC can be used for digital audio devices which don't have their own multiple inputs. I used this facility to great effect by routing the 168RC's eight inputs to the ADAT input of my Falcon MK X, and was able to record eight tracks simultaneously for the first time, using the new *ADATREC* utility, which comes free with version 2.06 of Steinberg's *Cubase Audio* for the Falcon. In fact, the 168RC makes the perfect production partner for the Falcon with an ADAT interface, as the only connections you need to achieve eight ins and eight outs are two optical cables between the two units. When recording, the 168RC's inputs become the Falcon's inputs and when mixing down, the eight channels of the Falcon appear on eight separate channels of the 168RC, all in the digital domain.

There are many other applications where the 168RC can save you money. Instead of having to buy a box like Digidesign's 882 or 888 with Session 8 or Pro Tools, to add eight channels of high-quality I/O to a Macintosh running your favourite audio/MIDI software, you can combine the extra functionality of the 168RC mixer with the Korg 1212 I/O PCI card, and obtain more EQ and effects for less money (see the sidebar on the Soundlink family of products). This applies to any system which can integrate an ADAT interface into its digital I/O. More and more ADAT interfaces are being announced every day, so check with your manufacturer for availability on your digital audio recorder.

In case this talk of economy has worried the purists out there, there is no cause for alarm. The A/Ds used on the 168RC show no sign of cost-cutting in their spec or quality, only in their number. The 18-bit converters sound as sweet as any I've heard, with a transparency which differentiates them from their 16-bit counterparts.

However, quality conversion is not all you need from a digital mixer. Mixers need to be able to cope with a variety of input types and levels. Inputs A, B, C and D on the 168RC are designed to cope with mic or line level, thanks to the provision of 20dB pad switches. Inputs A and B are provided with balanced XLR connectors and a common 48V phantom power switch. Inputs C and D are on standard jack sockets, making them ideal for connecting low output-level instruments like guitars and basses. However, they are still balanced stereo connectors, in case you want to connect a balanced source, though an unbalanced signal can also be input on a mono jack. These first four inputs are provided with insert jacks too (a stereo socket with the conventional ring/tip setup), allowing the signal to be routed through an external analogue effect before it is digitised. This is one of the most vital provisions on a digital mixer, and is far more important than on its analogue counterpart, for the following reason.


The 1212 I/O PCI card.

While it may be desirable, on an analogue mixer, to patch vocals, guitars and other signals with highly variable levels through a compressor, with a digital mixer it's absolutely vital to do this before the signal is passed through the converters. The reason for this lies in the nature of the digitising process. To achieve the optimal performance of any given converter, the signal must be supplied at 0dB. For every 6dB the signal drops below this, one bit of resolution is lost. So if a vocal phrase enters the converter at -30dB,

EFFECTIVE MIXING

One of the problems when reviewing digital synths and mixers with built-in effects is that often the effects would merit a complete review on their own, and this is particularly true of the two effects processors on the 168RC. Space limitations preclude this (especially since I've just used the word count on my WP and found that I'm already over the requested number of words...), but those who are familiar with the effects on the Korg Trinity will have some idea of the quality and flexibility available. The DSP processors used on the 168RC are the same as the main ones in Korg's flagship synthesizer (reviewed December and January 1996 in *SOS*). Some of the algorithms have been developed and adapted for the different requirements of general mixing, and this makes the effects even more flexible and interesting. Reverb algorithms with names like 'Gymnasium' and 'Cave' will be of particular interest to those in search of the ultimate drum sound (I had a whale of a time with these) and I found the modulation effects very flexible and enriching. All the effects are of equally high quality and the fact that they are plumbed in digitally makes sure that the signal quality remains optimal. Don't forget that if you need extra effects these can be plumbed in digitally as well (an Alesis Quadraverb 2, for example).

EFFECTS LIST

- *Small Hall 1&2*
- *Medium Hall 1&2*
- *Large Hall*
- *Small Room*
- *Medium Room 1&2*
- *Large Room 1&2*
- *Small Dry Plate*
- *Medium Wet Plate*
- *Medium Dry Plate*
- *Large Wet Plate*
- *Large Dry Plate*
- *Short Sharp ER*
- *Short Modulated ER*
- *Short Reversed ER*
- *Medium Modulated ER*
- *Medium Reversed ER*
- *Gymnasium*
- *Church*
- *Concert Hall*
- *Stadium*
- *Cave*
- *Canyon Wet*
- *Machine Talk*
- *Short left/centre/right Delay*
- *Long left/centre/right Delay*
- *Short & Long Mono Delay*
- *Modulated Delay*
- *Light, Medium & Heavy Chorus*
- *Bi-phase Modulation*
- *Light & Heavy Flange*
- *Phaser*
- *Ensemble*
- *Tremolo*
- *Auto Pan*
- *Fast & Slow Rotary Speaker*
- *Overdrive with Amp Simulation*
- *Pitch Shift*
- *Graphic EQ*
- *Enhancer*
- *Limiter with Exciter*
- *Gate with Limiter*

the quality of the conversion will drop from 18 to 13 bits. Don't make the mistake of thinking that this is something which can be fixed later, using a digital compression or 'normalisation' algorithm. Once a signal has been digitised, the signal-to-noise ratio is set in stone. So normalising a signal recorded at -30dB in a system with a measured ratio of 90dB will bring the noise floor up to -60dB when you boost the signal to 0dB. The only way to avoid this problem is to compress the signal in the analogue domain before you digitise it. The 168RC makes this possible with its pre-converter insert loop on the first four channels.

Inputs E, F, G and H don't have the 20dB pad or insert loop, but they do have the balanced stereo jack socket and, like the first four inputs, they also have trim controls, allowing the input level to the converters to be optimised. Like the settings of the pads and the phantom powering, these trim controls are not memorised in the 168RC's automation 'Programs' (more on these shortly). In fact, none of the controls mentioned so far are, but this is how it should be. These controls should always be 'live' for instant adjustment. The last thing you want is a setting of phantom power or a pad changed by a snapshot being recalled.

WOT, NO S/PDIF IN?

Strictly speaking, it's inaccurate to say that the 168RC only has eight analogue inputs, because there's also a stereo input on coaxial connectors for Tape In. However, I didn't mention this at the same time as the other inputs as it is hard-wired to the analogue monitoring circuitry, and cannot therefore be routed through any of the digital mixer channels. It can only be used for monitoring a stereo tape machine back through the desk, presumably for checking your recording after having mixed down to DAT in the digital domain (at least, I hope you'll want to keep the final mix all-digital — otherwise what would you be doing with a desk like the 168RC?).

Of course, if you're only using this Tape In to check back mixes and the like, it doesn't matter that it is analogue, and it certainly saves you listening to your mix through an extra A/D-D/A conversion (as you have to do on a certain all-digital desk I could mention), but this does highlight what I consider to be the most serious omission on the 168RC: the lack of S/PDIF input. It will be some time before everyone has routing boxes to convert multiple S/PDIFs to ADAT interface format, so you might well have to run a source DAT or CD signal into the mixer in analogue form (thereby defeating what I take to be the point of the 168RC's other generous digital connectivity). Similarly, there is no way to connect the S/PDIF output of a synth or other sound source, to allow it to be mixed in through digital.

I got around this by using the Falcon's ▶

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that you can automate it using snapshots or external control). Once assigned, you have pan, level and on/off control of each of the eight groups — and don't forget that these are available on ADAT output A for sending directly to a digital recorder. If you need analogue outs for these, you'd simply put an 880 D/A on this ADAT output.

MIDI AUTOMATION VS SNAPSHOTS

A hundred internal snapshot memories, for snapshot-type automation, are available within the 168RC, but the desk can also send all parameter changes out over MIDI, for automation via a MIDI sequencer. You can choose whether the automation uses continuous controllers or SysEx, depending on what works to the best advantage for your software and the number of MIDI ports you have available. I found continuous controllers best, as this data can be displayed and edited graphically by most sequencers. The on-board Programs (Korg's term for snapshots, static pictures of the desk status at a given time) allow you to re-configure the mixer completely for specific applications — routings, effects and all — but they can also be used to make smaller changes to levels and settings in mid-mixdown, via MIDI program changes embedded in a sequence. This is obviously ideal for complete scene changes, but for less radical alterations, especially those which don't need to be instantaneous, using MIDI SysEx or Continuous Controllers for automation gives much better results. If you were using the 168RC for live shows, 100 Programs would not last you for a full set, unless you used MIDI to make the necessary small alterations in level and EQ, and saved the Program (snapshot) changes for when you need to alter many parameters simultaneously — if you used SysEx or Continuous Controllers in this latter situation, they might clog up your MIDI stream anyway.

"Of all the automated mixdown systems I have ever used, the 168RC offers the simplest and most glitch-free operation..."

I found that using *Cubase* (though other sequencer programs will obviously work too) to automate EQ settings was great fun, and allowed me to obtain the sort of effects on a synth bassline which you would normally have to create with a synth filter as you were recording it. People doing dance music are going to love this automated EQ facility as, unlike synth resonance, you can put it on anything — vocals, drums, whatever you're mixing down — and on 12 channels at once. One word of caution, though. During very fast sweeps and resonance boosts, a certain amount of stepping could be heard, so the most radical effects need to be moderated a little to maintain the smoothness of operation you'd get from analogue EQ. However, this is more than compensated for by the automation facility and the ability to edit after the event, using your sequencer's functions. I soon found myself trying things that would be impossible without *Cubase*'s tools for editing continuous controllers.

SUMMING IN DIGITAL

Although Korg were not able to supply the full manual with the review 168RC, I found the preliminary documentation covered the rare thing I couldn't work out from first principles. Overall, the 168RC is a breeze to use, and most parameters can be accessed from several different screens (ie. as part of one channel's parameters, or as part of the global display of one parameter for all channels).

In conjunction with Korg's forthcoming 1212 I/O PCI card for the Mac and PC, the 168RC would make a killer digital recording studio using the bundled *Deck 2.5* software, but the real interest in the combination of 168RC and 1212 I/O will come when companies like Steinberg and Emagic support the Korg PCI card from within their software. Once you have the ADAT I/O on that card, the 168RC is the only way to go for mixing. The 12 inputs and outputs match up perfectly with the 12 faders on the 168RC, and you can use the remaining four faderless and EQ-less channels as two external stereo aux returns.

It goes without saying that a mixer with eight busses and such generous ADAT I/O provision has to be a natural choice for recording and mixing with ADATs. If you have two ADATs, or an ADAT and an 8-track hard disk recorder with ADAT I/O, this is the only game in town. The people who will be most disappointed in the 168RC are those who compare it with the Yamaha ProMix 01. It is a totally different beast. The 168RC is an 8-buss mixer designed for integration into a digital system. It is not a 2-buss mixer with motorised faders and the ability to take 16 analogue inputs as supplied. If that's what you need, buy a ProMix 01. If you want the features of the 168RC, particularly in conjunction with digital sources, and you need 16 analogue inputs as well, you'll need to budget for an 880 A/D.

This mixer breaks so much new ground that it is easy to forgive its few omissions; my only real criticism is the lack of an S/PDIF input — it would have been nice to be able to plug a DAT, CD or S/PDIF-equipped synth in directly. I think in 1996 all mixers should have more digital inputs than analogue; one day all mixers will, and it's nice to see a new company to mixing being first to reach this important milestone. Of all the automated mixdown systems I have ever used, the 168RC offers the simplest and most glitch-free operation, and the three Falcon mixes I did while I had the desk are amongst the cleanest and sweetest I ever managed without the help of a qualified engineer. This really is the mixer I have been waiting for all these years. SOS

FADE IN FULL

Though the 168RC is an automated desk, its faders are not motorised, so they won't perform the spooky fader movements of the Yamaha ProMix 01 or 02R. However, Korg do use a clever system for showing you the position the fader would be in a recalled Program (snapshot). When you first move the fader, it doesn't change the level, but one of two small LEDs (with up and down arrows) lights to show you whether you are above or below the preset level. Once you move the fader to the preset level, both these LEDs go out and the fader becomes 'live'. While this is obviously not as good as faders which move automatically to the preset positions, it does at least mean that levels won't suddenly jump dramatically when you touch a fader. If the fader is not currently functioning (on a paired channel, for example), both LEDs light to show that it's currently inactive.

info

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EFFECTIVE MIXING

One of the problems when reviewing digital synths and mixers with built-in effects is that often the effects would merit a complete review on their own, and this is particularly true of the two effects processors on the 168RC. Space limitations preclude this (especially since I've just used the word count on my WP and found that I'm already over the requested number of words...), but those who are familiar with the effects on the Korg Trinity will have some idea of the quality and flexibility available. The DSP processors used on the 168RC are the same as the main ones in Korg's flagship synthesizer (reviewed December and January 1996 in *SOS*). Some of the algorithms have been developed and adapted for the different requirements of general mixing, and this makes the effects even more flexible and interesting. Reverb algorithms with names like 'Gymnasium' and 'Cave' will be of particular interest to those in search of the ultimate drum sound (I had a whale of a time with these) and I found the modulation effects very flexible and enriching. All the effects are of equally high quality and the fact that they are plumbed in digitally makes sure that the signal quality remains optimal. Don't forget that if you need extra effects these can be plumbed in digitally as well (an Alesis Quadraverb 2, for example).

EFFECTS LIST

- *Small Hall 1&2*
- *Medium Hall 1&2*
- *Large Hall*
- *Small Room*
- *Medium Room 1&2*
- *Large Room 1&2*
- *Small Dry Plate*
- *Medium Wet Plate*
- *Medium Dry Plate*
- *Large Wet Plate*
- *Large Dry Plate*
- *Short Sharp ER*
- *Short Modulated ER*
- *Short Reversed ER*
- *Medium Modulated ER*
- *Medium Reversed ER*
- *Gymnasium*
- *Church*
- *Concert Hall*
- *Stadium*
- *Cave*
- *Canyon Wet*
- *Machine Talk*
- *Short left/centre/right Delay*
- *Long left/centre/right Delay*
- *Short & Long Mono Delay*
- *Modulated Delay*
- *Light, Medium & Heavy Chorus*
- *Bi-phase Modulation*
- *Light & Heavy Flange*
- *Phaser*
- *Ensemble*
- *Tremolo*
- *Auto Pan*
- *Fast & Slow Rotary Speaker*
- *Overdrive with Amp Simulation*
- *Pitch Shift*
- *Graphic EQ*
- *Enhancer*
- *Limiter with Exciter*
- *Gate with Limiter*

the quality of the conversion will drop from 18 to 13 bits. Don't make the mistake of thinking that this is something which can be fixed later, using a digital compression or 'normalisation' algorithm. Once a signal has been digitised, the signal-to-noise ratio is set in stone. So normalising a signal recorded at -30dB in a system with a measured ratio of 90dB will bring the noise floor up to -60dB when you boost the signal to 0dB. The only way to avoid this problem is to compress the signal in the analogue domain before you digitise it. The 168RC makes this possible with its pre-converter insert loop on the first four channels.

Inputs E, F, G and H don't have the 20dB pad or insert loop, but they do have the balanced stereo jack socket and, like the first four inputs, they also have trim controls, allowing the input level to the converters to be optimised. Like the settings of the pads and the phantom powering, these trim controls are not memorised in the 168RC's automation 'Programs' (more on these shortly). In fact, none of the controls mentioned so far are, but this is how it should be. These controls should always be 'live' for instant adjustment. The last thing you want is a setting of phantom power or a pad changed by a snapshot being recalled.

WOT, NO S/PDIF IN?

Strictly speaking, it's inaccurate to say that the 168RC only has eight analogue inputs, because there's also a stereo input on coaxial connectors for Tape In. However, I didn't mention this at the same time as the other inputs as it is hard-wired to the analogue monitoring circuitry, and cannot therefore be routed through any of the digital mixer channels. It can only be used for monitoring a stereo tape machine back through the desk, presumably for checking your recording after having mixed down to DAT in the digital domain (at least, I hope you'll want to keep the final mix all-digital — otherwise what would you be doing with a desk like the 168RC?).

Of course, if you're only using this Tape In to check back mixes and the like, it doesn't matter that it is analogue, and it certainly saves you listening to your mix through an extra A/D-D/A conversion (as you have to do on a certain all-digital desk I could mention), but this does highlight what I consider to be the most serious omission on the 168RC: the lack of S/PDIF input. It will be some time before everyone has routing boxes to convert multiple S/PDIFs to ADAT interface format, so you might well have to run a source DAT or CD signal into the mixer in analogue form (thereby defeating what I take to be the point of the 168RC's other generous digital connectivity). Similarly, there is no way to connect the S/PDIF output of a synth or other sound source, to allow it to be mixed in through digital.

I got around this by using the Falcon's ▶

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"The biggest question raised by the preliminary spec I saw on the 168RC was how its 24 inputs related to its 16 mixer channels. In fact, this is handled very elegantly, using a programmable patch system."

S/PDIF input, and then routing this inside the Falcon to two of the eight channels on the Falcon's ADAT output, and into the 168RC from there. This allowed me to route the digital output of my Roland S760 sampler into the 168RC for mixdown (although it did tie up two of the Falcon's audio channels during mixdown). I assume that you'll be able to do the same thing if you're using Korg's 1212 I/O card with a Macintosh or PC, but I suspect with the same limitation (loss of two hard disk recording tracks).

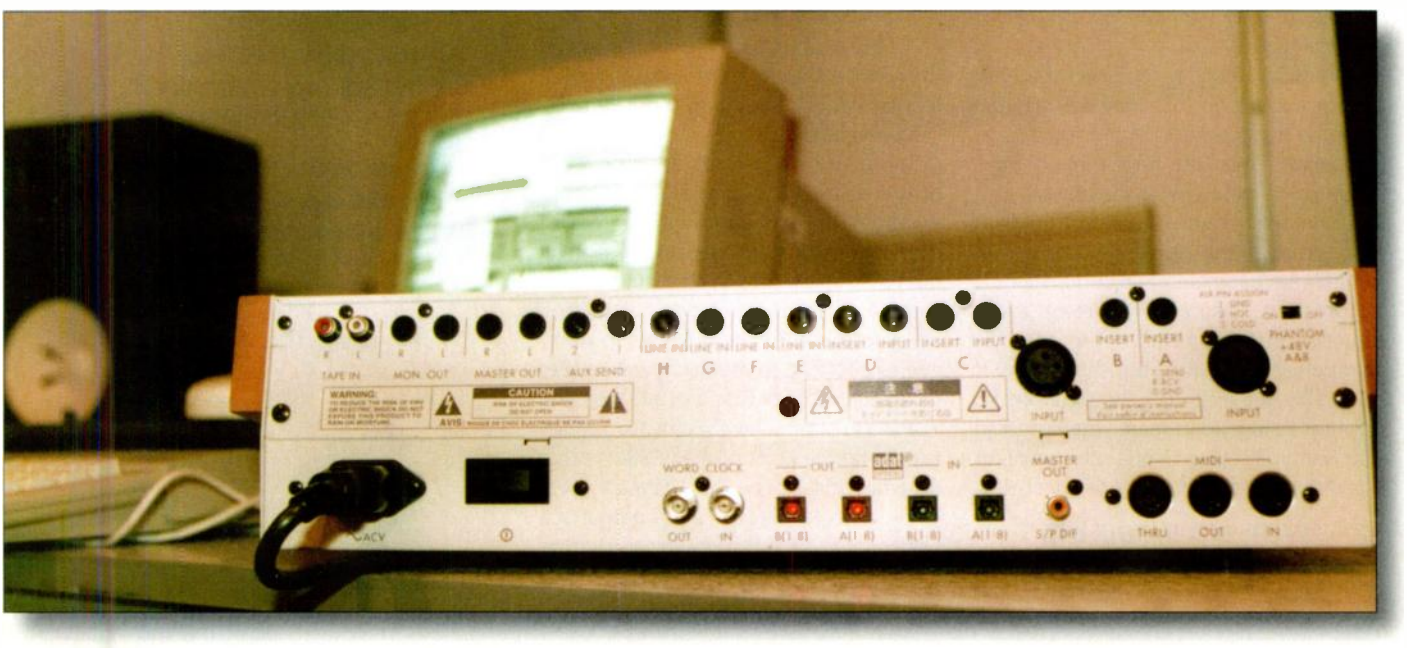
The ideal solution would be if Korg came up with another 1U rack box like their 880 interfaces, but which converted four S/PDIF inputs into one ADAT output. This would then allow you to mix and match multiple S/PDIF signals, from synths, samplers and CD or DAT, for processing through the main channels of the 168RC without A/D conversion. I think you may be able to use the Alesis AI-1 interface to do this, but it does cost over £900, and you might need a BRC in your setup. I'm sorry to make such a big thing about not being able to plug an S/PDIF signal into the 168RC, but surely this is the *raison d'être* of the Soundlink series — to keep signals in the digital domain as far as possible.

24 INTO 16 *DOES* GO

The biggest question raised by the preliminary spec I saw on the168RC was how its 24 inputs related to its 16 mixer channels. In fact, this is handled very elegantly, using a programmable patch system. Pressing the button marked 'Input', to the right of the LED display, calls up a screen which shows you which input is feeding each of the 16 channels. Using the Up and Down buttons, you can move between the four rows of channels and then use the knobs below the screen to alter the input source for the four currently-selected channels. The parameter field for each channel lets you select inputs ANAL A-H (analogue), DIG A1-8 or DIG B1-8 (the two ADAT inputs). This means that you can route any input to the channel of your choice for mixing, EQ and effecting. Unfortunately, there is no way to utilise whichever eight of these inputs remain unassigned in the mix output. It would have been nice if spare inputs not going through mixer channels could have been used as external effects returns for processors connected to Aux 1 and Aux 2. As it is, if you're using external effects, you have to bring them back through channels 13-16 (assuming you don't want to EQ, otherwise you will tie up some of channels 1-12, which are the ones which have EQ).

The two ADAT outputs on the mixer have separate functions. The first is hard-wired to the eight busses on the mixer, so that busses 1-8 appear on digital channels A1-8. This means that you can pick up the eight busses in the digital domain on another device with the ADAT optical connector. The fact that the 168RC is a true 8-buss mixer makes it the ideal tracking mixer for use with an ADAT (especially the original one, whose converters are starting to sound a little tired). In fact, the first Program on the 168RC is called 'Rec adat 1', the second 'Mix adat 1' and the third 'Mix adat 2' (ie. for mixing down two ADATs to DAT). Something tells me that the Korg guys had the ADAT in mind when designing and configuring.

ADAT output B is fully assignable, and this is the one you would use if you were cascading 168RCs together to build up the number of channels and effects available (you can use up to six 168RCs in cascade). Again, there are master and slave Programs included for using more than one 168RC. You set the signals to be sent on this second ADAT output by pressing the 'Ex. Bus I/O' switch to the left of the LCD display: a screen then appears, showing the eight digital channels and parameter fields, where you can select the sources. As well as mixer channels 1-16, you can also select any of the eight busses, Aux 1 and 2, or the main left or right outputs. I found this to be a fantastic feature in conjunction with the Falcon, as it allowed me to use the 168RC as a super Falcon 8-input converter



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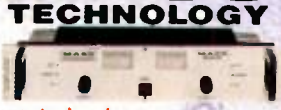

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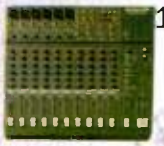

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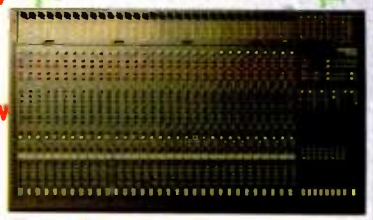

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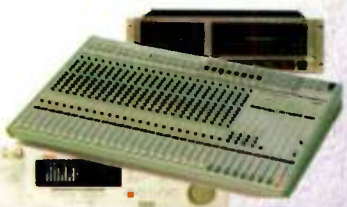

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box with mic preamps, inserts and effects, all with the 18-bit conversion and 24-bit processing quality of the 168RC. Obviously, Korg designed this particular usage for the ADAT or their own Soundlink 1212 I/O card for Mac or PC users, but Falcon owners can take advantage of it straight away by using SoundPool's ADAT interface. When companies like Steinberg and Emagic add support for the 1212 I/O card in *Cubase* and *Logic Audio*, Mac and PC owners will get exactly the same fantastic capability (of course, if you want to record just audio, the OSC *Deck 2.5* software bundled with the 1212 I/O will give you this facility straight away). This mixer (and any others which implement the ADAT digital interface) could spell the end for those add-ons to hard disk recorders, the 8-input/output expander boxes. Why go through extra conversion stages when you can pipe eight channels at once into your mixer in the digital domain and get rid of the spaghetti at the same time?

16 CHANNELS, BUT ONLY 12 FADERS?

Channels 1-12 are full mixer channels with their own dedicated faders. They feature 3-band semi-parametric EQ, two aux sends and two effects sends, pan, mute and solo. The mute and solo buttons are directly above the faders and have LED indication to show their status. A final switch selects the channel currently being edited in the display. All aux and effects sends, pan, EQ and buss settings are edited in this way, with the knob below each parameter field in the display adjusting that parameter. These parameters cannot all be shown at once in the display and so are split into three groups: Input/Send/Pan, EQ controls, and Buss assignments, which are selected by the buttons immediately above the fader channels.

DIGITAL MIXER FEATURES COMPARISON

	ProMix 01	168RC	Yamaha 02R
Analogue Ins	18	8 (exp. to 24)	24
Digital Ins	0	16	4 (expandable to 36)
Analogue Outs	4	4 (exp. to 20)	8
Digital Outs	2 (at 48K only)	18	4 (expandable to 36)
Internal FX sends	2 stereo	2 stereo	2 stereo
External FX sends	2	2	6
Onboard FX processors	2	2	2
Onboard Comp/Gates	3 stereo	None	50 stereo
Automation	Snapshot only	Snapshot + MIDI	Full internal real-time control
Motorised Faders	16 + 2 + 1	None	16 + 8 + 1
Busses	2	8	expandable to 32
Display (approx)	2"x6" LCD	2"x6" LCD	4"x5" backlit LCD
Price	£1999	£2495	£7049

Channels 13-16 do not have their own faders, nor any EQ, so they cannot be used as full input channels. Their primary purpose seems to be for external effects returns and so on. A single Select switch cycles around these channels, presumably because you will not need to keep adjusting them as often as the 12 primary channels.

The I/S/P (Input/Send/Pan) display for each channel shows the individual input routing (duplicated from the overall input screen I mentioned above) with a level meter and phase switch. Next to this are the four sends, two to the external Aux 1 & 2 and two to the internal Eff 1 & 2, each with its own Pre/Post switch. The right-hand side of the screen shows the pan setting and (for channels 13-16 only), the level control and solo/mute switches.

There are also global screens for all 16 channels, which can be selected by the Aux Send, Eff Send, Pan and Meters buttons to the right of the LCD. These allow you to visualise the status of one parameter for all the channels simultaneously. The Meter screen is obviously particularly important, as many people are so used to being able to see levels on all 16 channels on a conventional mixer. This screen also features a Peak Hold parameter which allows you to determine how long (or even if) peaks are held in the display.

> "I found the EQ sounded extremely sweet, without any of the harshness that can sometimes characterise digital EQ."

Pressing the EQ button below the LCD displays the seven EQ parameters available on each of the first 12 channels (this button does not respond if you press it while you have channels 13-16 selected). There are Frequency and Gain controls for Hi, Mid and Low, plus a Q control for the Mid range; the parameters beside the Gain control actually tell you the amount of cut or boost you currently have set, in dB. I found the EQ sounded extremely sweet, without any of the harshness that can sometimes characterise digital EQ.

The 168RC comes with 20 preset EQ settings, which I found incredibly useful starting points for getting a sound (especially on drums). Coming, as I do, from the world of keyboards and MIDI, I have very little experience of EQing raw sounds from scratch (I lasted one week as a tape-op at Matrix Studios back in 1980 before I realised that this was not my route to stardom) and I think others with my background will really appreciate this 'starter for 10' approach to EQ. Of course, those with the training can just set the EQ flat and do all the work themselves.

The final group of parameters is found under the Buss button, which calls up a screen for setting which of the eight busses the selected channel will be assigned to. This works in exactly the same way as on a conventional mixer (except, of course,

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that you can automate it using snapshots or external control). Once assigned, you have pan, level and on/off control of each of the eight groups — and don't forget that these are available on ADAT output A for sending directly to a digital recorder. If you need analogue outs for these, you'd simply put an 880 D/A on this ADAT output.

MIDI AUTOMATION VS SNAPSHOTS

A hundred internal snapshot memories, for snapshot-type automation, are available within the 168RC, but the desk can also send all parameter changes out over MIDI, for automation via a MIDI sequencer. You can choose whether the automation uses continuous controllers or SysEx, depending on what works to the best advantage for your software and the number of MIDI ports you have available. I found continuous controllers best, as this data can be displayed and edited graphically by most sequencers. The on-board Programs (Korg's term for snapshots, static pictures of the desk status at a given time) allow you to re-configure the mixer completely for specific applications — routings, effects and all — but they can also be used to make smaller changes to levels and settings in mid-mixdown, via MIDI program changes embedded in a sequence. This is obviously ideal for complete scene changes, but for less radical alterations, especially those which don't need to be instantaneous, using MIDI SysEx or Continuous Controllers for automation gives much better results. If you were using the 168RC for live shows, 100 Programs would not last you for a full set, unless you used MIDI to make the necessary small alterations in level and EQ, and saved the Program (snapshot) changes for when you need to alter many parameters simultaneously — if you used SysEx or Continuous Controllers in this latter situation, they might clog up your MIDI stream anyway.

"Of all the automated mixdown systems I have ever used, the 168RC offers the simplest and most glitch-free operation..."

I found that using *Cubase* (though other sequencer programs will obviously work too) to automate EQ settings was great fun, and allowed me to obtain the sort of effects on a synth bassline which you would normally have to create with a synth filter as you were recording it. People doing dance music are going to love this automated EQ facility as, unlike synth resonance, you can put it on anything — vocals, drums, whatever you're mixing down — and on 12 channels at once. One word of caution, though. During very fast sweeps and resonance boosts, a certain amount of stepping could be heard, so the most radical effects need to be moderated a little to maintain the smoothness of operation you'd get from analogue EQ. However, this is more than compensated for by the automation facility and the ability to edit after the event, using your sequencer's functions. I soon found myself trying things that would be impossible without *Cubase*'s tools for editing continuous controllers.

SUMMING IN DIGITAL

Although Korg were not able to supply the full manual with the review 168RC, I found the preliminary documentation covered the rare thing I couldn't work out from first principles. Overall, the 168RC is a breeze to use, and most parameters can be accessed from several different screens (ie. as part of one channel's parameters, or as part of the global display of one parameter for all channels).

In conjunction with Korg's forthcoming 1212 I/O PCI card for the Mac and PC, the 168RC would make a killer digital recording studio using the bundled *Deck 2.5* software, but the real interest in the combination of 168RC and 1212 I/O will come when companies like Steinberg and Emagic support the Korg PCI card from within their software. Once you have the ADAT I/O on that card, the 168RC is the only way to go for mixing. The 12 inputs and outputs match up perfectly with the 12 faders on the 168RC, and you can use the remaining four faderless and EQ-less channels as two external stereo aux returns.

It goes without saying that a mixer with eight busses and such generous ADAT I/O provision has to be a natural choice for recording and mixing with ADATs. If you have two ADATs, or an ADAT and an 8-track hard disk recorder with ADAT I/O, this is the only game in town. The people who will be most disappointed in the 168RC are those who compare it with the Yamaha ProMix 01. It is a totally different beast. The 168RC is an 8-buss mixer designed for integration into a digital system. It is not a 2-buss mixer with motorised faders and the ability to take 16 analogue inputs as supplied. If that's what you need, buy a ProMix 01. If you want the features of the 168RC, particularly in conjunction with digital sources, and you need 16 analogue inputs as well, you'll need to budget for an 880 A/D.

This mixer breaks so much new ground that it is easy to forgive its few omissions; my only real criticism is the lack of an S/PDIF input — it would have been nice to be able to plug a DAT, CD or S/PDIF-equipped synth in directly. I think in 1996 all mixers should have more digital inputs than analogue; one day all mixers will, and it's nice to see a new company to mixing being first to reach this important milestone. Of all the automated mixdown systems I have ever used, the 168RC offers the simplest and most glitch-free operation, and the three Falcon mixes I did while I had the desk are amongst the cleanest and sweetest I ever managed without the help of a qualified engineer. This really is the mixer I have been waiting for all these years. SOS

FADE IN FULL

Though the 168RC is an automated desk, its faders are not motorised, so they won't perform the spooky fader movements of the Yamaha ProMix 01 or 02R. However, Korg do use a clever system for showing you the position the fader would be in a recalled Program (snapshot). When you first move the fader, it doesn't change the level, but one of two small LEDs (with up and down arrows) lights to show you whether you are above or below the preset level. Once you move the fader to the preset level, both these LEDs go out and the fader becomes 'live'. While this is obviously not as good as faders which move automatically to the preset positions, it does at least mean that levels won't suddenly jump dramatically when you touch a fader. If the fader is not currently functioning (on a paired channel, for example), both LEDs light to show that it's currently inactive.

info

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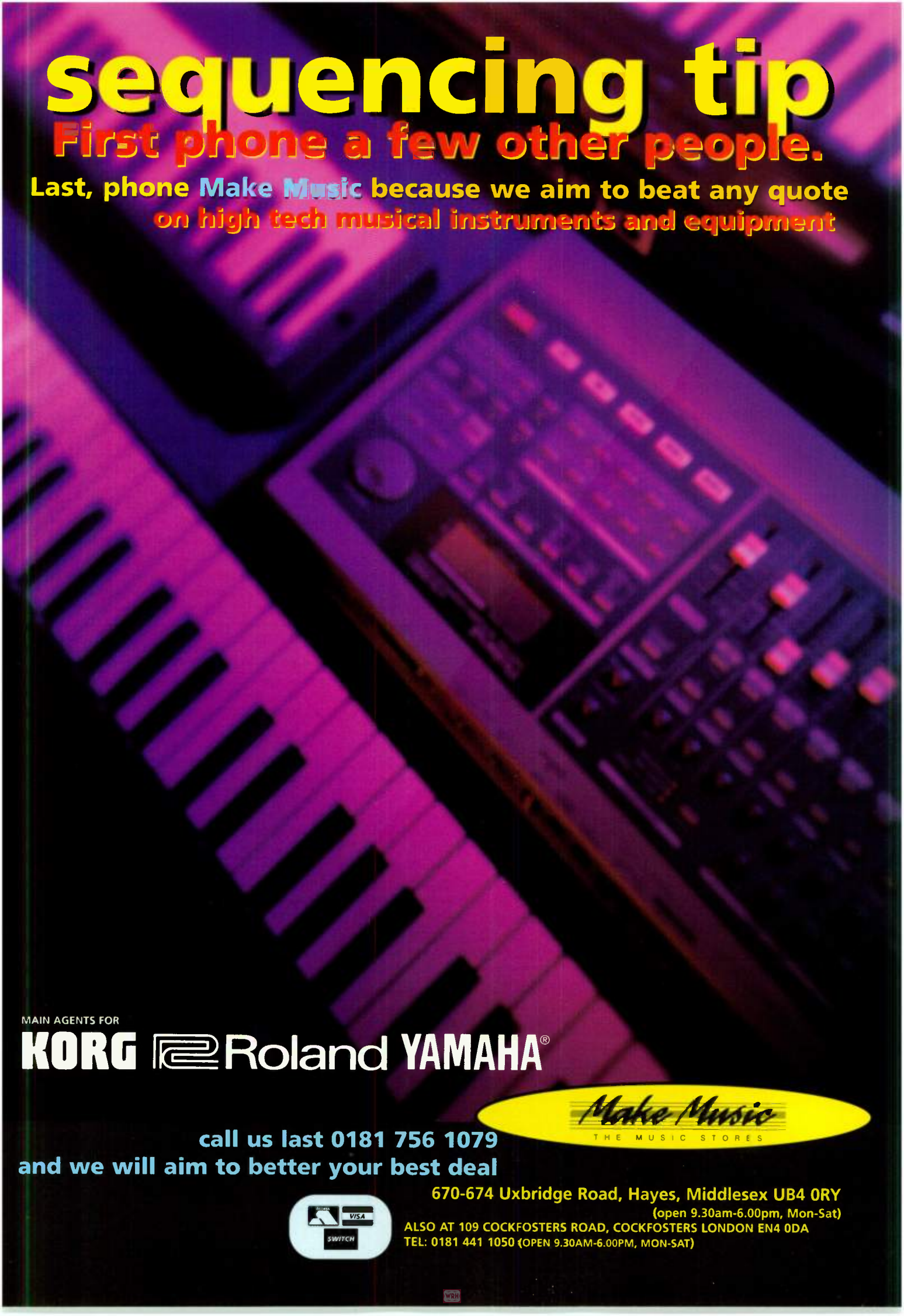
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House of Cards

MIKE CHANDLER & FRANCO DE BONIS: CREATIVE LABS

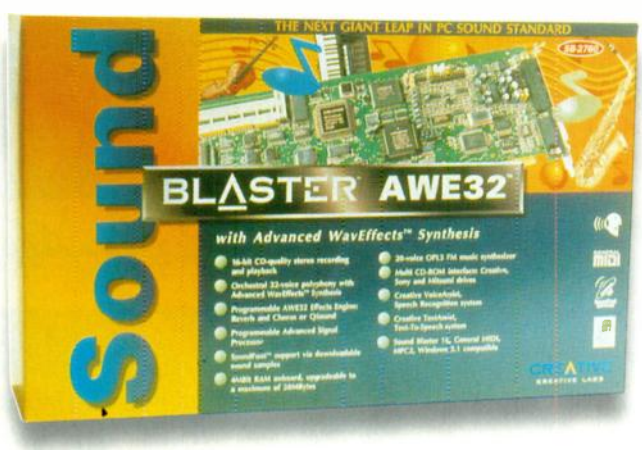
Designers of the SoundBlaster range, Creative Labs recently unveiled their next generation soundcard, the AWE64 Gold. PAUL WHITE discusses the future of PC soundcards with Creative lads Franco de Bonis and Mike Chandler.

Creative Labs was founded in Singapore just 15 years ago by Sim Wong Hoo, a man who clearly saw a healthy future in the computer games market when those around him viewed it as a mere curiosity. Today, the ubiquitous SoundBlaster trademark he created has been widely adopted as the generic term for soundcards in general, rather like Hoover, Biro and Thermos in their respective areas, an image that Sim Wong Hoo said he was keen to build upon at a recent product launch.

Until recently, computer game soundcards have been just that — sounds for games. But as the quality expectations of end users continue to increase, and the demands of multimedia users develop, soundcards are growing more sophisticated at a breathtaking rate. By virtue of the economy of scale, the PC user can now tap into some very serious audio technology for a fraction of the cost of stand-alone studio components — and it's this fact that saw me attending a preliminary demonstration of Creative Labs' next generation of soundcard, the AWE64 Gold.

In his launch speech, Mr Sim Wong Hoo confirmed the company's commitment to becoming more active in the home studio arena, not just with cheap and cheerful soundcards, but with on-card technology capable of being used for serious recording and composition. My impression was that the Gold card we were about to see was just the beginning of a very exciting future for PC-based studio owners.

After the demonstration, I managed to catch a few minutes with Creative Labs' UK Product Support Group Manager, Franco de Bonis, and Mike Chandler, European Brand Marketing Manager for the company. I wanted to know whether a Gold card invariably resulted in an overdraft!



Creative Labs' popular AWE32 will soon be joined by the powerful AWE64 and AWE64 Gold soundcards.

GOLD CARD STATUS

Mike Chandler: "There are actually two new cards due to be released, the AWE64 and the AWE64 Gold, though I feel the Gold model is the one that the MIDI musician will be most interested in, because of its high-quality signal path and digital output. We've used multi-layer circuit boards and newly-designed electronics to bring the noise figures down to the level you'd more normally associate with stand-alone MIDI sound modules, plus there's an S/PDIF digital output so that you can record the card's output directly to DAT if you need to.

"Like most soundcards, the AWE64 Gold performs several different jobs, and one of these is to transfer stereo audio into and out of the computer. It's also a very powerful synthesizer — actually several synthesizers, plus a MIDI interface using real DIN connectors, not a joystick adaptor cable. The standard 1Mb ROM-based sounds of the AWE32 have been retained, though they'll sound cleaner through the new electronics, and there's also 4Mb of onboard RAM, upgradable to 16Mb, which provides additional synthesizer functions. This block of RAM holds further sound banks, which are loaded up from the hard drive. Once loaded, the user has access to virtually unlimited high-quality wavetable sounds plus the standard 128 onboard sounds. There's also waveguide-based sound modelling, designed to make certain sounds appear more realistic. The overall polyphony of the card is 64 parts."

PHYSICAL MODELLING?

'Waveguide modelling' sounds very much like the type of physical modelling where you take a source sound and then shape it, rather than creating the entire sound from scratch mathematically.

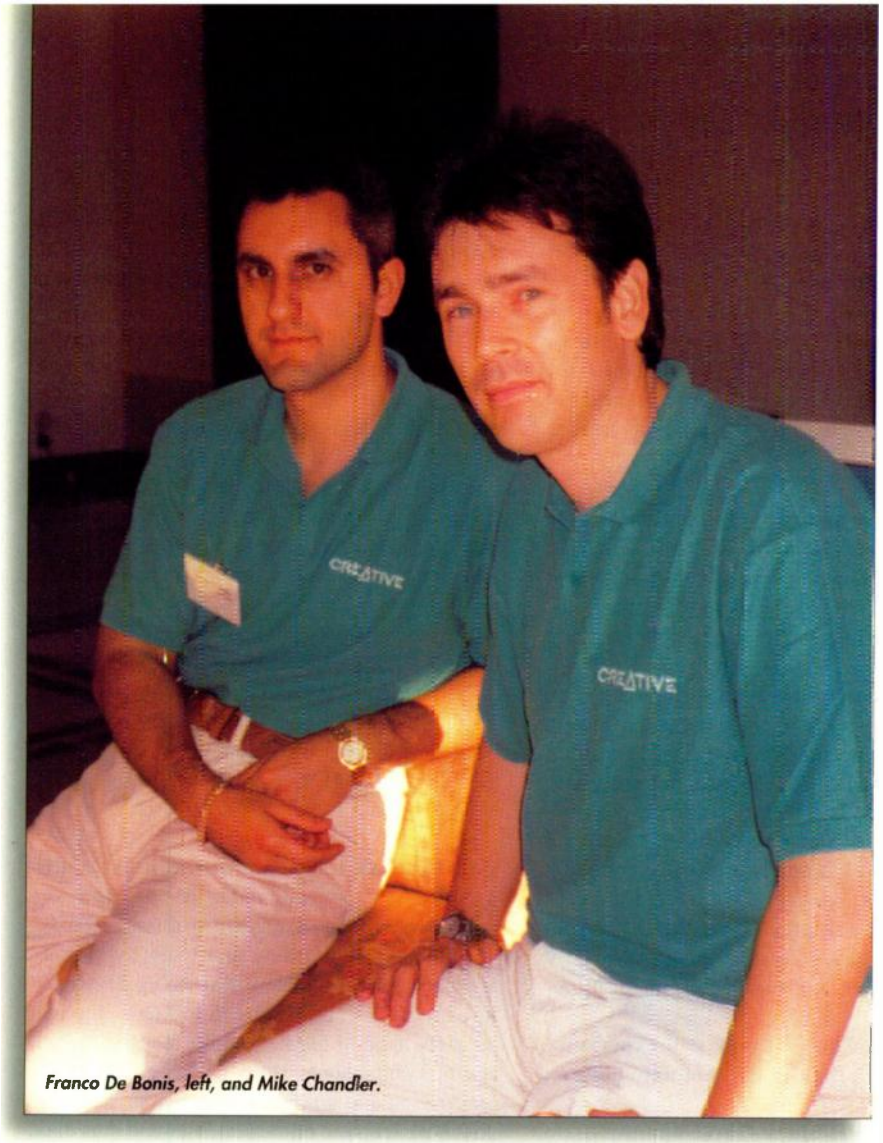
"It is a type of modelling that has been described to us as a kind of positive filter which adds movement and articulation to existing wavetable sounds that would otherwise be static. There are just 15 instrument types in the AWE64 at the moment, but more will be added before the board goes onto the market. Even at this stage, some of the examples are extremely realistic, especially the classical guitar; the technology was developed by Seer Systems, based on work done at Berklee university.

"The new card also supports SoundFonts, an existing Creative Labs technology for loading and playing back samples that I believe to be as yet under-utilised in the MIDI music field."

SOUNDFONTS

Are the RAM-based synth sounds packaged with the AWE64 supplied in SBK format or are they SoundFonts?

"All the loadable wavetable sounds are in SoundFont II format — there's a high-quality GM



Franco De Bonis, left, and Mike Chandler.

bank which comes up in place of the ROM-based synth sounds, plus additional banks into which you can load any of the supplied SoundFonts. A SoundFont is like the audio equivalent of a printer font — in sampler terms, it comprises a set of multisamples complete with all their program data relating to keygroups, envelopes, looping and so on. The various SoundFont samples are provided on a sound bank CD-ROM that comes with the card, and the amount of memory they occupy depends very much on the sounds themselves. For example, if you're sampling a sitar, you might be able to get away with just a couple of fairly short samples per octave, whereas a piano needs a lot of multisamples to make it sound convincing. You can also create your own samples by importing or recording a .WAV file, then editing it using the supplied software tools. The included *Vienna* software package allows you to change envelopes, add certain effects and so on, then turn the resulting .WAV sample into SoundFont II format. Having done that, you use the control panel to load it into the card's memory and the GM SoundFonts come up in place of the 1Mb AWE GM ROM sounds; any additional SoundFonts appear in alternative banks."

In terms of discrete hardware equivalents then, this card ostensibly provides a set of high-quality stereo audio converters, a basic GM synth bank, a 4Mb enhanced SoundFont-based synth bank which you load up before use, a physical modelling process, plus a SoundFont sampler complete with editing software, not to mention a CD-ROM full of samples and all kinds of support software. Even accepting that stand-alone equipment probably offers more facilities and better quality in some areas, that still sounds like an incredibly attractive package, especially as it can all be utilised within a typical MIDI + Audio PC sequencer. I understand that there's also a 3D sound system in there for good measure!

3D GAMES

"The modern games market demands exciting sound to go with the visuals, and we've used a 3D audio system developed by Emu Systems, who are part of the Creative Labs group of companies. You can actually move the sound around through 360 degrees — the timbre will change to give the illusion that the sound is actually moving right outside the loudspeakers, and even behind you. We're already working closely with games developers, so that they can take advantage of this system to make the audio action match the positions of the action on screen."

It's obvious that the games market is responsible for making these very low

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EXPANSION PLANS

Gazing into the crystal ball, it seems likely that more and more discrete studio equipment will be replaced by PC cards, but how many cards can a PC address before it runs out of free IRQs or physical slots?

"Eventually, there is the promise of the Universal Serial Buss which could be used to connect up any kind of peripheral, from mice and keyboards to printers and modules. It's a fair way off yet, and what will happen first is that the ISA slots in PCs will gradually give way to more PCI slots. The obvious answer is to move to PCI cards, which will alleviate the problem in the short term, and that's something we're looking at."

Is an expansion chassis a practical solution?

"I don't think so, because PCI cards communicate directly with the processor to achieve their speed. Moving things outside the PC may incur noise or timing problems, and in any event, you'd run out of available IRQs. Long term, we're going to have to look for a completely different solution, but probably still based on PCI cards. Some things are already being taken out of the card slots and built onto the motherboard, which frees up physical slots, but they still take up interrupts (IRQs), so that's where the limit occurs."

prices possible, but what access will the musician have to these 3D facilities, and will they be musically useful?

"The 3D positional audio processing can only be applied to sound effects loaded in the form of SoundFonts — the 3D algorithm is not suitable for music sounds, because it introduces an initial delay which is not acceptable for musical purposes."

PC HEADACHES

When musicians move up from, say, an Atari to a PC, they can get into awful trouble with PCs, especially when having to deal with complicated hardware installations. What are Creative Labs doing to make life as easy as possible for these people?

"Things are definitely stabilising. When Windows 95 was first released, there was a problem with plug-and-play, because old versions of it were built into the BIOS and didn't work properly with the final thing. You'd plug in a card, the BIOS would configure the card, but then it might not report it properly to Windows 95, so it wouldn't work. Modern PCs have either not included plug-and-play in the BIOS, so that Windows 95 deals with everything — which it does beautifully — or they've put in an up-to-date version."

Does that mean you may still experience problems with an older PC that may have an old BIOS?

"It is possible, but a simple solution is to disable the plug-and-play in the BIOS and let Windows 95 deal with your card. We ship utilities with our cards for DOS and Windows 3.1 users, where you run a software plug-and-play configuration manager — again, disable it in hardware and let the software do it.

"Most PCs have an option where you press some key combination during startup to enter the setup mode, and once you're in there, you'll find an option called something like 'plug-and-play configuration', 'PCI setup' or something similar. In the tradition of the PC, it'll be buried in there somewhere, but normally it will have something like 'plug-and-play BIOS on/off', or 'plug-and-play managed by...' and the selectable options will be 'OS' or 'hardware'. You should set it to 'OS'. That seems to solve most plug-and-play problems that occur with older PCs. I'd say that most PCs sold after Windows 95 was released should be OK."

Mr Sim Wong Hoo, Creative Labs' founder.

BUSSES AND DRIVERS

One criticism levelled at some budget soundcard packages is that the included software drivers can only talk to one piece of software at a time, yet if you have a software synth editor, you'll probably want to run it at the same time as your sequencer so that you can hear the effect of any changes in situ. Can we expect multi-client MIDI drivers, and can you confirm that there will be full-duplex audio operation on the AWE64 to allow you to record and monitor audio at the same time?

"As it stands, the AWE64 card doesn't have a hardware duplex capability, but there will be a software duplex driver that allows monitoring in 8-bit quality when you're overdubbing, rather as you can now do with the AWE32. At the moment, you can't work in duplex mode at the same time as using the waveguide modelling, so it's a case of using the wavetable sounds first, then adding the modelling when you're finished, although this is only temporary and will be addressed in the next month or two. The MIDI drivers are not multi-client — different MIDI device drivers use different ports."

What is the AWE64 Gold card likely to cost?

"The exact price hasn't been set, but translating from the dollar price and adding tax, we expect it to be around £240, give or take a few pounds."

FUTURE SOUNDS

Will Creative Labs continue to build multi-purpose PC soundcards, or do you see yourselves creating dedicated synthesizer cards?

"I think we'd probably stick to the hybrid card approach. There is a new chip being developed to succeed the Emu 8000, and this new chip will be at the heart of our new cards, along with PCI, and that chip should allow us to provide all the features musicians are looking for. With the possible exception of the real high-end musician, I think the example AWE64 Gold we have shown you is already sufficiently powerful."

What it doesn't offer is compatibility with the huge sample library of Akai-compatible CD-ROMs. Is there any likelihood that a utility will become available that will enable sample CD-ROMs to be converted into SoundFonts or SBK file formats?

"We have no plans to do this in the near future, though there is third-party software available that can perform the conversion."

Mr Sim Wong Hoo mentioned Creative Labs' intention to build a prestige range of PC products for those who were prepared to pay more for extra quality; he used the analogy of Lexus cars. Can we therefore expect to see you taking on the big synth companies who are already producing some very good dedicated synth soundcards?

Franco de Bonis: "I think Mike would agree with me that the home studio market for soundcards wasn't that large 12 months ago, but now that PCs have grown faster and cards are available, more people are doing it and the market size is increasing. That's obviously of great interest to Creative.

"You can expect to see our cards handling a greater number of voices though hardware alone, a dramatic improvement in signal-to-noise ratio and certainly more in the way of digital I/O. We see there is a market, and the number of potential users is great enough for Creative to go out and provide them with what they need."

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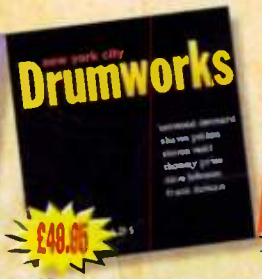

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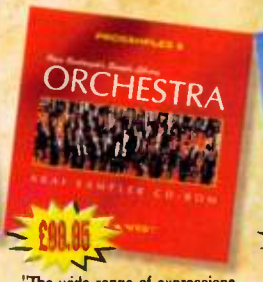

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WRH

Setting up is hard to do

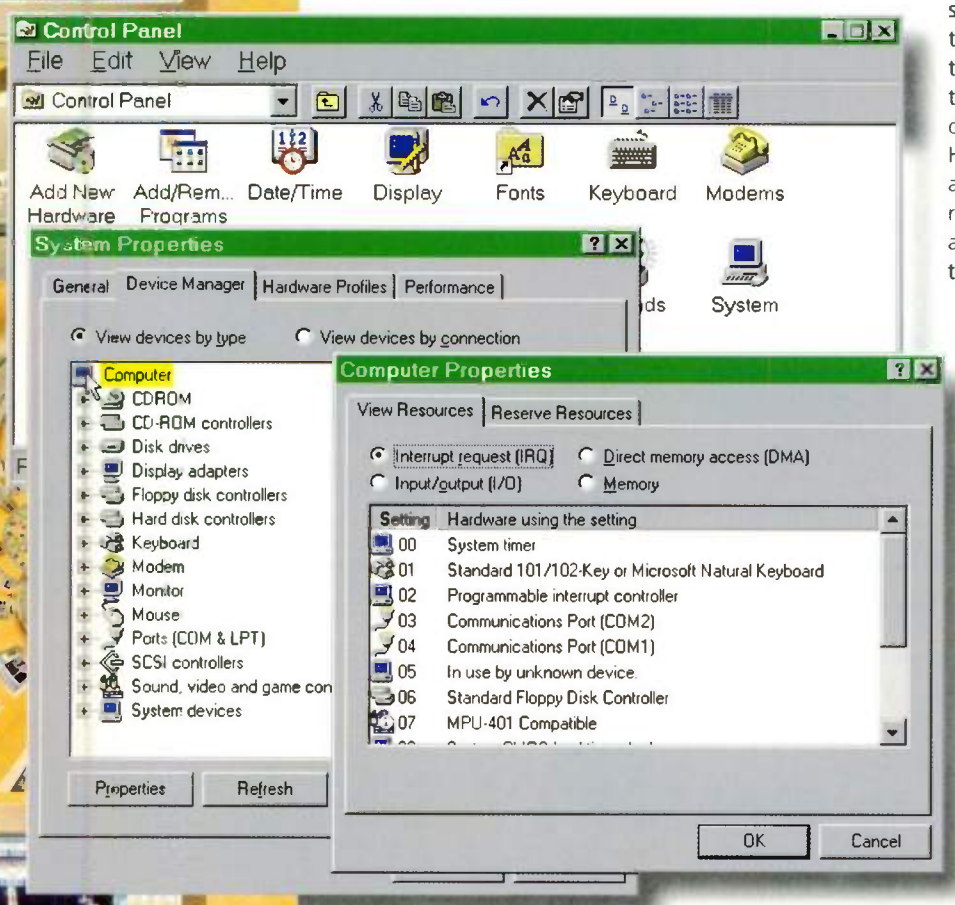
INSTALLING PC SOUNDCARDS UNDER WINDOWS 95

Many people have trouble adding new hardware cards to a PC. If your slots are full to overflowing, and every card is fighting for its own resources, you will almost certainly encounter problems. Fortunately, MARTIN WALKER is here to lead you through the minefield...

Despite major advances in PC technology, the platform still has some stumbling blocks that trip up most people sooner or later. Installing and setting up soundcards, floppy and hard disk controllers, SCSI controller cards, MIDI interfaces, modems and graphics cards in a machine with a typical maximum of six or seven slots is bad enough, but juggling the resources needed to get these devices working properly, such as IRQs and DMA channels (see the 'Jargon Buster' box elsewhere in this article for explanations of these and other terms), is something that may at times defeat even the most experienced PC guru. There are solutions to most problems, but often, in the absence of clear and detailed technical information, it is easier to negotiate a refund on a piece of hardware than battle on to resolve a problem.

The arrival of Windows 95 was heralded as the 'cure-all' for hardware installation problems, by incorporating so-called 'plug and play' facilities into the PC's software and BIOS which could then automatically interrogate plug and play-compatible cards for information related to installation and resources required. Since Windows would know the facilities already used by previously-installed plug and play hardware, it was supposedly a simple matter for it to allocate appropriate resources from the pool of remaining choices. That was the theory! In practice, legacy (ie. pre-Windows 95) devices still often have to be installed by hand, and whilst it is a laudable effort to streamline things, plug and play will only be totally effective in several years time, when the majority of hardware devices conform to its requirements. In the interim, some devices are recognised, and some are not. However, with the multiplicity of devices attached to the modern PC, the pool of resources is rapidly drying up, and additional approaches need to be tried which make the most of the ever-dwindling set of IRQs and DMAs.

Traditionally, there have been two routes to try if you need further information when a resource drought threatens. Unfortunately, the first of these, namely the manual supplied with Windows 95, has proved a non-starter, as it is of pamphlet proportions, and is more a token gesture than a serious attempt at a handbook. The second approach is to search out one of the many excellent reference books on Windows 95, but these can be very expensive (going up to over £50), and many require a course in the gym before you can lift them! What is needed is something in the middle ground, collecting together all the essential things that a MIDI musician using Windows 95 will need to hand when setting up a new soundcard or MIDI interface. Here, then, is the *Sound On Sound* guide to installing add-on cards. ▶



The hidden Computer Properties Menu — see following page for details.

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The first Installation stage is accessed via the 'Add New Hardware' section in the Control Panel, shown here. Most manufacturers of soundcards recommend manual installation, as the automatic option is not totally foolproof, and occasionally crashes the computer. Clicking as shown lets you proceed manually. Notice the Back button, which allows you to change your previous options at any stage.

THE RESOURCE SETTINGS LIST

First of all, here is a way to access something useful that many people don't know they already have. Six months after installing Windows 95, and bemoaning the fact that it was so tedious mapping out the full list of computer resources already in use by installed devices, I happened to be browsing through one of the heavyweight manuals in a bookshop and came across the following gem, which gives a complete listing of every resource currently used by the computer. I had had no idea that such a listing existed, but here's how to find it. Open the Control Panel, and double-click on System. Then select the 'Device Manager' tab to display a comprehensive list of connected devices, with the symbol of the computer itself at the very top. Now the bit that many people will find new — *Double-click* on this computer symbol, and hey presto — a new Computer Properties box appears, with options to show current IRQ, DMA and I/O usage (see the screenshot, on the previous page). The only drawback is that any legacy (pre-Windows 95) drivers will not declare their usage to the system, giving rise to the entry 'In use by unknown device'. This simply means that something is using it, but Windows 95 does not know what.

With this list to help you, the best thing you can do before installing any more hardware is to create a list of currently-used settings. After all, when something goes wrong, it is far easier to have this list to hand, especially if you also note down your existing choices for legacy hardware that do not show up on the computer's list. To change hardware settings, you will need to do one of two things. Older hardware cards come with small plastic 'jumpers' which clip between two metal contacts on the circuit board in a selection of positions. Changing hardware options is a simple matter of moving the jumper to a different position. Many modern cards have a small section of non-volatile memory onboard which uses a supplied utility program to change settings. Once the settings have been changed by software, you simply reboot the computer and the new hardware settings are activated. This method is easier to use, as future changes can be made without opening up the computer to get at the jumpers (which often also means removing the card to access them!) Plug and play devices, by their very nature, are also configurable from software.

SYSTEM DMA USAGE

0	8-bit
1	8-bit
2	Floppy disk controller
3	8-bit
4	DMA controller
5	16-bit
6	16-bit
7	16-bit

For drivers already supplied with Windows 95, or previously installed by hand, this selection allows you to narrow down the options. In this case, click on 'Sound, video and game controllers'. With so many devices available, it is sometimes useful to click on 'Other Devices'. This will present the full list of drivers included in every category, in case Windows has placed the driver you are searching for somewhere else.

BASE ADDRESS CHOICES

Every piece of hardware will need to use a set of I/O addresses, so that information can be written to and read from it. Manufacturers of cards will provide a selection of possible Base Addresses (the

PROBLEM INDICATORS

If you are having problems, look in the Control Panel under System Properties — there are two possible indications of driver problems. Firstly, a yellow exclamation mark on the driver symbol means that the hardware has been recognised, but that there is some type of system conflict, such as two devices with identical IRQ or I/O settings. This can happen when using the automatic installation option suggested by Windows 95, since its default settings for a particular device may conflict with another existing device already using the same settings. The easiest way to remedy this is to remove the driver via the Device Manager page, and then reinstall it by hand, using a more sensible set of options.

The second indicator is a red 'X' over the driver symbol, which means that the driver has been disabled and is not loading. To enable the driver, go into the Device Manager and double-click on the appropriate driver symbol. Under the 'General' tab, at the bottom of the screen in the Device Usage section, check the box in front of 'Original Configuration (current)'.

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Having selected a device type, this next screen shows what devices are already known by Windows 95, sorted by manufacturer. Here, for instance, is the 32-bit generic driver for any MPU401-compatible MIDI interface. Additional drivers supplied on floppy or CD-ROM are selected by clicking on the 'Have Disk' button.

SYSTEM IRQ USAGE

0	Timer clock
1	Keyboard
2	Programmable Interrupt controller
3	COM2 (normally modem)
4	COM1 (normally mouse)
5	usable
6	Floppy disk controller
7	usable
8	Real Time Clock
9	usable
10	usable
11	usable
12	usable
13	Maths co-processor
14	Hard disk controller
15	normally usable

▶ starting or first byte used) in order that each device gets a unique set of addresses. Various default addresses are used for specific functions. For instance, MIDI interfaces often use 330h (hexadecimal), and if you have two or more interfaces in your machine, at least one will need to be changed. If two devices end up with the same or overlapping addresses, then commands sent to either of them will be gibberish to the other, and the computer will probably have a minor fit. It is always safest to note down which of the small provided selection you end up choosing for future reference .

IRQ CHOICES

There are a total of 16 available IRQs, numbered from 0 to 15 inclusive. Many are already allocated for use by other computer functions such as scanning the keyboard and mouse, controlling the flow of data to and from floppy and hard disks, and updating various timers and clocks used by the system. Six IRQs are commonly available to choose from when installing hardware such as soundcards and SCSI controller cards: 5, 7, 9,10,11, and 12. You may see references to IRQ 5 or 7 being allocated to the parallel ports (normally used by a printer, but also by the new breed of external MIDI interface such as the MOTU PC-Flyer or Pocket Express, reviewed on page 205 in this issue). By default, Windows 95 does not allocate any IRQ to the parallel port, since it is rare for any printer to need an interrupt, so these remain in our pool of choices. IRQ 15 is sometimes used if you have two IDE disk drives installed, but, again, is normally an option.

IRQ 2 can be confusing. In early PCs, only eight interrupts existed, and to extend this to 16 in later machines, IRQ 2 was used by internal hardware, but mapped onto IRQ 9. Choosing IRQ 2 is therefore not a problem, but it will actually be IRQ 9 that carries out the work. This is why you may see references to IRQ 2/9 in many places; they are effectively the same thing. Isn't technology wonderful?

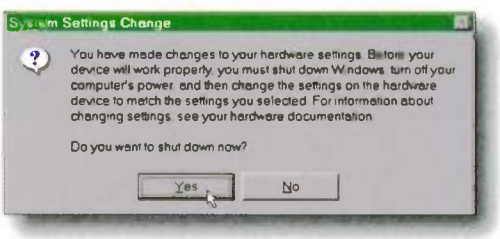
TYPICAL USAGE OF RESOURCES BY HARDWARE

	BASE ADDRESS	IRQ	DMA
CD-ROM drive	yes	0/1	0/1
Game port (joystick etc.)	yes	-	-
MIDI Interface	yes	1	-
SCSI controller card	yes	1	0/1
Wave Audio (half duplex)	yes	1	1
Wave Audio (full duplex)	yes	1	2
WaveBlaster daughterboard	-	-	-

DMA CHOICES

DMA is used in conjunction with interrupts to move around chunks of data such as sound automatically, without tying up the PC's processor. Most soundcards use DMA, as well as many SCSI controller cards and certain enhanced IDE disk controllers. There are eight channels of DMA available, numbered from 0 to 7 inclusive (0 to 4 are 8-bit, and 5 to 7 are 16-bit channels). As you might expect, the 16-bit channels can move data faster, and so give better performance with those devices that can use them. Unfortunately, since there are only three of them, it can be hard to work out the best way to allocate DMA resources. If you use a SCSI drive for audio, and have a controller card which uses a DMA channel (such as the Adaptec 1542), it is best to put the controller card on DMA 7 and the soundcard on DMA 5 or ▶

Pop in your driver floppy disk at this stage, or if you have downloaded new drivers from the 'net to your hard disk, simply use Browse to point to them. The filename will always be OEMSETUP.INF. Once this file has been opened, the screen will show what different drivers are available. There may be multiple choices if different drivers are needed for Wave audio and MIDI use.



Once complete, the driver setup utility will normally be launched automatically, so that resource choices can be made. After changing the setup hardware settings, this box will appear — Windows assumes that jumper settings may now need changing before you restart the computer.

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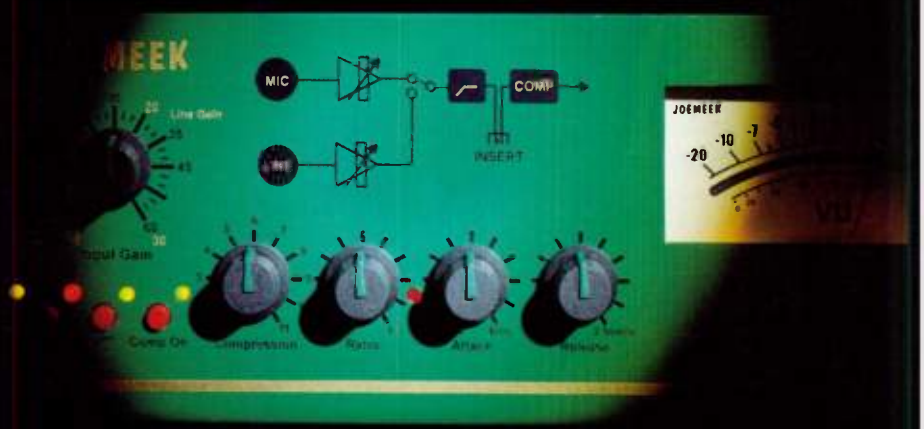

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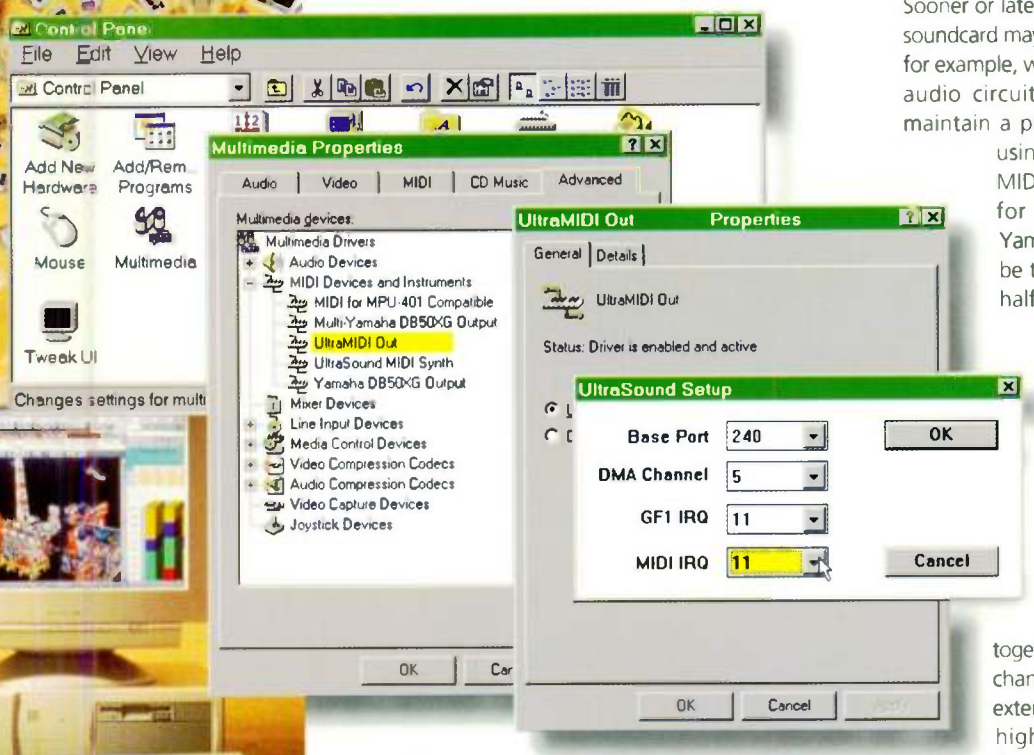
6. DAL CardD Plus users should use DMA 5 for playback and DMA 6 for record. This is because DMA channels are prioritised, and if you give the highest priority (number 5 for 16-bit channels) to the soundcard, clicks and pops should not occur because the SCSI controller is hogging the majority of the finite DMA time. Most PCI SCSI controller cards do not use DMA channels, and also provide better drive performance than those using DMA, so this becomes a prime consideration when choosing a controller card. Some soundcards, such as some of the Turtle Beach range (Monterey, Tahiti and Multisound) do not use DMA channels to shift audio data about, but a faster proprietary architecture called Hurricane, which is claimed to be up to eight times faster than DMA. This allows them to run more tracks of audio mixed down to stereo than the common-or-garden soundcard, although they are comparatively more expensive.

INSTALLING MULTIPLE SOUNDCARDS

Sooner or later, you will find that adding a second soundcard may solve an existing problem. You may, for example, want to use a card with higher-quality audio circuitry for hard disk recording, but maintain a previous card because you are still using its onboard CD-ROM interface, MIDI interface or WaveBlaster socket for a daughter board such as the Yamaha DB50XG. Another reason might be that your existing card only supports half-duplex operation, and by adding another half-duplex card, you will be able to record and play back simultaneously. If both cards support full-duplex operation, you will have the option of 4-track simultaneous record and playback, although the overhead in computer terms may be considerable. A useful compromise is to use one card for mono or stereo recording (one or two channels), and both together for playback of four simultaneous channels with independent outputs to an external mixer. Don't forget, though, that high-powered computers such as a Pentium 90MHz (or above) will have enough processor time to mix 4-8



Altering Windows 95 hardware settings for a Windows 3.1 driver is done via the Multimedia Properties window, as you can see.

JARGON BUSTER

• BIOS (BASIC INPUT/OUTPUT SYSTEM)
This is a chip on the computer's motherboard that contains all of the software routines commonly used to talk to the rest of the hardware.

• DMA (DIRECT MEMORY ACCESS)
This is used by soundcards to transfer sound directly from memory to output socket or vice versa, without using the computer processor. Although this allows software to carry on whilst sounds are being processed 'behind the scenes', there is a finite time allocated for total DMA. 16-bit soundcards normally use two DMA channels (one 8-bit and one 16-bit; although some like to use two 16-bit channels).

• DRIVER
A piece of software that handles the exchange of information between applications like sequencers (normally via Windows 95) and a particular piece of hardware. A driver needs to be able to send commands and data to the soundcard, and receive any data arriving at the hardware from the outside world.

• DUPLEX
Literally 'having two states'. Half-duplex soundcards can only record or play back, but not both at once. Full-duplex soundcards can perform these two operations simultaneously, which is almost a necessity for digital audio recording.

• GAMEPORT
Often provided on general-purpose soundcards to attach a joystick, but whether you have one or not, conflicts may arise with more than one soundcard using the default base address of 201h. For this reason, most cards have facilities to disable this port. If your card has this disabler option, it is often easier to take advantage of it if you are not going to use the joystick port.

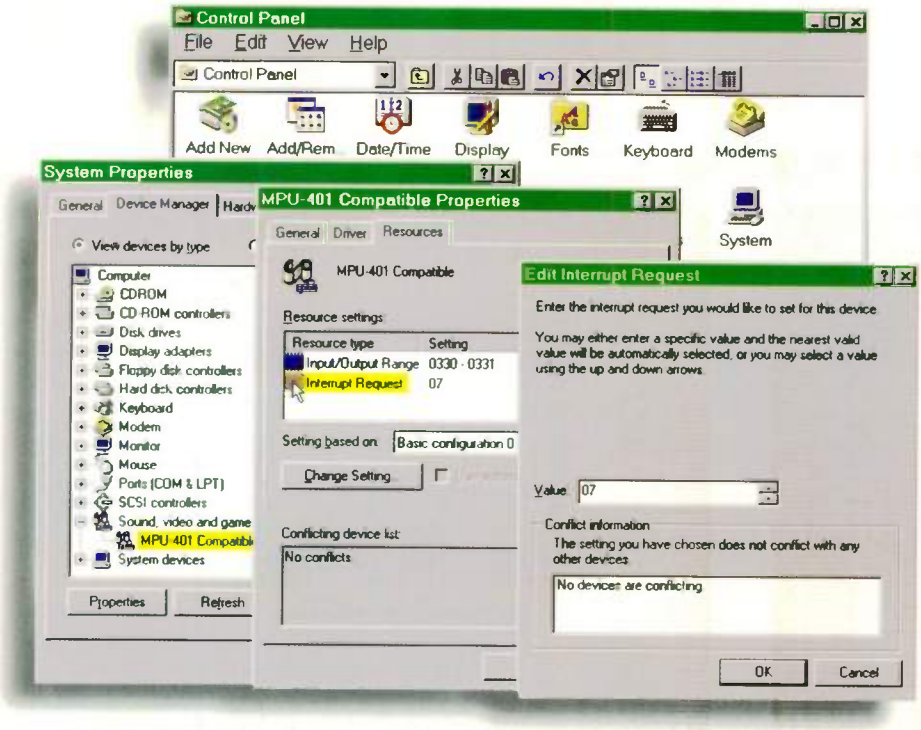
• HEXADECIMAL
A numbering system based on units of 16. Numbers in this format are followed by a small 'h' eg. 330h. As long as each device has a unique base address, you don't need to work out the equivalent decimal values.

• I/O (INPUT/OUTPUT) ADDRESS
Every piece of hardware will have some bytes of PC memory mapped to it, so that software can send or receive information to and from the hardware by just sending a value to this PC memory address. In effect, the hardware overlays the equivalent bytes of RAM, so that 'talking' to the hardware is identical to reading and writing to the same RAM address in memory.

• IRQ (INTERRUPT REQUEST)
Interrupts are a means of allowing regularly occurring operations to be automated. Suppose that we want to know whether a new MIDI note has arrived at the In port. Rather than constantly checking to see whether anything has happened, the MIDI Interface is designed such that the arrival of any MIDI data automatically generates an interrupt. When this happens, the computer processor remembers its current state, stops whatever it is doing at the time, deals with the note data, and then carries on where it left off.

• ISA (INDUSTRY STANDARD ARCHITECTURE)
The standard buss (card slot arrangement) used by most PCs for the last few years.

• NON-VOLATILE
A type of memory whose contents remain even after the power is switched off.



Altering hardware settings for Windows 95 drivers (this time from the System Properties window).

channels down to one stereo pair in real time, so unless you need more than two completely independent outputs, a single soundcard will suffice.

Installing two soundcards is perfectly possible (I have a couple in my own PC), but trying to allocate non-conflicting resources for them both can be a great source of problems. Since most soundcards will use one IRQ setting and one or two DMA channels, as well as extras for onboard MIDI or CD-ROM interfaces, you may have a lot of juggling to do before you can arrange it so that they will not interfere with each other, or with other hardware items already installed.

• PCI (PERIPHERAL COMPONENT INTERCONNECT)
The new standard for plug-in hardware used in most Pentium computers, and in the Apple PowerPC Mac.

• PLUG AND PLAY
The new standard for PC hardware cards containing onboard logic which stores the capabilities and resource requirements. These cards can be used both on new Pentium machines and older computers, because the specification does not require any change to ISA busses. The Plug and Play part of Windows 95 can interrogate the cards during installation, assign each a unique device ID and serial number, find the possible resource settings, and then report on any conflicts with existing devices, as well as changing the available settings automatically in many cases. In essence, Plug and Play is designed so that adding a device requires nothing more than taking it out of the box and plugging it in (famous last words!).

PLUG INTO THE FUTURE

Many PCs now have every single slot occupied, and most of their IRQs in use. In order to free resources for further expansion, the best way forward is to forget the piecemeal approach adopted so far and try to rationalise it. In my case, having two soundcards (one with a WaveBlaster daughterboard and CD-ROM interface) and a separate MIDI interface gives me a total of three MIDI Ins and Outs, as well as 4-channel simultaneous record/playback of 16-bit audio — in theory! However, by using one of the latest external multi-port MIDI interfaces, you can get up to eight Ins and Outs, save a slot, and get LED readout as well. For the same reason (ie. it saves on slots), more and more people are turning to SCSI devices, simply because up to seven of them can be externally attached to a single PC card, and can potentially be shared by your sampler or another computer.

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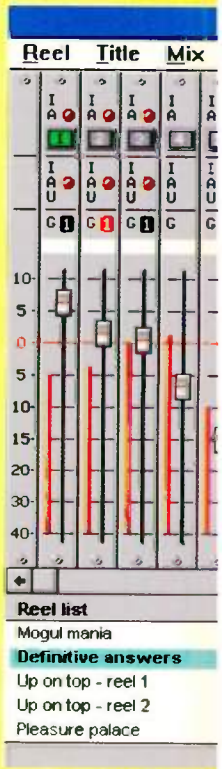

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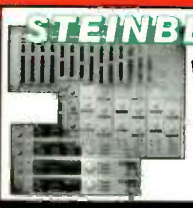

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Crash & Learn

COPING WITH CRASHES UNDER WINDOWS 95

AARRGGH! Just as you were about to save, your computer crashes, destroying the only record of your latest musical opus. What should be your next step? Before you douse your PC in aviation fuel and set it ablaze, calm down, and hearken unto the soothing advice of Crashmeister JANET HARNIMAN COOK...

How do you feel when your sequencing session is in full swing and the PC takes a nosedive? Shocked? Disappointed? Angry? Or do you, like me, experience all three? Work may be lost, and time is certainly wasted. But once you've overcome the temptation to open the window and pitch the PC into the street, take a deep breath, and reboot. Keep cool, be patient and bear two points in mind. Firstly, when your PC commits this apparent act of treachery and artistic vandalism, it is because it has encountered something so out of order that it has had to shut down. All crashes have a cause — they're usually attributable to badly-written software, faulty hardware or user error. Secondly, the best form of crash protection is to save your work after every edit, and regularly back up your major files. In this article, we shall examine the common causes of crashes in Windows 95, how to deal with them, and consider the steps that may be taken to prevent them. By the way, I must emphasise that the inclusion of an application in a crash screen does not imply that that software is particularly prone to crashing! It took a ludicrous amount of data to engineer the *Cubase* overload and the *Wavelab* screens were part of the same crash.

Figure 1: an overworked Cubase comes to a halt.

FATAL & RECOVERABLE CRASHES

There are two basic types of crash — fatal and recoverable. The fatal crash 'kills' the system, and all unsaved files are instantly lost. The PC hangs in a cursorless black screen, or may automatically power down and reboot. A common fatal crash type is a General Protection Fault (GPF), which occurs when an application attempts to access or allocate resources to memory areas to which it should not have access. It is as if the application has forgotten where it should place its data, and dumps it in the wrong place. This could be the result of corruption in the application files on disk, or a maybe a glitch in the software itself caused by poor programming. Normally, GPF crashes are fatal, unsaved data is lost and the application terminates. However, if you have installed GPF recovery utilities, such as the *WINProbe 95 CrashShield* or Norton *CrashGuard*, you are given the opportunity to save any unsaved work before closing the application. Needless to say, this can be a life-saver.

In a recoverable crash, your application displays an error message dialogue box to inform you that a non-fatal error has occurred. You will be given the option of terminating the program or continuing to run the application. If you quit you will lose unsaved data, so the advisable course is to attempt to continue, then save your work and reboot. Should you choose to ignore the error message and continue to run the application, then ▶

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Coping with PC crashes

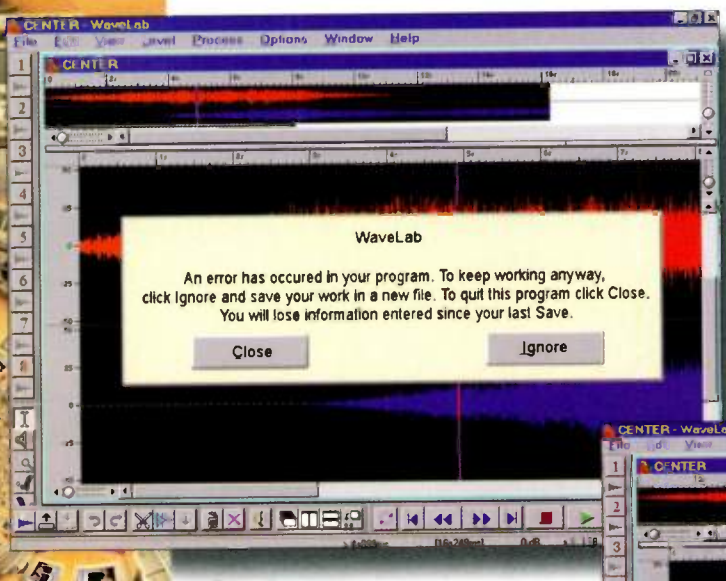

Figure 2.

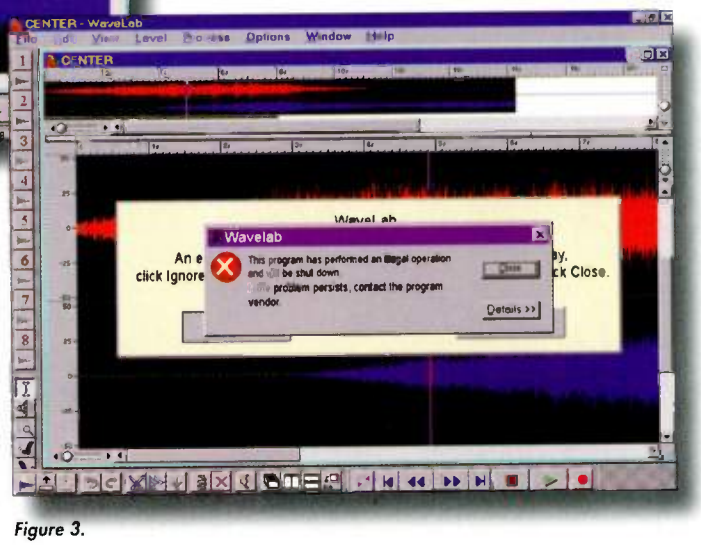

Figure 3.

▶ you accept the risk of creating corrupt work files. These may simply fail to load, or may even crash the application. Other minor crashes may cause your applications to halt the current task, but do no actual damage. For example, if you overtax your PC resources whilst running *Cubase*, you will be presented with a dialogue box stating that your system is too slow and playback has been stopped (see Figure 1). You are advised to mute audio tracks or choose a less demanding lower sample rate; all very polite! Following a crash, the audio editor *Sound Forge* will, in a most considerate fashion, give you the option of converting the unerased temporary files back to useable Windows wavefiles (.WAV).

STRICTLY ILLEGAL

Sometimes, when problems occur, Windows 95 will intervene. A dialogue box appears explaining that an illegal operation has been performed — the PC's way of telling you that something untoward has happened. The details box provides further information as to the cause of the crash. In our example, *WaveLab* is having difficulties with the soundcard, and the information presented refers to a glitch caused by the Multisound drivers (see Figures 2 and 3).

A more severe crash is when your application freezes or locks. Although the application workspace continues to be displayed, pointer control is lost, and your MIDI output may resort to playing the Chord From Hell. To free the system, resort to the keyboard reset (Control + Alt + Delete). A pop-up dialogue box should appear listing active applications. You will then be given the choice of waiting, in case the application is simply busy, or of exiting and returning to Windows 95. If you are unlucky, you will get the dreaded 'Blue Bomber' screen, which starkly informs you that your application has become unstable. The choices are to again return to Windows 95, or perform a keyboard reboot. Either way, your current work is lost. At worst, Windows 95 will crash. If the screen hangs in black, then power down the computer. Wait a minute, then switch back on. This gives the computer time to chill out electrically.

HARDWARE MALFUNCTION

Physical breakdown is rare, and most faulty components show up during initial installation. The PC boot routines will usually pick up failed devices. For example, if the video card is down, the monitor will not produce a text display. Drive or RAM failure is reported by the BIOS. If installed devices fail — such as soundcards, MIDI interfaces, network cards and SCSI cards — a Windows 95 'Non Detection of Hardware' error message will report the fact. If the fault is intermittent, the device may work properly for a while, then fail and revive seemingly at random. Consequently, tracking down intermittent faults can be tricky! The only evidence of the breakdown may be system instability (which will show up as repeated crashes) and the faulty device will cause other system components to misbehave, which may mask the underlying cause. For instance, a faulty video card may cause MIDI applications to ▶

WINDOWS 95

Windows 95 has proved a more robust operating system than Windows 3.1. I used Atari and Amiga systems before moving to a 486 DX2 66MHz PC, and by comparison, Windows 3.1 on the PC had a significantly lower crash rate. Since upgrading to a Pentium 100 running Windows 95 some nine months ago, I estimate the crash frequency has fallen by a further 40%.

This improved stability is achieved because Windows 95 itself monitors system activity down to hardware level. Unlike Windows 3.1, which relied on DOS to perform this role, Windows 95 supervises the allocation of system resources — memory, CPU, ports, drives and other I/O devices — according to the needs of active applications. This enables faster reporting of hardware discrepancies and earlier detection of badly-written code — especially that of device drivers such as soundcards and MIDI interfaces. If an application runs out of control, Windows 95 can prevent it trashing memory areas required by other applications. A protection routine called an 'exception' is placed on each memory area, and Windows 95 intervenes if an illegal read\write attempt is made, so averting a potential crash.

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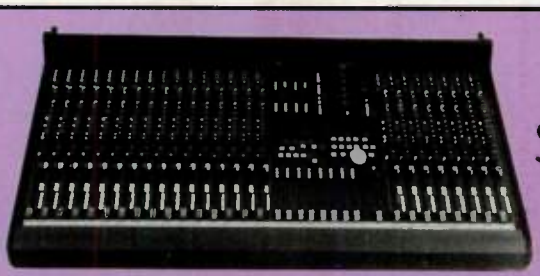

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Coping with PC crashes

underperform and crash. There may be related clues that surface when you run other applications, such as screen glitches in your word processor. The best way to test for intermittent faults is to replace a suspect component, and if the fault clears up, then your suspicions are confirmed.

Serious hardware crashes are fortunately relatively rare. For real scary 'nothing-gets-out-of-here-alive' stuff, how about the rogue power supply that, as it self-destructs, not only bombs the software but also sends high-voltage spikes that destroy the motherboard, melt the processor and vaporise the RAM? In fact, probably the worst hardware fault you may experience is a hard disk crash. Drives wear out, and hard disk audio recording in particular takes a heavy toll. Sectors of the drive become permanently unuseable, and the internal format data used to configure storage areas may be corrupted. The drive will become useable only after reformatting, and this erases all previously-stored information. Data on dead drives *can* be recovered, but it is a specialist operation, and can be expensive. Prevention is better than cure, and the answer is to regularly back up important files to another drive, to DAT or to CD-R.

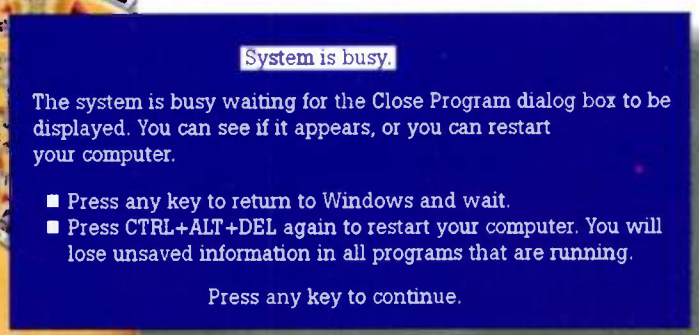

Figure 4: the dreaded 'Blue Bomber'.

F-PROT ANTI-VIRUS SOFTWARE

The English-language shareware version of the *F-Prot* anti-virus program is free for non-business use on your own computer. Updates are available via the post, from BBSs, or via FTP. The primary method of distribution is through SimTel and Garbo, and all mirrors of those sites should always carry an up-to-date version of *F-Prot*. The primary locations are given at the bottom of this text (xxx, incidentally, stands for the version number — for example, 222 is version 2.22).

A Frisk Software International, Posthólf 7180, IS-127 Reykjavik, Iceland.
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POWER SUPPLIES

According to some estimates, over 60% of PC breakdowns are caused by electrical failure. Computers need a constant, smooth, regulated AC flow of mains electricity. However, the quality of mains electricity varies widely depending on where you live, and even on what time of day it is. A blackout is when the power is cut altogether; the less commonly-known 'brownout' is when voltage level drops. A surge is a sudden gain in current amplitude, and a spike is a sudden rise in voltage. Another common problem, line noise, originates in RF and electromagnetic interference; an example of this is when you put a portable radio near your computer, and it picks up a horrid buzz. In a similar way, the power supply to your PC can be affected by the electrical proximity of photocopiers, microwaves, fridges or air conditioners, as it is typically a basic unit with a low tolerance for such electrical problems. For modest PC setups, £25-30 will buy a filtered 4-way output block (plugboard) to protect against line noise, surges and spikes.

Power cuts of less than a millisecond can crash a PC, unless you have an uninterruptable power supply (UPS). When the mains supply falters, an off-line UPS electronically switches on a battery which gives ▶

WINProbe 95 main screen.

QUARTERDECK *WINPROBE 95*

This wonderfully useful, well-presented hardware diagnostic, system analysis and system maintenance program for Windows 95 includes *CrashShield* for GPF file retrieval and the *WinProbe Knowledge Base* (an excellent introduction to Windows 95 and PC hardware which features a soundcard installation guide and troubleshooter). *WinProbe95* will monitor memory and system resources and alert you if they drop to the point where system performance is affected adversely. It can analyse your PC's hardware and system software configuration and run checks to ensure that your hardware is set to produce optimum performance. Additionally, a stress test can help to locate intermittently failing components. You can also fine-tune the Windows 95 Registry and system startup files. The *WinProbe Backup* utility creates a backup of essential system files and can be used to restore your system setup should you need to reinstall Windows 95. Highly recommended.

£ *WINProbe 95* (on CD-ROM) £57; *CleanSweep95* £46. Prices include VAT.
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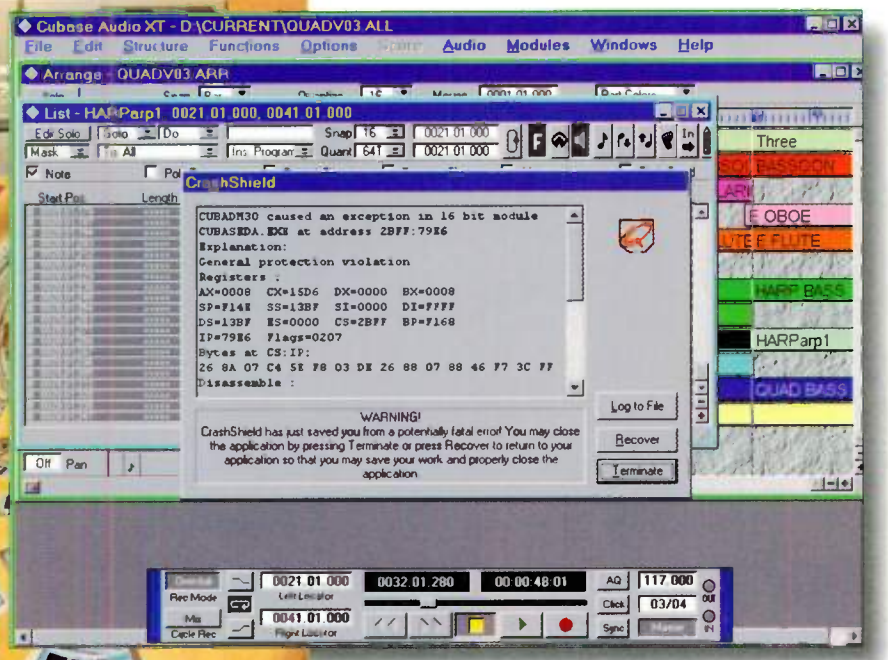

Figure 5: WINProbe 95 CrashShield in action, fighting off a General Protection Fault for long enough to give you time to save.

▶ you five or six vital minutes of power to complete simple tasks, save and quit. Off-line UPS protection for desktop computers starts at about £100. Occasionally, however, the fraction of a second needed for the off-line UPS to switch in is sufficient time for the computer to go down. The fail-safe solution is an on-line UPS which permanently powers the PC. Prices start around £250.

SLOW HARDWARE, RAM & DRIVES

System instability can be caused by hardware which is functioning correctly but cannot attain the performance level required by the application. This is most commonly down to lack of RAM, sluggish data transfer rates from hard disk, or a slow processor chip. The new generation of PC applications are extremely demanding. You need a very powerful PC to realise the full potential of 'MIDI + Audio' applications like *Logic Audio*, *Cubase Audio* or *SAW Plus*. A very good way of avoiding crashes is to be realistic about the capabilities of your system, and run within them.

When RAM gets low, performance suffers: the system slows down and exhibits an increased tendency to crash. Closing down applications not in use conserves memory, but bear in mind that Windows 95 needs at least 16Mb of RAM just to run most basic applications. For simple 'MIDI + Audio' multitrack and editing applications 20Mb is better; in fact, the golden rule is that you can never have too much RAM.

Older hard drives may be too slow to achieve the sustained data transfer rates required by hard disk recorders. The application will be subject to playback and record interruptions, and may even shut down. The only solution is to replace the drive with a faster model — you can always use the old drive for less demanding tasks, such as archiving. Drives subject to thermal recalibration are generally unsuitable for use in hard disk recording and CD-R transfer, as during thermal recalibration the hard drive suspends its data flow. Though the audio data is usually buffered, thermal recalibration can still cause interruptions in recording and/or playback (especially if multiple tracks are in use), and may well induce a crash. ▶

CRASH PREVENTION PLAN

A: AFTER EACH SESSION
- Run *ScanDisk* and *Defrag* to optimise your hard drives.

B: WEEKLY, OR AFTER EVERY CRASH.
- Locate and delete temporary files — ideally use *CleanSweep 95*, then run *ScanDisk* and *Defrag*.

C: MONTHLY AND AFTER SYSTEM CHANGES
- Check all external PC cables are secure (do this whenever you move the computer).
- Run weekly regime.
- Use *WINProbe 95* to check system, and if needed run *WINProbe 95 Backup*.
- Use virus checker.

D: AFTER REMOVING THE PC'S LID
- Always check all internal cards & cables are aligned correctly and seated securely before replacing lid.

GLOSSARY

• APPLICATION
Suite of programs bundled together to perform a task or task set such as MIDI sequencing.

• COLD BOOT
Powering down completely, pausing and switching back on via the PC front panel mains switch.

• DOS
Microsoft Disk Operating System.

• EXCEPTION
Protection placed by Windows 95 on an area of memory to preserve integrity of use.

• FREEZE
Type of crash where an application locks up whilst still displaying workspace.

• GPF
General protection fault — usually a fatal crash.

• I/O DEVICES
Data input and output devices (two-way).

• INPUT DEVICES
Include mouse, keyboard, MIDI In.

• LEGACY WINDOWS
Windows 3.1.

• MULTITASKING
Concurrent processing — the ability to run multiple applications at the same time.

• PORT
Input/output (I/O) memory address used by device to share information with computer.

• RAM
Random Access Memory — your computer's main memory area.

• SCSI
Small computer systems interface — protocol used to control hard drives, CD-ROM, scanners etc.

• SECTOR
Section of hard disk track.

• SWAP FILE
Area of hard drive requisitioned by windows for use as a temporary file storage area.

• TROUBLESHOOTER WIZARD
Routine designed to guide user through solving hardware conflicts in Windows 95.

• VIRUS
Intrusive, self-replicating program deliberately written to cause mischief or data loss.

• WARM BOOT
A quick reset from the front panel or keyboard (Control + Alt + Delete).

• WINDOWS 95 REGISTRY
Database in Windows 95 used to store system configuration details.

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Coping with PC crashes

SWAP FILES, FRAGMENTATION & CORRUPTION

Windows 95 requires up to 50Mb of hard disk for its swap file — the place where temporary files are stored. Less than 50Mb of free disk space will increase the chances of crashes. Applications also grab disk space for temporary file buffers, and after a crash they may be left uncleared on the hard disk. Quarterdeck *CleanSweep* (£46) is invaluable for removing files that applications scatter around Windows during installation, and is also a must if you copy demos, shareware and PD programs from computer magazines' free cover disks.

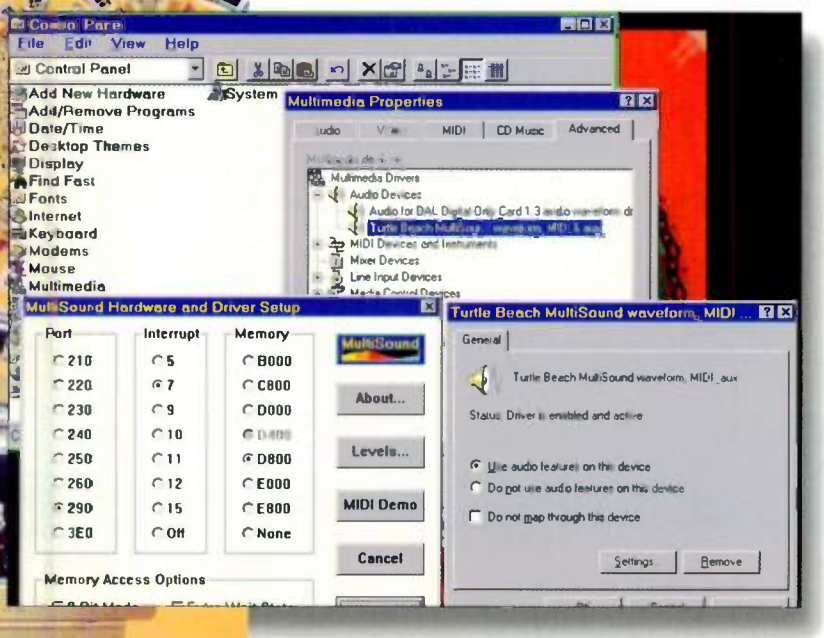

Figure 6: running Windows 95's built-in diagnostics on a soundcard.

In everyday use, files on the PC's hard drive can become fragmented. Rather than being written sequentially, the file is scattered in different locations across the drive, so that to read the file, the disk heads must chase around the drive surface collating the file segments. This slows the drive down considerably, and will cause data transfer rates to drop unacceptably. To remedy this, use the *Defrag* utility in Windows 95. *ScanDisk* (also found under Windows 95) is used to check the surface of your hard drive and correct simple errors. It is advisable to run *ScanDisk* and *Defrag* after each session to ensure optimum disk performance.

Never power down your PC without first closing Windows. Doing so will cause a crash that could damage application or operating system files. Fatal damage of this type necessitates the removal and reinstallation of the corrupted application. If system files are damaged, you may have to reinstall Windows 95. Unless you have a system backup disk, you will lose your applications' own system files (see the *WINProbe 95* box elsewhere in this article), which will mean reinstalling your cards and applications. Please note that the Windows 95 startup disk simply enables the C:\ prompt from which you can reinstall Windows 95. It does not restore customisation preference files such as desktop and taskbar configurations.

File corruption can also occur through poor storage of magnetic media, like floppy disks and DAT. It is best to keep these in a dry, dust-free environment at an even temperature, and away from electrical cables and RF sources like monitors or televisions.

VIRUSES & DIAGNOSTICS

Data corruption may also be the result of your system being infected by a computer virus. A virus is a program that spreads by attaching itself to a host program or to the computer's boot record (startup area). When the host is run, the virus activates and copies itself to other programs. A common source of infection is pirate software, and the consequences of virus infection vary from the silly and merely irritating (eg. daft messages or graphics flitting unbidden across your screen) to the appalling and catastrophic (complete system crash and self-wiping hard disk). About 8000 different viruses have been identified in all, and protection is available through utilities such as Norton *AntiVirus* v2. A shareware alternative for personal use only is *F-Prot* (see separate box for details).

Finally, it's worth mentioning that Windows 95 includes its own diagnostics routines — you can examine your system configuration in the Device Manager under System Properties. Double-click on the computer icon to display Computer Properties and view system resource settings (see Figure 6). If you have devices that do not have specific Windows 95 drivers, they will not appear in the IRQ list. More information on resource settings can be found in Martin Walker's article on installing soundcards, which starts on page 164 this month. Lastly, don't forget that Windows 95 Help includes a Troubleshooter wizard to help you solve hardware problems. SOS

Special thanks to: Trevor Learoyd of Northern Synthesizer Service Centre, Bradford (UPS), Godfrey Small of AMS (Windows 95) and Ben Robinson (hardware). Screen reconstructions by Michael Shackleton.

CABLES & CONNECTORS: POINTS TO NOTE

- Before replacing PC components, first check that leads and cards are firmly seated in their slots and sockets.
- Be gentle when handing internal ribbon cables, as they are very easily damaged.
- Check any suspect cables by substituting another of proven reliability.
- Reversed connectors are a recipe for disaster, so always ensure they are aligned correctly; a chinagraph pencil is useful for marking the original orientation.
- Mains plugs should be checked periodically to ensure that wires and fuses are securely located, and under no circumstances should the mains earth be removed.
- Check all audio and MIDI connectors similarly, and remember that rough handling can destroy delicate mini-jack and phono card connectors.
- Always take precautions against Electro Static Discharge (ESD or Static) before handling PC components
- Wear an anti-static strap and avoid touching card surfaces. Static electricity from your clothes and fingers can scramble the instruction sets encoded on the microchips, and this leads to instability and crashes.

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Card Times

ALL ABOUT SOUNDCARDS

PART 2: BRIAN HEYWOOD concludes his look at PC soundcards by considering some of the issues involved in using them to record and play back digital audio.

Last month, I looked at the various types of synthesis offered by different PC soundcards; this month, I'm looking at how to generate sound from your card in a different way, using the digital audio playback and record capabilities offered by some MPC soundcards.

MIDI VS. DIGITAL AUDIO

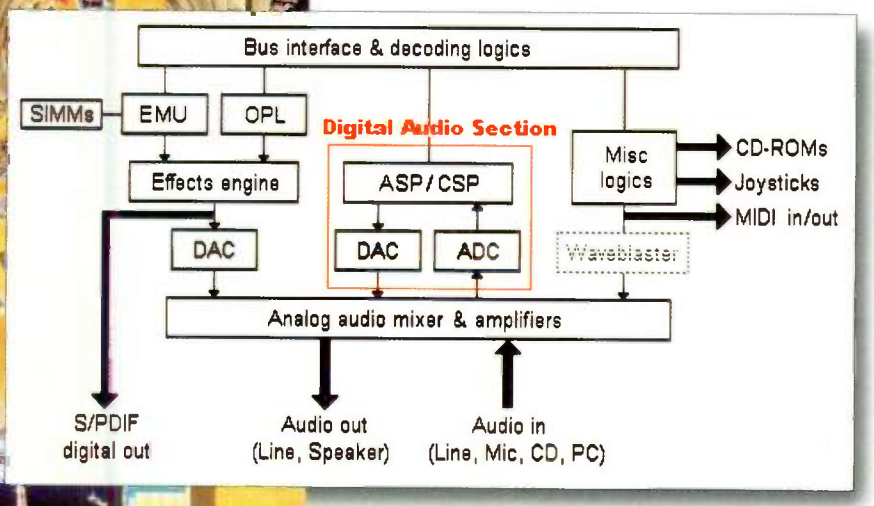
Digital audio playback via your soundcard is actually conceptually simpler than MIDI synthesis, in that your PC is simply being used as a glorified playback unit. In this case, the audio is stored digitally on your PC's hard disk, and then converted to an analogue signal suitable for amplification by the circuitry on the soundcard. You are far more likely to hear digital audio playback than synthesis from your trusty PC in multimedia applications, for two reasons: firstly, the quality of playback is far more predictable; and secondly, it is easier to produce an audio file than a MIDI file, since the latter requires a certain amount of musical skill. In fact, if you want to use your MIDI system to produce a multimedia soundtrack, you may end up mixing it down into the PC's .WAV digital audio file format to ensure that quality is maintained across the wide range of available soundcards, rather than creating a MIDI file which may seem of lower quality when reproduced using the sounds on an inferior card.

From a technical standpoint, digital audio playback is simpler than synthesis as well, since all the soundcard has to do is to turn a digital number into an a voltage, rather than perform the mathematics required for true synthesis, or the polyphonic scanning of memory required for wavetable playback. In some ways, *recording* digital audio is also technically simpler for the PC than recording MIDI: with digital audio, the PC hardware has to scan the audio input on a regular basis (ie. at the sample rate, for example 22.05kHz) and transfer the information to disk. This happens regardless of whether there is any signal present or not, and silence takes up as much space on your hard disk as an audio signal. A MIDI performance, on the other hand, is far more unpredictable. MIDI data will not arrive at the PC at all in quiet passages, and then can arrive thick and fast in note-heavy passages utilising plenty of controllers. This means that interrupt handlers need to be used (see the 'PC Concepts Explained' box elsewhere in this article).

SOUNDS FINE, BUT...

Like the synthesizer section of a soundcard, the digital audio playback section needs to have a driver that allows Windows audio applications to access the audio hardware using the standard Windows Applications Programming Interface (API). While digital audio playback and recording is conceptually simpler than MIDI, this driver does have to be well written in order to cope with the sheer amount of data generated to reproduce audio digitally, and to cope with the constant, relentless nature of the process. When you purchase your soundcard, it is important to make sure that you find out where (and if) such drivers are available.

The only troublesome technical aspect of digital audio *playback* (as opposed to recording) is the large amount of data that has to be transferred between the disk and the digital-to-analogue converters. When sampling at the oft-quoted 'CD quality' ▶



Block diagram of the popular AWE32 soundcard from Creative Labs, showing how small the digital audio replay section is.

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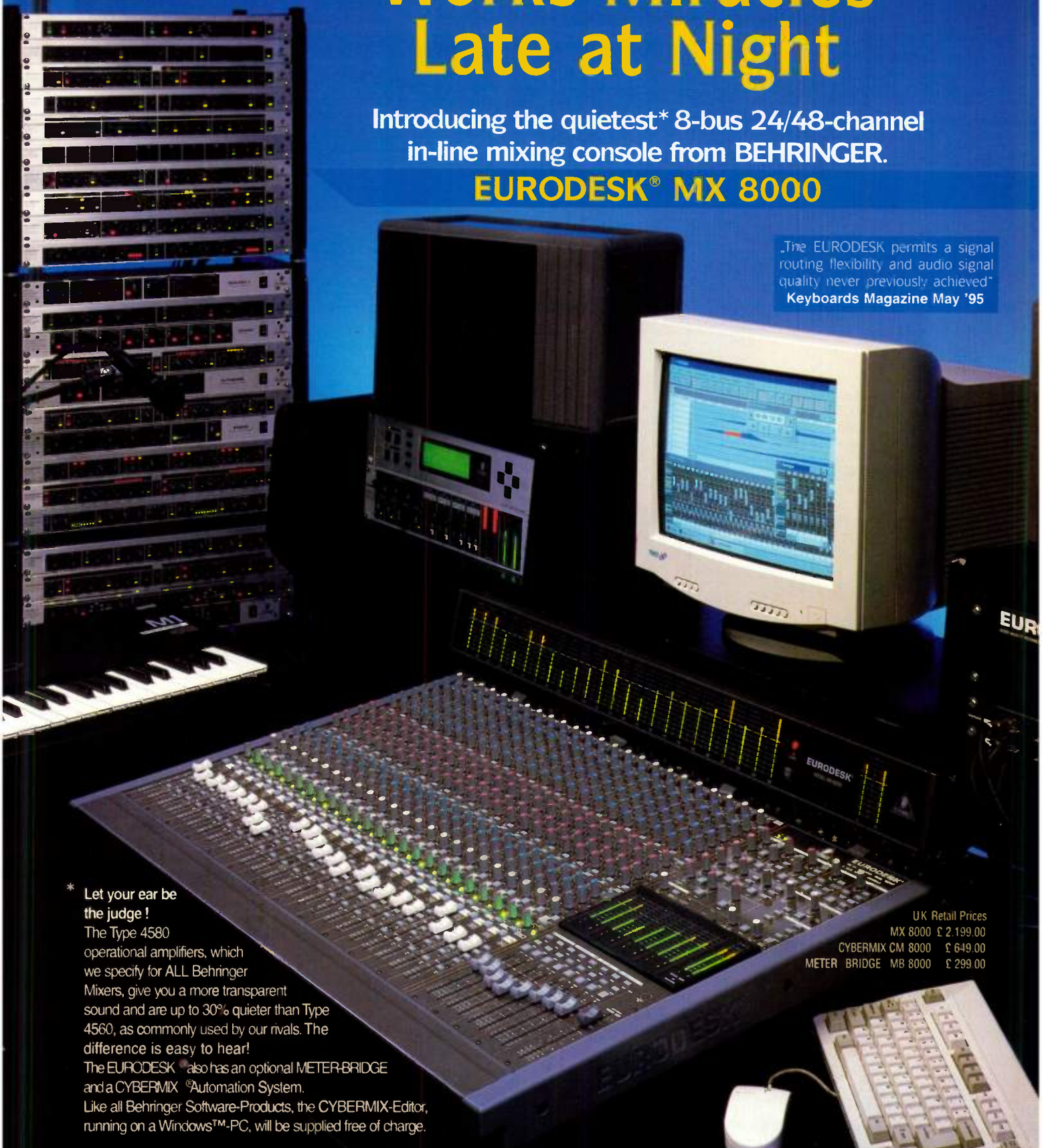

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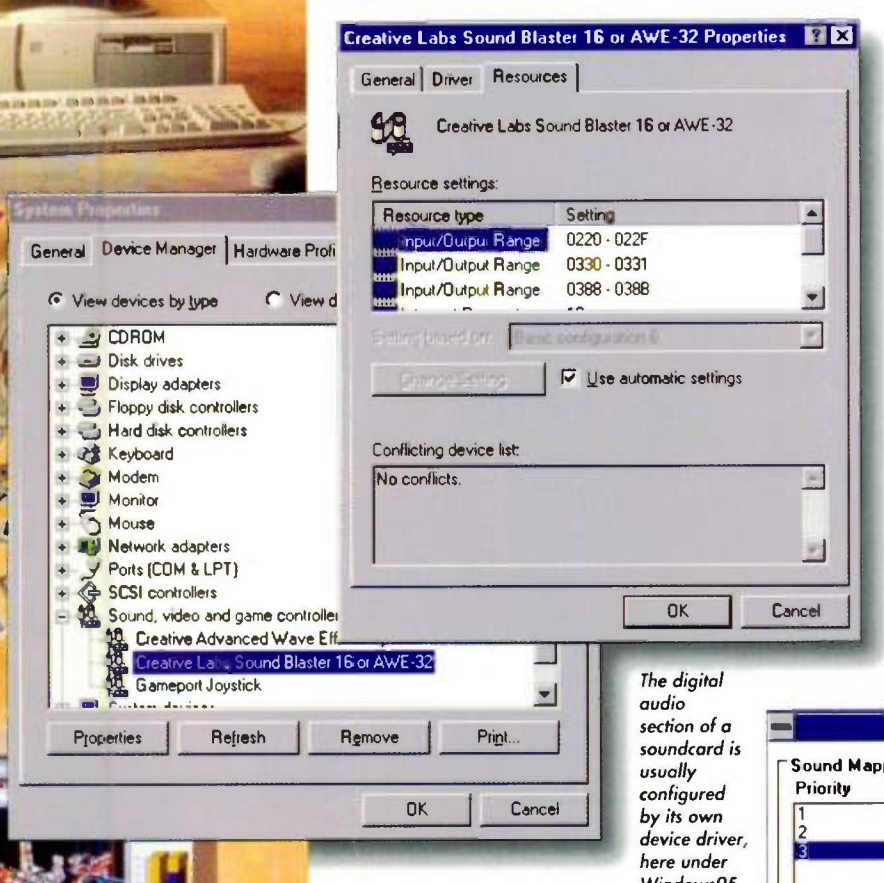
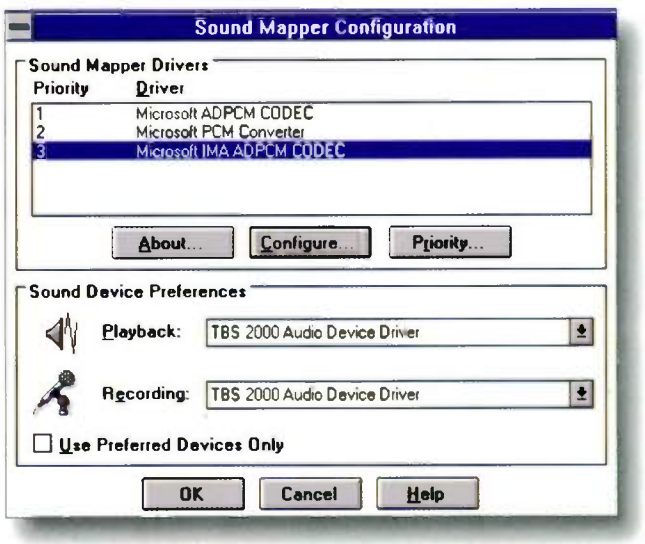


The digital audio section of a soundcard is usually configured by its own device driver, here under Windows95.

useful tips on how powerful a PC needs to be to play back digital audio reliably, although the software you use can also have an effect on how many tracks you will have available — take a look at the same article for some useful tips on how to optimise your PC's performance for digital audio.

CD OR SEEDY QUALITY?

If you're planning on using a soundcard for musical applications, the quality of the card's audio output is obviously going to be important, and you may encounter many cards claiming to offer 'CD quality' output. This is a bit like seeing a second-hand car dealer called 'Honest John's', or believing that a politician will keep their pre-election pledges after they get into office. The 'CD quality' label usually simply refers to the ability to play back 16-bit stereo sound sampled at 44.1kHz, and doesn't say anything about the quality of the analogue circuitry between the converters and the external connectors. As many soundcards are targeted at the games market, they have to be extremely competitive on price, and



Under Windows 3.11, there is a separate Sound Mapper device, but not all PCs will have this installed.

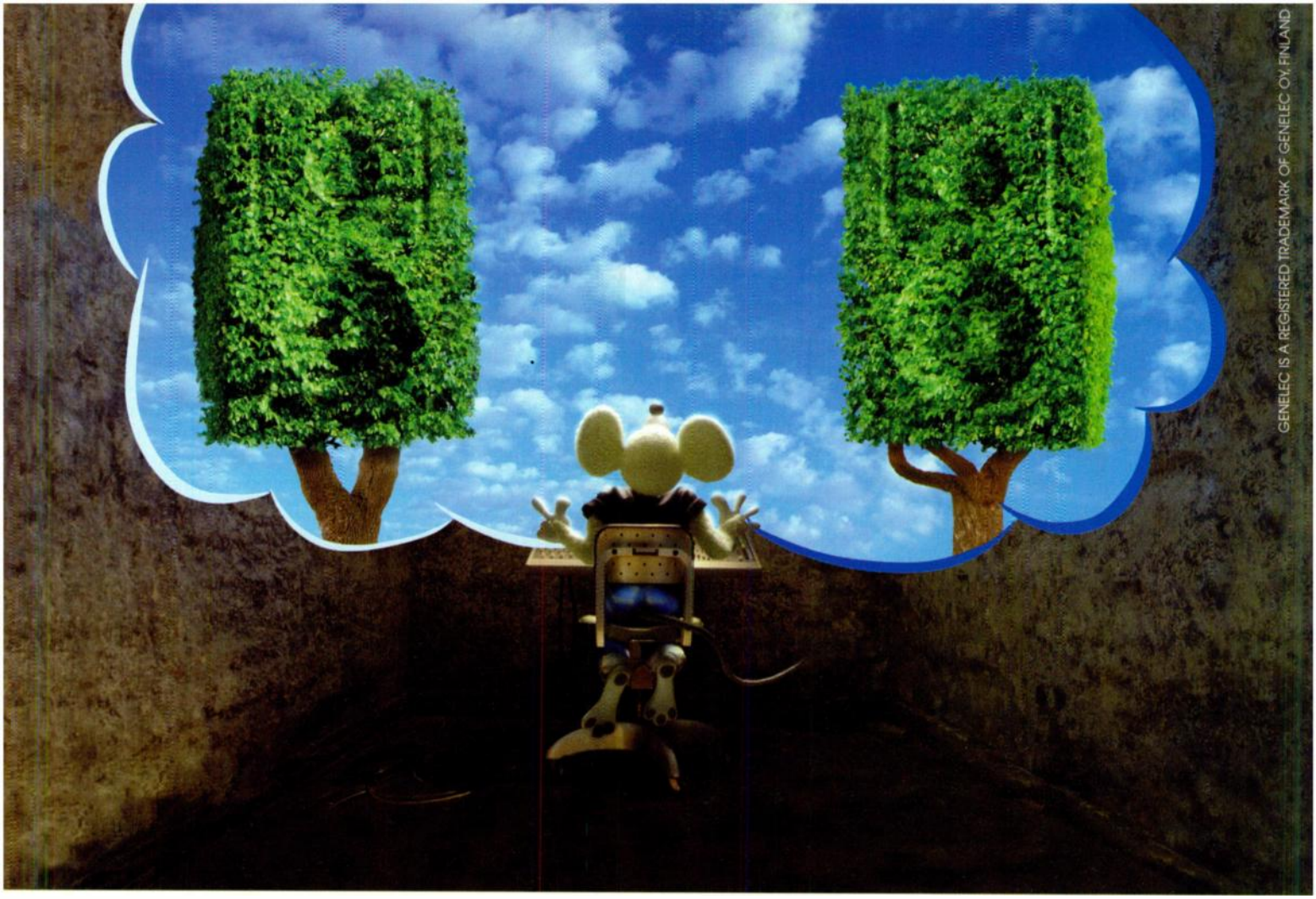
▶ (16-bit stereo at 44.1kHz, but more on this in a minute), the PC has to shift just over 10Mb of data across the data buss every minute, or 175K per second. This might not sound a lot in computer terms — after all, even the original IBM PC's data buss ran at 4.7MHz. However, audio data has to cross the buss *twice* — it is read from the converters into RAM, and then written from RAM to the hard disk. It also has to compete with other data that wants to use the buss, like graphics (and other) information read from the hard disk. Unlike this other data, though, audio data can't wait if the data buss becomes momentarily clogged; if the data doesn't get through, it's lost for ever (if you're recording) or appears as stuttering (on playback). Martin Walker's article on PC hard disk recording requirements in the PC Musician section of last month's *SOS* gives some

corners are often cut on the analogue circuitry. I've heard reports that the least significant two or three bits on cheaper cards are simply random numbers (ie. noise), which reduces the effective sample size to 14 or even 13 bits. Certainly, some consumer CD players have better audio characteristics than the majority of soundcards on the market. However, there are a number of cards on the market that can produce true CD quality. Cards like the Gravis UltraSound Max, the Roland RAP10, the more expensive Turtle Beach cards and the Terratec Maestro 32/96 card (mentioned in October's PC Notes) all have nice clean audio outputs. Of course, it depends on what you want from your system; the SoundBlaster AWE32, for example, is perfectly adequate for producing demos, and many other cards fall into this category.

Apart from the quality of the analogue circuitry, there are other factors that affect the quality of a soundcard's audio output, the most important ▶

DISK SPACE REQUIREMENTS FOR DIGITAL AUDIO DATA (MB/MINUTE)

SAMPLE RATE	11.025kHz	22.05kHz	44.1kHz
BIT RESOLUTION			
8-bit mono	0.66Mb	1.3Mb	2.6Mb
8-bit stereo	1.3Mb	2.6Mb	5.25Mb
16-bit mono	1.3Mb	2.6Mb	5.25Mb
16-bit stereo	2.6Mb	5.25Mb	10.5Mb



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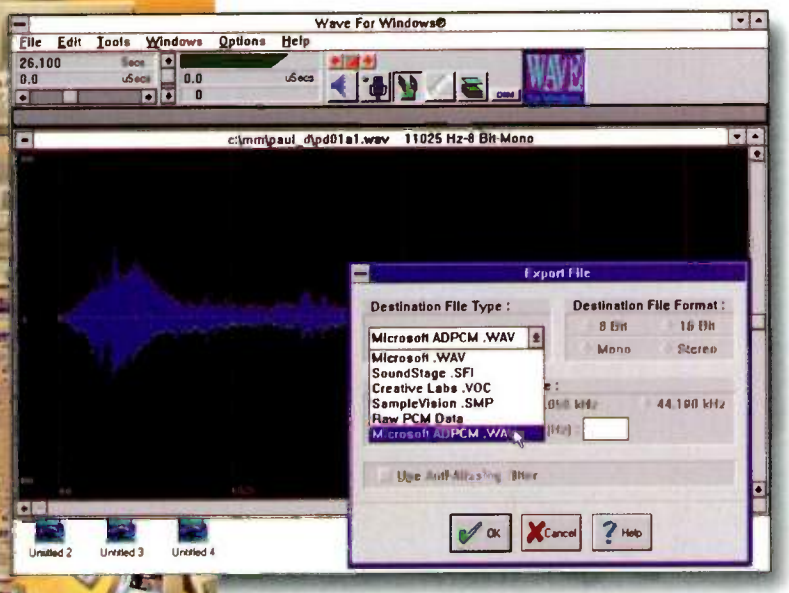


Wave editing software (such as Wave For Windows, shown here) will usually be able to export recorded audio data in various formats, allowing sample rate and format conversion.

▶ being the quality of your PC's power supply, which was probably not designed with audio in mind. Some cards take this into account, and heavily filter the power lines on the card, but this adds cost to the card. Another potential problem that occurs when you have audio electronics inside the PC's case is that of radio frequency interference (RFI) between adjacent expansion cards. This can be reduced by keeping video and hard disk controller cards away from the soundcard. You may have to try various configurations before you find the best arrangement.

SYNCHRONICITY

Aside from the audio functionality of your soundcard's digital audio section, another point to consider is whether it has a full or half duplex capability — ie. whether or not you can play back and record audio simultaneously. This might not seem too important, but consider how difficult it could be to record a backing vocal without being able to hear the original (I know, I've tried it!).

Martin Walker pointed out last month that you could record in 'sync' using a MIDI backing track for reference, but this falls down if you need to record a track that fits with one that is already on disk. To perform this task, a full duplex card needs to have two independent access channels — usually DMA channels — and this takes up twice the buss resources that a half-duplex card requires. Such added complexity makes the card more expensive to manufacture, the software driver more expensive to develop, and installation more problematic — so it's perhaps not surprising that most games soundcards don't bother with full duplex operation. Still, there are a reasonable number of cards available with this facility. Cards from Gravis, Roland and Turtle Beach have had it for quite a while, and the SoundBlaster AWE32 driver has recently been updated to provide full duplex operation (call 01734 344744 if you need a driver update). Again, it's always worth asking when you buy a card whether it has this capability.

THE DIGITAL CONNECTION

Until now, we have only considered cards that play back samples as an analogue audio signal. There are situations that you might want to transfer the audio direct to or from other digital media (like DAT), while remaining in the digital domain. Alternatively, you might want to use external converters to side-step the interference

THE WAVE OF THE FUTURE?

Last month, in his article on PC desktop music systems, Paul White mentioned software synthesizers that use the digital audio outputs of your PC to output waveforms generated by the program. There is of course nothing new about this — tracker applications have been doing it with MOD files for ages. A MOD file uses short samples to produce sounds, transposing them on the fly to create tunes. Many games soundtracks have been created using this method, but what is now new is the ability to control the software synthesizer in real time via MIDI; although, as Paul pointed out, this process does require a lot of processing power. The most successful software synth to date comes from Yamaha, but you need at least a Pentium PC to be able to take advantage of this technology.

MORE PC CONCEPTS EXPLAINED IN BRIEF

Many of the terms used in this month's article were clarified in the 'PC Concepts Explained' box in last month's instalment of this article. Many others are also explained in Martin Walker's article on configuring soundcards, which starts on page 164 this month.

• MIDI INTO DIGITAL AUDIO
One question often asked is how a MIDI file can be turned into an audio file on your disk. It would be a relatively simple task for one of the software synthesis packages to do this (at least compared to creating a MIDI file from a mixed audio file — the data just needs to be written to disk rather than to the digital-to-analogue converters), but at present, I don't know of any application that performs this task. So, at the moment, the only way to do this is to loop your soundcard's synthesizer output to its line input, and record it that way.

• DSP (DIGITAL SIGNAL PROCESSOR)
This is a computer processor specifically designed to handle the type of maths required for processing sampled analogue signals. Originally developed for radar and radio signal processing, they have been applied with great effect to digital audio signals; in fact, you find some sort of DSP in every type of digital effects units. A soundcard equipped with a DSP can make use of it to relieve the load on the PC's main processor when playing back digital audio.

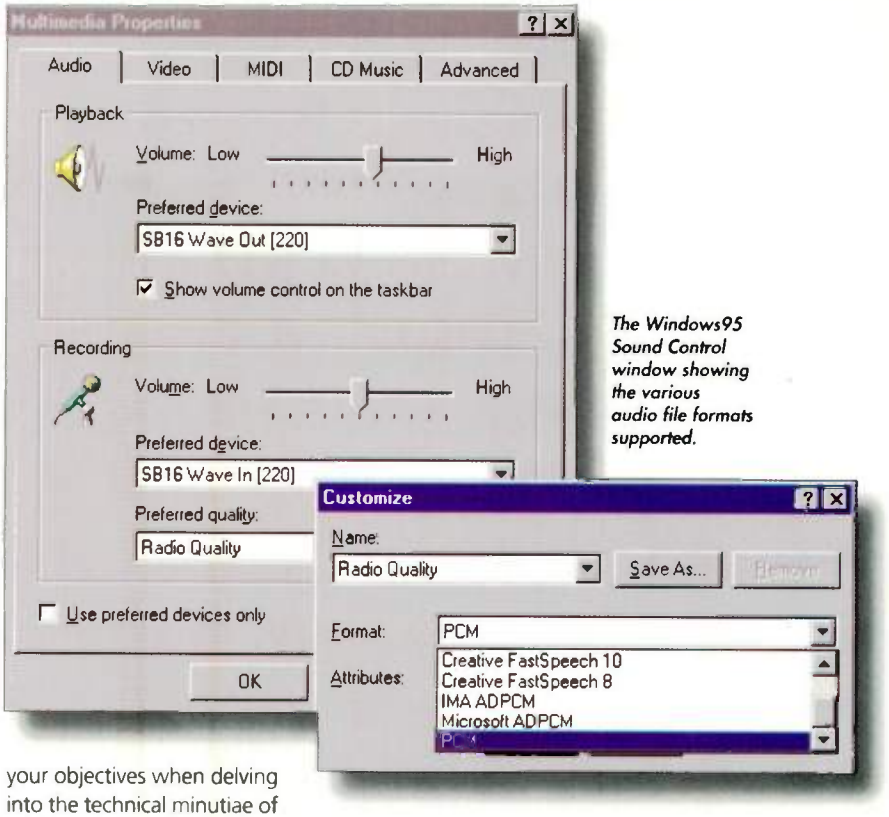
• IRQ (INTERRUPT REQUEST) LINES
The interrupt lines allow PC hardware to alert the processor chip that a high-priority event has occurred and needs attention. This means that unpredictable events — like MIDI bytes from a live performance — can be read by the PC without tying it up completely. Theoretically, the IRQs can be shared between a number of soundcards, but in practice this almost never happens..

• PULSE CODE MODULATION (PCM)
The protocol used by Windows to encode the audio data into the .WAV file format. This format can handle a wide range of sample rates, bit resolutions and number of audio channels. There is also a variant protocol called ADPCM that compresses the audio data, thus reducing the size of the file.

problems you can encounter with analogue audio circuitry inside the PC. I've only encountered two digital cards: Creamware's TripleDAT and DAL's CardD. These cards have S/PDIF (Sony/Philips Digital InterFace) connectors that allow the digital information to be directly transferred to and from the PC, with none of the possible signal degradation that can occur when digital audio is converted into an analogue signal, sent to another digital medium, and reconverted to a digital signal there. The AWE32 card is curious in that you can take the output from the onboard synth as a S/PDIF signal, but not digital audio. More cards with digital outputs are due on the market in the next few months; the aforementioned new card from Terratec will have two digital outputs and one digital input, and there have been persistent rumours that a new Yamaha card will have digital ins and outs.

THE BOTTOM LINE

A computer with a soundcard, even if it has a modest digital audio replay section, can act as a very compact and easy-to-use music workstation. If you are producing demos, or using your computer as a kind of musical notepad, then the digital audio section of a soundcard can add a lot of impact, even if it's only used to add a vocal line. However, bear in mind that it is very easy to lose sight of your objectives when delving into the technical minutiae of audio equipment. There is not a lot of point insisting on high-quality audio — say a 90dB noise floor — unless you are planning to produce commercial-quality CDs on your PC. It just depends on your ultimate objectives. SOS



The Windows95 Sound Control window showing the various audio file formats supported.

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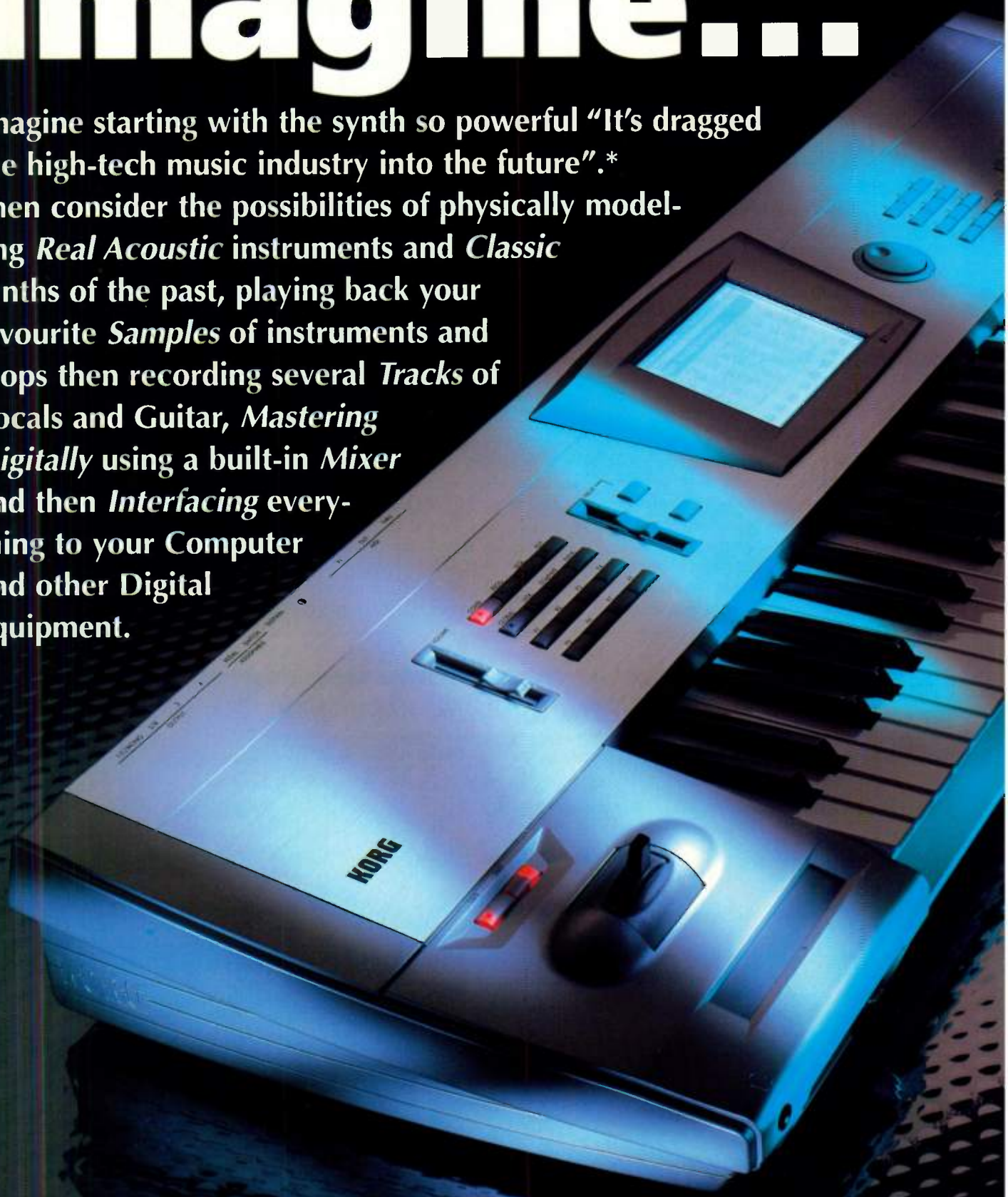
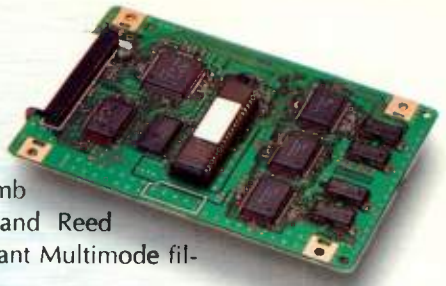


You have just imagined your options with the Korg Trinity.

* As predicted by Sound on Sound Magazine, Jan. 1996.

Solo TRI Option



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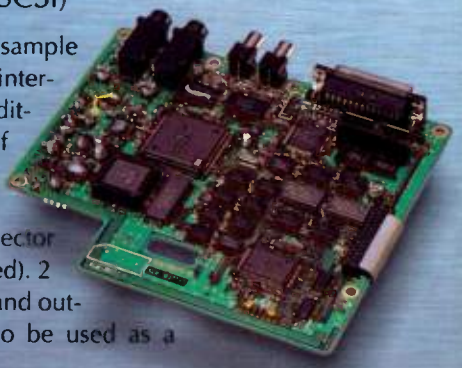
SCSI TRI Option

This board adds a SCSI port to the Trinity enabling you to connect the Trinity to an external hard drive or CD ROM drive. (This option is included in the HDR TRI Option.)

HDR TRI Option

(Hard Disk Recorder with SCSI)



16 bit Hard Disk Recorder @ 48K sample rate. Synchronised to the Trinity's internal Sequencer. Non-destructive editing and automated control of Volume, Panning, EQs and effects sends. 2 track record and 4 track playback. SCSI connector for external hard drive (not supplied). 2 analogue inputs and SPDIF input and output. The SPDIF interface can also be used as a Backup Utility.

Trinity Pro 76 note

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Thrice Blessed?

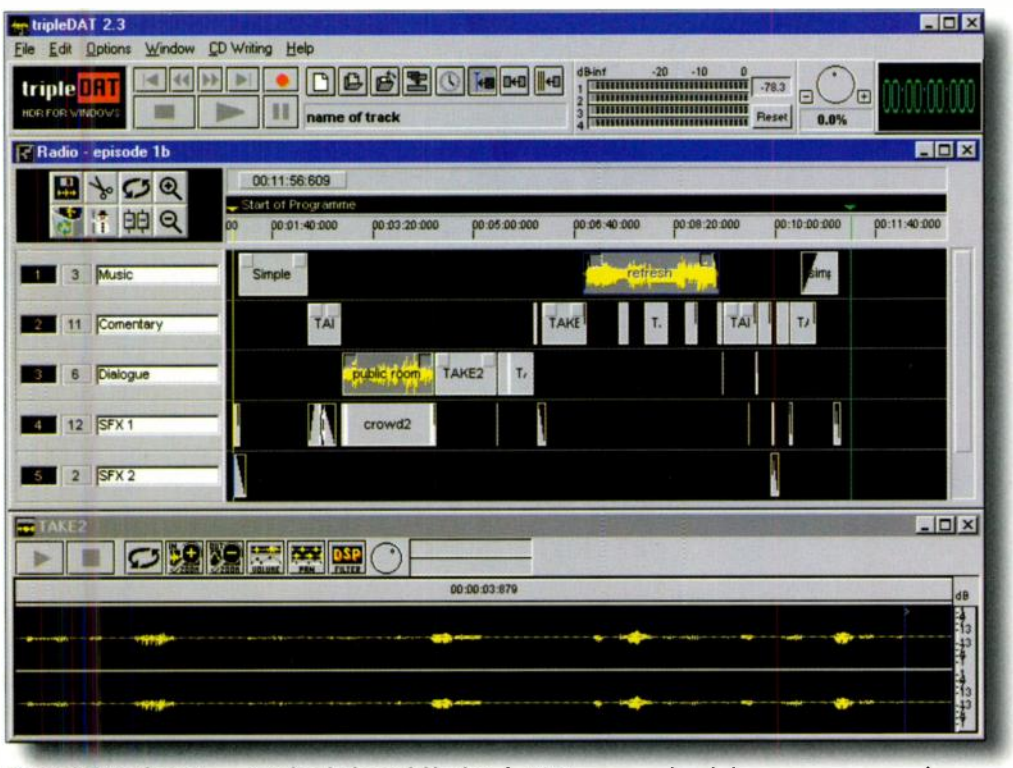
CREAMWARE TRIPLEDAT PC DIGITAL AUDIO EDITING/RECORDING SYSTEM

Creamware's recently-updated, PC-based TripleDAT system attempts to offer a 'halfway house' solution to those who've outgrown their MPC audio system, but can't afford a professional digital recording setup. BRIAN HEYWOOD is the cat who gets the Cream(ware)...

From a musician's point of view, the IBM-compatible PC has progressed in leaps and bounds over the last few years — both in terms of its available computing power and support for digital audio. A wide range of non-linear audio editing (ie. hard disk recorder) solutions have become available to the PC owner, allowing you to choose a system that suits your requirements and budget. Systems of this nature tend to fall into two camps: those that use DSPs to handle the audio — for instance, Soundscape, SADiE and Digidesign's Session 8 — and those that use the PC's hard disk, processor and one or more MPC (multimedia PC) soundcards.

MPC-based systems are the cheapest of these, since you can easily create a system using hardware that you already own, and there is a lot of competition between software vendors, ensuring that prices are low. However, using the MPC approach means that the PC has to do a lot more work, so your computer has to be more powerful to cope, and thus more expensive — check out Martin Walker's article on the requirements for PC-based hard disk recording in last month's *SOS* for more information.

From a purely professional audio standpoint, the other major difference between MPC- and DSP-based systems is that the latter invariably allow you to transfer the audio to DAT as a digital signal, either using the S/PDIF or AES/EBU protocols, while the MPC systems tend to have only analogue outputs. Apart from the product under review here, the only other digitally-equipped MPC-based soundcard generally available at the time of writing is DAL's CardD. So there is a bit of a gap between the better MPC-based systems and the low end of the DSP-based professional systems, both in terms of price and capabilities. TripleDAT slots neatly into this gap, as it has digital I/O and dedicated software, but still uses the PC to provide the hard disk sub-system and processing power, which keeps the cost down.



The TripleDAT software's user interface looks much like that of a MIDI sequencer, though the tape transport controls make more sense for digital audio than MIDI data.

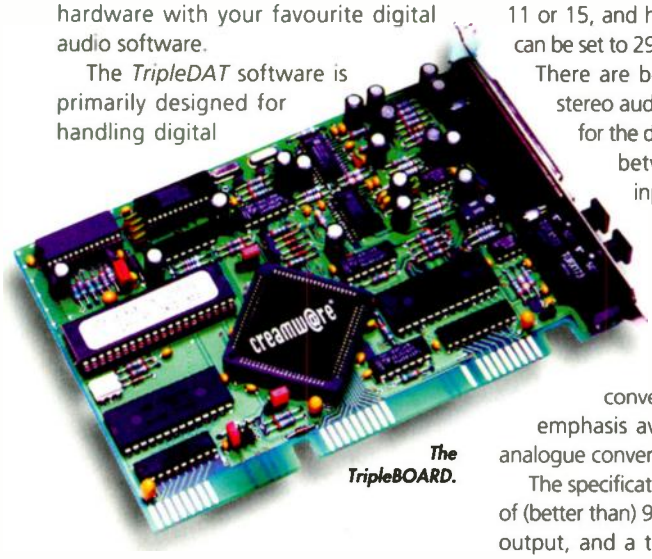
WHAT YOU GET

The TripleDAT system is actually a combination of hardware and software: the hardware is an audio card (the unsurprisingly-named TripleBOARD), and the *TripleDAT* software is a full-featured, non-linear audio application dedicated to the hardware. As regular *SOS* readers will be aware, this is not the first time I've looked at the TripleDAT system — back in the September '95 issue, I reviewed it when the software component was entitled *TripleMAGIC*, and stood at version 1.0. Well, 12 months have seen a considerable refinement of the package, which has now reached version 2.3. The whole thing seems a lot more solid, and the rough edges I commented on in my last review have been removed.

While the *TripleDAT* software is keyed to the TripleBOARD, the hardware can be used with any MPC audio application, since Windows audio and MIDI drivers are provided. This makes the card

extremely versatile, since you can use different software packages depending on what you happen to be doing at the time. For instance, you might want to use *Cakewalk Audio* for creating the music and then run the *TripleDAT* software for CD pre-mastering. In fact, if you don't need the more advanced features in the bundled software, there will soon be a cut-down system available called Master Port, which is useful if you simply want to use the hardware with your favourite digital audio software.

The *TripleDAT* software is primarily designed for handling digital audio, providing tools for recording, editing and processing the audio data which is stored on your PC's hard disk (on-board effects are included — see the 'Here's How It Effects You...' box elsewhere in this article). This means that you need to have a fair amount of spare hard disk space (either on your main drive, or on a dedicated drive for your digital audio), since it takes just over 10Mb of storage to hold a stereo minute of sound at CD quality. You can record at 48kHz or 32kHz, but I imagine that the bulk of the work done on the system will use the standard CD rate of 44.1kHz. Luckily, the prices of large-capacity hard drives have plummeted over the last year, although for digital audio applications, you will get the best results with drives that are AV-rated, which are, needless to say, more expensive.



The TripleBOARD.

While it is possible to record audio in synchronisation with either an external device or a MIDI sequencer running on the same PC, or even by loading a completed MIDI file into TripleDAT's internal MIDI file player, I feel this would be a rather awkward way of using the system — more on this point later. In my opinion, the software is more suited to straight manipulation of audio data. To this end, it uses a lot of the techniques pioneered by more expensive professional systems, such as non-destructive editing and real-time control of fades and crossfades.

The TripleDAT system also comes with a DOS-based tape streamer application that allows you to use a DAT recorder to back up your hard disk via the card's digital audio output. This is quite an important consideration when using a hard disk-based system, since you either have to archive the material you record, or erase it when your hard disk becomes full.

TRIPLEDAT HARDWARE

The TripleBOARD is a half-length ISA buss audio card with both audio and MIDI interface capabilities. The card takes up a single interrupt which can be set to IRQ 10, 11 or 15, and has a base I/O address that can be set to 290, 300 or 310 hexadecimal. There are both analogue and digital stereo audio inputs and outputs, and for the digital input, you can choose between one of two optical inputs or a co-axial (ie. RCA phono 'cinch') connector. The card uses 18-bit, 128 x oversampling bitstream-type converters, with overload detection on the analogue-to-digital converter (ADC) and digital de-emphasis available on the digital-to-analogue converter (DAC).

The specification quotes dynamic ranges of (better than) 90dB for input and 96dB for output, and a typical channel separation of 100dB. These figures will undoubtedly be degraded in a PC with a noisy power supply. Subjectively, the quality of the analogue outputs compared well with that of my SADiE system, sounding warmer.

In addition, the TripleBOARD includes a MIDI input and output, and a driver for an infra-red (IR) LED module which can be used to remote-control a DAT machine. This is really only important when you are using the tape-streaming software (of which more in a moment). The co-axial S/PDIF, analogue audio signals and MIDI data is routed to the card via a 25-way 'D'-type feature connector on the metal mounting bracket, where the optical connectors and the IR-LED output are located. The card is supplied with a suitable plug with clearly-labelled flying leads for the audio and MIDI signals. The manual gives a full 'pin out' of the feature connector, so it would be a simple matter to build a breakout box for the TripleBOARD.

Creamware also produce an optional AES/EBU interface, but this was not included with the review system, so I was unable to test it. Together with the rest of the TripleDAT package, this forms the TripleDAT Plus system. You can buy this as an all-in-one package, or alternatively, you can buy the TripleDAT system, and then upgrade to the TripleDAT Plus for an extra fee later.

TRIPLEDAT SOFTWARE

Anyone who has used a track-based sequencer or a professional segment-based digital audio editor will feel immediately at home with *TripleDAT*'s software interface. The main action occurs in the Arrange

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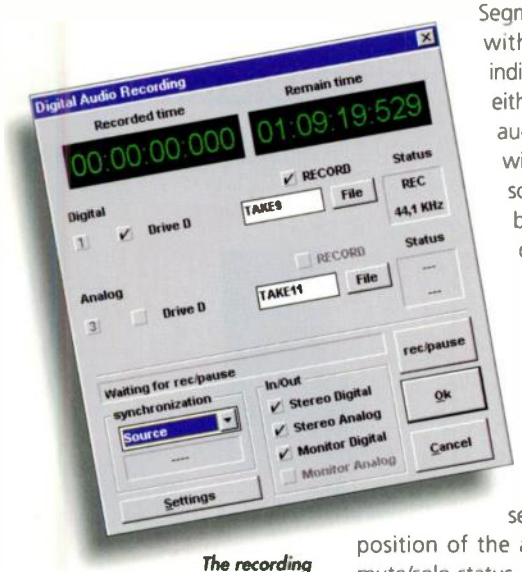
window, which is laid out as a series of horizontal tracks stacked vertically, with the time axis along the top edge of the window. Segments of audio appear as blocks, with fades and crossfades being indicated graphically. The blocks can either be blank, or can display the audio waveform, though the latter will slow down the screen updates somewhat. The blocks can either be 'frozen' (ie. fixed to their original timecode position) or 'melted', which means that you can move them around the arrangement.



The recording control panel allows you to record from any combination of digital and analogue inputs, giving up to four inputs.

Down the left-hand side of the Arrange window are the individual track controls. These allow you to select the physical output the audio is sent to, and the volume and pan position of the audio. The track names, their mute/solo status, and a display of the number of samples currently on each track are also displayed on the controls themselves.

Within the Arrange window, the current playback position is indicated as a vertical green line which can either move left to right over the sound blocks as they play back, or can remain stationery while the audio blocks move from right to left. The first method is common on computer-based systems since it involves less in the way of screen updates, while the second is common on dedicated hard disk recorders. Having the entire screen scrolling is very cool, but even on the test system — a 166MHz Pentium with 24Mb of RAM — the display was somewhat jerky when there were a lot of audio segments displayed on the screen.

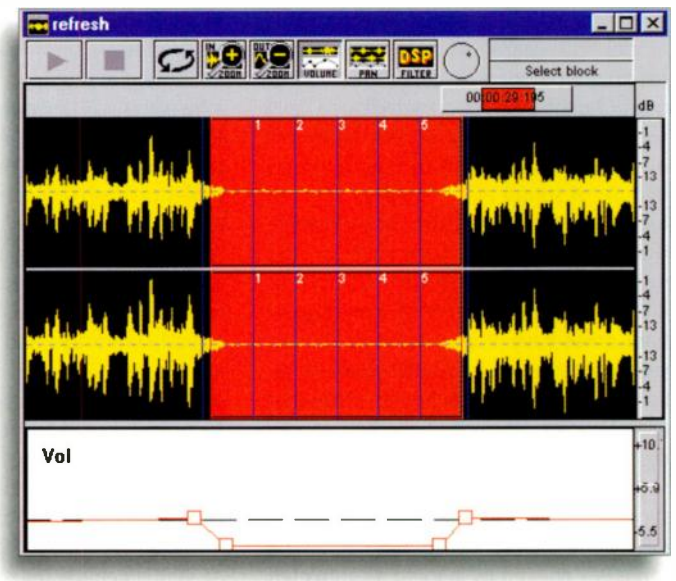
The Arrange screen also shows various markers, including two special ones that allow you to loop a section of the arrangement. The markers help you to move quickly to various parts of the track, and can be dropped into the arrangement during playback by pressing the 'M' key. The markers have the rather curious additional function of controlling your DAT machine via the IR-LED remote control interface. I can't actually think of any practical use for this feature, considering the lack of any feedback from the DAT to the PC.

Lastly for this quick look at the Arrange window, the Toolbar deserves a mention. This lets you manipulate the sample data and display characteristics, though I found it tended to get in the way if I left it 'floating' over the sample work area. Luckily, the Toolbar can be dropped into the top left corner of the Arrange window, where the only thing it hides is the Creamware logo!

RECORDING

Recording audio to hard disk involves using the Record window, which I found curiously non-intuitive. In terms of the features on offer and the clarity of its layout, it is actually very good, allowing you to record any combination of stereo signals using the two sets of inputs (ie. stereo analogue and digital inputs). There are certain limitations — you can't monitor the current tracks if you use all four inputs, for example. My main concern is that has the feel of a stand-alone recording device, as if you've left the *TripleDAT* application and are using a 'bolted-on' annexe. I feel that it would be perfectly adequate for transferring data from a different format, say a DAT machine, to your hard disk, but it could be a bit fiddly to use to record a live performance.

Likewise, I don't really feel that *TripleDAT*'s recording interface is particularly well suited to the task of multi-track recording, say as a replacement for a traditional tape-based system. The reason for this is twofold; firstly the recording window breaks the connection between the track-based audio and the recording process, and secondly you have to hit the record button twice (Rec/Pause and then Rec) before it actually starts recording. The way it works is that you record an audio segment, and then, when you are happy with it, you hit the on-screen 'OK' button which drops you back into the Arrange window, so that you can place the recorded audio into one of the tracks. Basically, TripleDAT has all the recording machinery you'd expect — including a punch in/out facility — but it's not laid out to make it easy for the musician/recordist to operate and play at the same time.



The Cutter (see page 196) lets you loop (or skip) sections of the audio as well as set up a volume envelope, both very powerful features. Here, a two-bar section of a song is looped and 'dipped' so a voiceover can be superimposed.

pros & cons

TRIPLEDAT £1295

pros

- Relatively low cost compared to dedicated professional systems.
- Excellent sound quality.
- Digital interface options available.
- MPC drivers allow other Windows music/audio applications to use the hardware.
- Comprehensive list of effects and audio analysis facilities.
- Can be used to create 'one-off' audio CDs using a CD-R drive.

cons

- Needs at least a Pentium PC with 16Mb of RAM to give adequate performance.
- Slow compared to DSP-based hard disk systems for certain operations.
- User interface a bit quirky.
- Synchronisation not good enough for extreme variations of timecode, so may not be suitable for video post-production.
- The software is very highly optimised to the Intel Pentium chipset, and so may not work well on PCs fitted with alternative processors (Cyrix, for instance).

summary

A solid, high-quality audio production environment, this is a good choice for anyone wishing to move into the cheaper end of the professional non-linear market — as long as they have a Pentium.

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A new upgrade for WaveConvert (Macintosh/PowerMac 1.6, Windows 1.2) is now available. New features for the Macintosh include: audio conversion from within Quicktime, pre-processing for Real Audio encoding, custom Creator ID's, improved dithering, preservation of all regions, markers and loops in conversion (SDII, AIFF), and more. New features for Windows include: AIFF support, unlimited number of files, quantisation noise gate, arbitrary sample conversion rates, special dither for speech files, improved file naming conventions, Maximiser and audio quality. WaveConvert was used to prepare Real Audio files for the Metallica website (www.metclub.com) and by the band Nine Inch Nails for converting all the music and sound for the new video game Quake (the successor to Doom from ID software)

Waves' Audiotrack and L1 Ultramaximiser plug-ins are now available for Sonic Soundry's Sound Forge 3.0.

Coming soon-

PS22 Stereomaker - a dramatic stereo-from-mono plug-in for TDM, SDII and Powermac.

WaveConvert for Windows & Macintosh is an easy to use audio processing application for multimedia developers. It combines the well known peak limiting technology of the Waves L1 Ultramaximizer with other Waves processors into a powerful one step audio processor. Wave Convert easily converts Mac or Windows based high resolution audio files into lower resolution audio files while retaining optimal sound quality.

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The C1 is a true frequency-selective dynamic processor with phase compensation. That simply means you could compress only the bass without colouring the sound. Or you could limit only the treble, and so forth. The C1 is an expert tool: there is no other dynamic processor like it in the world. Ideal for mastering, voice-over, or even frequency-selective keying, the C1 is supported by an extensive Setup library.

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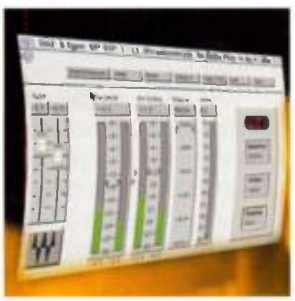

L1 Ultramaximizer is the worlds best known digital peak limiter. The L1 features IDR processing-a better dithering/noise-shaping system than others costing nearly 20 times the price. Ideal for mastering Compact Disc and multimedia audio as loud as the major labels and publishers. The L1 is industry standard for CD and multimedia mastering. Our users include Microsoft, Steve Miller, Sony, Sega, Nintendo, korg and Tangerine Dream.

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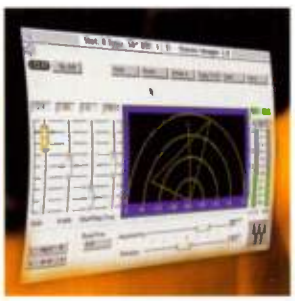

The S1 Stereo Imager brings together a comprehensive set of stereo manipulation tools. Four distinct processes make the stereo image wider or narrower, increase space in the lower frequencies and rebalance the left-centre-right, independantly! Three of these processes are phase-compenstaed, keeping mono compatility. Beyond any stereo processor on the market, the S1 is excellent for stereo TDM subgroups, reverb returns, stereo mic recording and mastering.

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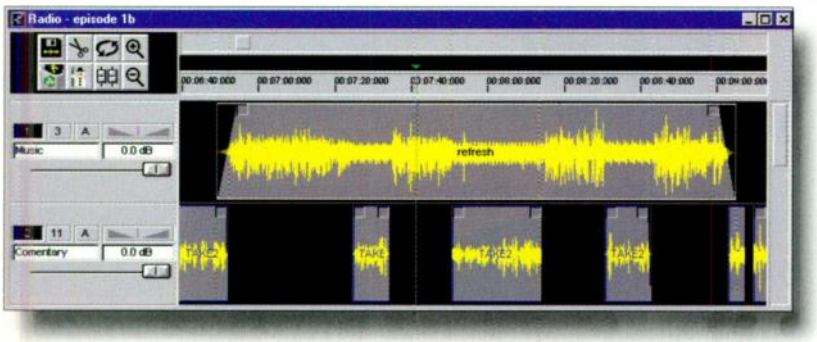
Creamware TripleDAT



The Arrange window can display audio waveforms, as well as giving control of fades. This shows a looped and dipped audio segment (Music) along with its associated voiceover (Commentary). Notice the track faders, which only appear when you zoom in.

THE CUTTER

While you can select and position the samples in the Arrange window, precise editing requires use of the Cutter window. This looks very much like a WAV. editor, and works closely with the Arrange window; you can load audio segments into the Cutter by just double-clicking on them in the Arrange window. Using the Cutter, you can take advantage of the features allowed by non-destructive editing: for example, you can repeat (ie. loop), skip or mute sections of the sample without changing the data actually stored on the disk. An example of this is where you need to extend a section of music, say a two-bar bridge between a chorus and a verse, so that you can insert a voice-over. By looping the bars, you can create a bed for the spoken section, and using the Cutter's volume control envelope, you can 'dip' the music so that it doesn't interfere with the intelligibility of the commentary — which is a very useful feature for multimedia, radio and video post-production. You can also create a pan envelope to move a sample within the stereo image, say for separating two voices taking part in a dialogue.

SYNCHRONISATION

TripleDAT can act as either a synchronisation slave or master, with timecode being channelled through the MIDI ports as either MTC (MIDI Time Code) or MIDI Clock. The synchronisation source or slave can either be an external device, or can be software running on the same PC, connected via the Windows driver installed as part of TripleDAT's MPC Windows support. This means that you could run the *TripleDAT* software in tandem with a MIDI sequencer such as *Cubase* or *Cakewalk*, though I think that a dedicated 'MIDI + Audio' package would be easier to use. The MTC implementation seems pretty comprehensive, and supports the four standard frame rates (24, 25, 30 and 29.97 drop frame), though I'm not sure that their definition of the rather bizarre 29.97 rate sometimes used in North America is correct — it should be either 30fps (drop frame) or 29.97fps. Thankfully, this is not an issue with European video work. MIDI Clock is also supported, though I'm not sure if there is anyone out there still using this — I guess the facility has only been included for backwards compatibility with the previous version of TripleDAT.

One of the critical features of a non-linear editor, particularly in the audio post-production world, is how well it chases external timecode. If you are trying to add a soundtrack to a video, your editor must be able to follow the variations in speed inherent in a mechanical tape transport. This feature is called 'continuous re-sync' and is also important if you are using your hard disk editor in conjunction with a multitrack tape machine, say an Alesis ADAT or a Tascam DA88. I performed some sync tests on the TripleDAT system, taking an external tape-based MTC sync signal, and changing its speed with the tape machine's varispeed control. I found that TripleDAT would continue to follow the external timecode, as long as the speed variations weren't too extreme. There seemed to be a buffer delay which caused an echo for a second or so, after which the PC would catch up (or slow down) until the two signals were in step. However, fast changes in the timecode rate caused a permanent time offset (ie. delay) to be introduced, until the timecode was stopped and then restarted, at which point synchronisation would be re-established. I concluded that TripleDAT is suitable for sync'ing to an external tape machine as long as you never need to use extreme varispeed or a shuttle wheel as part of your normal working methods. This will only be an issue if you're trying to use the system for video post-production (where the hard disk system has to chase the video machine when it's being controlled by a jog/shuttle wheel). To be honest, for most musical applications this would never be a problem, and Creamware recognise this; they say that they have optimised synchronisation to "run smooth and stable [*sic*] within usual studio applications" — in other words, the system is aimed at music production rather than video post. Even so, TripleDAT outperforms virtually all MPC-based systems in this area, and even a few professional systems — Digidesign's Session 8, for example, can't do continuous re-sync unless you buy extra hardware.

TYPICAL MULTITRACK PERFORMANCE

(With real-time volume, pan, and clipping active)

- 486 DX/2 66MHz PC, EIDE HD 5-6 mono or 3-4 stereo tracks.
- PCI Pentium 90, 16Mb of RAM 12-16 mono or 7-10 stereo tracks.
- PCI Pentium 133, 16Mb of RAM 14-20 mono or 9-16 stereo tracks.

HERE'S HOW IT EFFECTS YOU — ONBOARD PROCESSING

TripleDAT claims to use real-time effects, though not all the processes can be performed on the fly (pitch-shifting, for example). However, there are quite a few effects that can be *auditioned* in real time, which allows you to tweak them before you make them permanent. The effects can actually be applied in two different ways; you can use them on one or more individual samples to create a new audio segment for use in the Arrange window, or you can apply an overall effect to the entire mix as you transfer it to another medium, say DAT. The first method is useful for applying 'spot' effects, and the second is best for when you're remastering tracks. The following effects are currently supported: Limiting, Compression, Expansion, Gating, De-Essing, Parametric Equalisation, Delay, Room Simulation (reverb) and Time-Stretching. Two other processes which aren't strictly effects are the Spectrum Analyser and the Signal Phase Correlator, which allow you to monitor your mix and possibly highlight any potential problem areas. For example, you can use the Correlator to detect phase problems that could make your stereo mix sound odd when transmitted in mono.

Another interesting feature is that you can apply the real-time effects to an external signal, using the Warp input feature. So, in theory, you could use your TripleDAT-equipped PC as a stand-alone effects module for your studio — although this is possibly a slight case of technology overkill!

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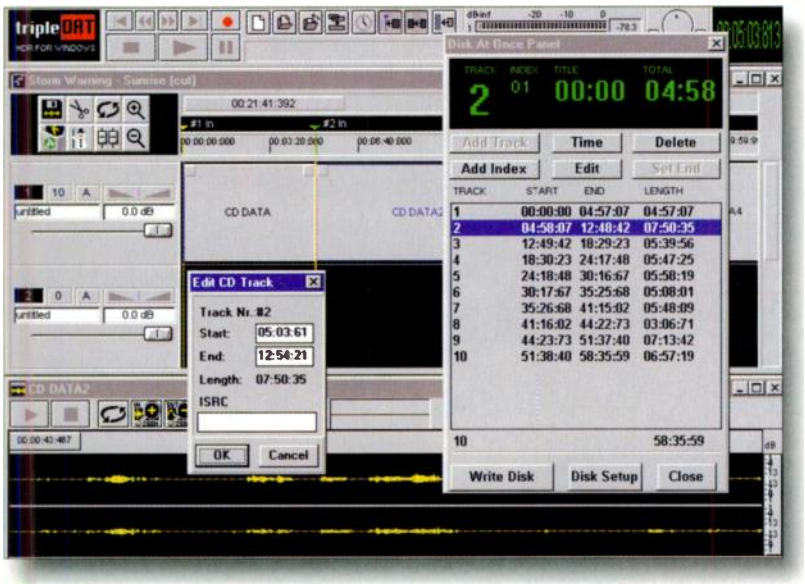
CD-R FACILITIES

The latest version of the TripleDAT system includes bundled software for creating a CD-R (ie. a 'gold disc' audio CD) directly from the audio data in the Arrange window. You can create a finished CD using Disk at Once (DAO) or you can compile a disk one track at a time using Track at Once (TAO). TripleDAT supports a large number of CD-R drives — I tested this facility using a Yamaha CDE102 dual-speed CD-writer, which gave excellent results.



The CD-R control works with the information in the Arrange window. Notice that the track indexes appear as markers above the audio data. The smaller dialogue box allows you to define the ISRC code for each track, allowing automatic logging of radio and TV broadcast usage of the tracks.

It took me about five minutes to work out how to use this part of the program, which is pretty good considering that at the time of the review, the full manual and help file updates weren't available in English! The CD-R feature means that you can carry out the entire mastering process using TripleDAT, though you have to be extremely careful handling the CD-R disc if you want to use it to produce a glass master for CD production. TripleDAT will even produce multiple copies of a gold disc by ejecting the finished CD and then prompting you for the next blank — very useful for short CD runs.

CONCLUSIONS

While I haven't had the time to cover all the features present in TripleDAT in detail, I feel that Creamware have provided all the facilities you would expect to find in a computer-based hard disk editor. The only reservations I have regard the reliability of the external synchronisation under certain situations (which will only affect a small number of applications anyway), the quirkiness of the user interface (which doesn't influence how the system performs), and the non-intuitive nature of the multitrack recording functions. The provision of both optical and co-axial digital interfaces on the TripleBOARD means that you can use the system with a wide range of consumer and low-end professional equipment, while the AES/EBU option means that the system can also be at home in a professional production environment. The implementation of the Windows MPC drivers is also very nice, as it allows musician users to take advantage of the growing band of 'MIDI + Audio' sequencers such as *Cakewalk Audio* and *Cubase Audio*. In fact, the cut-down version (Master Port) may be all you need if you're not too bothered about using the bundled software, but just want to upgrade the audio hardware of your current sequencing system. The *TripleDAT* software can also take advantage of any additional soundcard fitted to the PC, so you have a 'win-win' situation, with each use of the PC supporting the other. The implementation of the tape streamer software — even though it's rather awkward to set up — is another vital feature that allows you to use TripleDAT as a professional tool. It would be nice to see this function either integrated into the main application or given a Windows front end — and in fact I hear Creamware are planning a Windows version.

The TripleDAT system is a good example of what I choose to call 'Desktop Audio', where advances in computer technology have brought advanced audio production facilities within the reach of a much wider band of practitioners. Creamware have managed to do this without cutting any corners in terms of quality or capabilities; in fact, some of the effects are more advanced than those offered by more expensive non-linear editing systems. TripleDAT's major shortcoming here is that it relies on the PC's processor, and can therefore be slower for certain tasks, although I only fell foul of this once when working on an audio segment the length of a CD! All in all, I reckon TripleDAT is a good choice if you need a budget professional mastering/non-linear editing system, and Master Port is worth looking at if you just want to take advantage of the digital I/O hardware. SOS

SYSTEM REQUIREMENTS

- Minimum: 486DX/2 66MHz PC with 8Mb of RAM, and a 500Mb hard drive.
- Recommended: Pentium 90MHz PC/Pentium 133MHz PC, with a 16Mb of RAM, and 1Gb hard drive.
- One free ISA slot.
- Windows 3.11 or Windows 95.

PRICING

- TripleDAT (TripleBOARD plus v2.3 software, including DOS-based tape streamer and CD-R software); £1,290.
- TripleDAT Plus (TripleDAT system plus AES/EBU hardware interface); £1429.
- Master Port (TripleBOARD plus cut-down software and tape streamer, no CD-R software); £799.
- Upgrade from Master Port to TripleDAT; £549.
- Upgrade from TripleDAT to TripleDAT Plus (board modification by Et Cetera necessary); £150.
- Update from version 1.0 software to version 2.3; £250.

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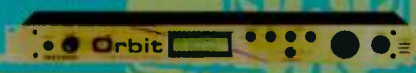

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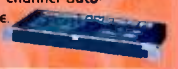

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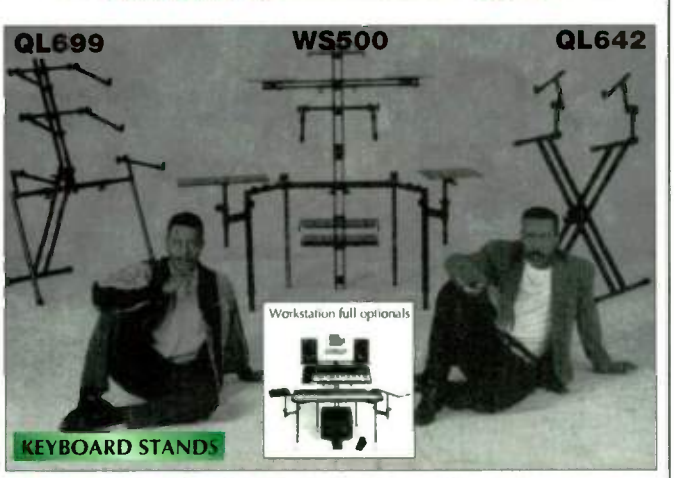

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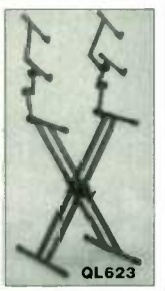

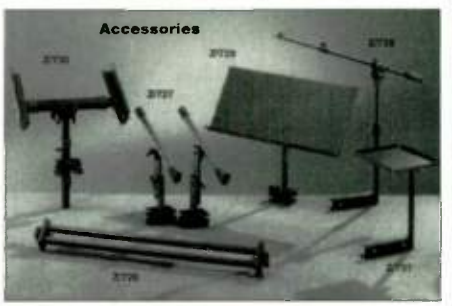

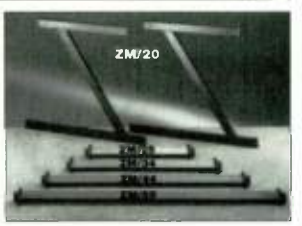

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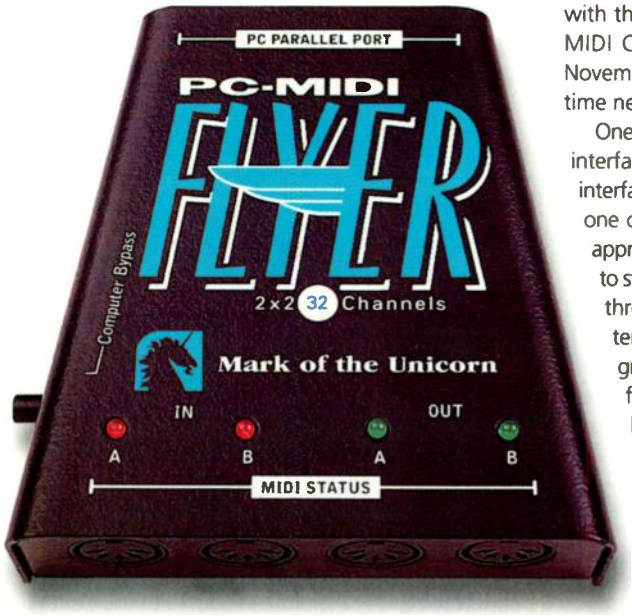
PARALLEL UNIVERSE

MIDI interfaces come in many different shapes and sizes, with most slotting inside the PC. External interfaces, however, such as those made by MOTU, can offer certain advantages, as MARTIN WALKER discovers.

MOTU PC-MIDI FLYER AND POCKET EXPRESS PARALLEL PORT MIDI INTERFACES

MIDI Interfaces tend to be heard and not seen — if they work reliably, once installed they're forgotten about. And so they should be.

The early history of PC MIDI interfaces revolves around the Roland MPU-401 design, which became a standard that every other manufacturer eventually emulated. The first wave of soundcards had non-standard interfaces for MIDI, which refused to work with some sequencing software, so MPU-401 compatibility soon became the name of the game, and ensured reliable use with many MIDI software packages. Later, with the arrival of more and more 16-part multitimbral synths, a single MIDI In and Out became increasingly restrictive — and once you have two or three synths, each capable of receiving on 16 MIDI channels, it's far more sensible to use a separate MIDI Out to drive each one. This avoids clogging up a single interface by attempting to send 16 channels of note, controller, and even SysEx information, simultaneously during a single piece of music. If the load is split between several MIDI Outs, each can have its own healthy batch of data, avoiding problems such as the occasional glitch or missed note.



At the opposite end of the interface, many people find a single MIDI In to be limiting — anyone who played keyboards through the '70s and '80s should still have the ability to play several synths simultaneously, as well as controlling a bank of foot pedals. Although nowadays this may seem 'over the top' to some, it can result in much more expressive performances than simply recording each part in isolation. Recording several musicians playing MIDI 'live' is another application with the same requirement (see 'The Alternative MIDI Controllers Session, *SOS* September to November 1993). Trying to record all this in real time needs either a merge unit or multiple Ins.

One solution to this problem is to use multiple interfaces — for instance, I currently have three interfaces in my PC: a Roland MPU-401 type, and one on board each of my two soundcards. This approach is perfectly adequate, but does tend to store up further problems for the future. Firstly, three slots are occupied in the PC, and slots tend to be in very short supply, being used for graphics cards, hard and floppy disk controllers, fax modems, and so on. Secondly, and the bane of every PC owner's life, there are the often conflicting requirements when installing a new device. Each must be allocated an IRQ (interrupt) setting, an I/O (Input/Output) address, and possibly a DMA (Direct Memory Access) channel. The new Pentium machines have Plug and Play architecture, which automates some of this selection, but this can only recognise Plug and Play devices, and pre-Plug and Play devices still normally have to be installed by hand — not an enviable task for people who prefer to drive their cars rather than tinker about under the bonnet.

The better alternative is to use a multi-port interface. Not only does this make installation ▶

pros & cons

MOTU PC-MIDI FLYER £99 / POCKET EXPRESS £219

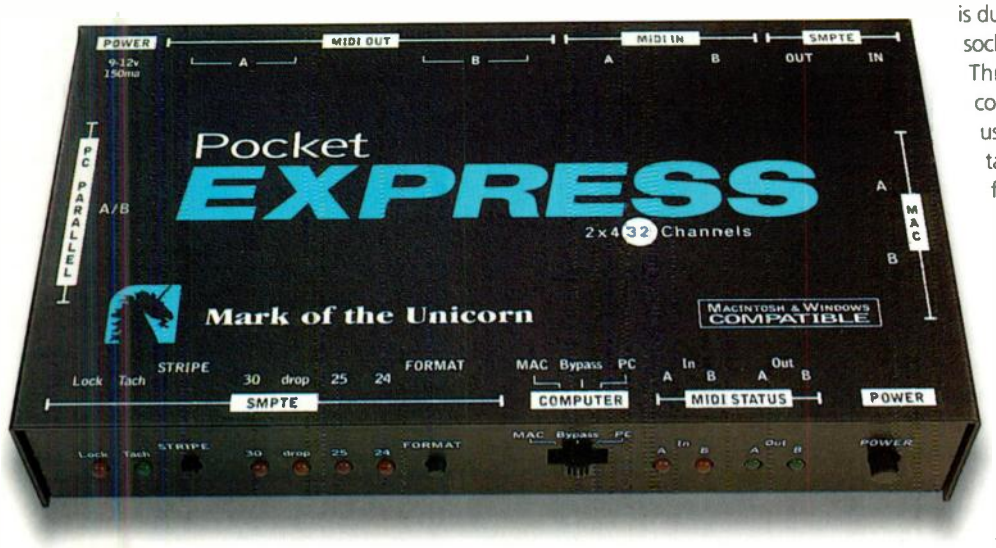
pros
- Two inputs and two outputs.
- Uses no internal slot!
- Useful bypass switch.
- Easy to install for most people.

cons
- Ties up printer port.
- Occasional clashes with existing hardware.

summary
Both these devices are rugged, reliable, and an ideal way to expand your MIDI setup without filling up the inside of your PC.

SOUND ON SOUND

potentially easier, but it also means that only one software driver is needed to address the entire set of ports, and less system conflicts tend to arise. A recent trend is to pop all of the circuitry into a case and plug it into either a serial or parallel port, avoiding the use of a slot, and hopefully bypassing even more of the potential installation problems, since these ports have I/O addresses and IRQ settings already allocated, making life easier for both the end user (less installation decisions) and the manufacturer (fewer frantic calls from users).



PLUGGING IN

So, onto the items under scrutiny, Mark of the Unicorn's PC-MIDI Flyer and Pocket Express PC MIDI interfaces. Each is built into a solid, stove-enamelled metal case which should withstand the proverbial roadie's boot. Both also have LED readouts for each of their two available MIDI Ins and Outs (32 MIDI channels in total), which is always a useful way of checking that data is actually passing through the unit. In addition, a computer bypass switch lets you use each interface as a Thru box even when the PC is not powered up (very useful when you just want to play a keyboard without firing up your sequencer). The Flyer is powered from the parallel port, and the Pocket Express comes complete with its own plug-in power supply. Like them or loathe them, the dreaded 'wall warts' do help to keep the price down, and as long as you keep them well out of the way of audio cables, they'll do their job perfectly adequately.

The main differences between the two interfaces are that the Pocket Express can be connected to a Mac as well as a PC, each of its two MIDI Outs is duplicated (giving a total of four DIN output sockets, which could well save having to use a Thru box), and it's also equipped with a comprehensive set of SMPTE sync options for use with analogue tape machines and video tape, including 30, 29.97 drop, 25, and 24 frame rates. It can also be used to stripe SMPTE onto audio tape decks, although for video, MOTU recommend their Digital Time Piece, which has genlock facilities to ensure accurate matching (for more in-depth info on this subject, look no further than Paul White's feature on SMPTE and MIDI Time Code in the June 1996 issue of *SOS*).

Connection to the PC is via a standard DB-25 lead that is included with each unit. Unfortunately, there is no through-port, so unless you have multiple parallel ports on your PC, there will be nowhere to plug in your poor old printer. You could try a switcher box (available from most computer suppliers for about £15) which will allow either device to use the single parallel port. Alternatively, I use a parallel port expander card (again, about £15) which adds two more ports to the basic one.

> "Parallel-port interfaces seem ideal as the insides of our PCs continue to fill up with multiple soundcards, SCSI controllers, fax modems and the like."

This allows three simultaneous parallel devices to be connected (LPT1, 2, and 3), although, of course, it does take up one of your precious slots.

Installation of both devices proved easy enough in my case, taking about half an hour. The supplied drivers incorporate *Express Setup* software, which correctly identified which of my three parallel ports the interface was connected to. They also attempt to intelligently allocate an interrupt (IRQ) setting from a choice of 4, 5, 6, or 7, and will default to ▶

SERIAL BOX

The use of serial ports for MIDI has generated some problems in the past, and many manufacturers have now stopped trying to squeeze high-bandwidth MIDI data (especially SysEx) in and out of a port which would normally see use with a mouse or modem. Windows 95 users have a further problem here, as reports are that serial MIDI ports tend not to be very reliable using this operating system. Even using buffers, the data can still arrive at the In port faster than it can be removed. The buffer helps, but with large SysEx dumps or SDS sample dumps, the data keeps on coming, and even with a buffer the system may eventually fall over. Sound modules such as the Yamaha TG300 do have serial port interfaces, but since the rate at which SysEx data arrives at the PC is set by Yamaha, it can ensure total reliability with its own data. For general-purpose interfaces, using the parallel port tends to be far more reliable, as it was designed to transmit and receive data at much higher speeds in the first place.

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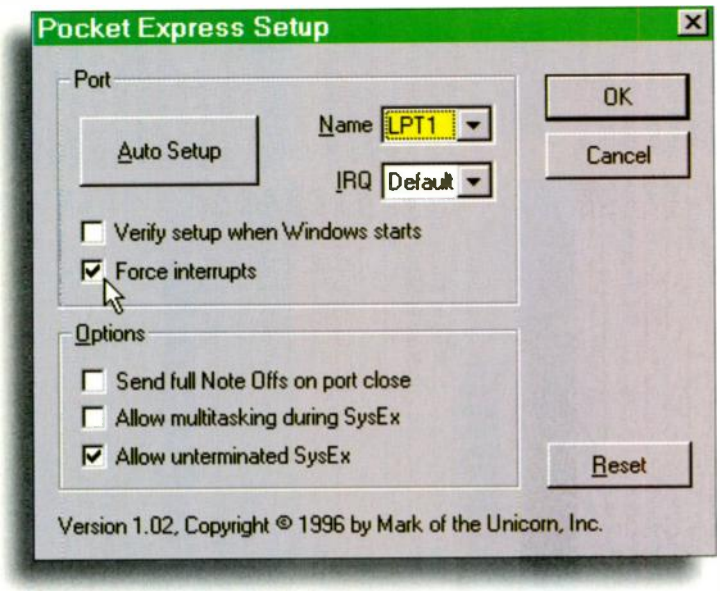
IRQ7, as this is normally used by LPT1 (the default printer port). This, again, worked fine on my PC, although I do know of other people whose machines reported no IRQs free at all from the four provided. Although four options sounds generous, IRQ4 is already used by the first serial port (normally connected to the mouse), and IRQ6 is permanently tied up to the floppy disk controller. This leaves IRQ 5 and 7, and if either of these is currently unused, *Express Setup* will use them. If neither are available, the dreaded shuffle of resources starts — finding another internal card that uses IRQ 5 or 7, that also has other available unused settings. Parallel port connection avoids the need to set I/O addresses (the locations in memory used by the PC to read and write MIDI data). Normally a selection of alternatives are needed, but in the case of parallel ports, the address is already decided by the operating system, giving one less potential source of conflict.



Auto Setup will normally do just that — but in case of emergency, please tick this box.

IN USE

When you fire up your sequencer after having installed either of these interfaces, you'll find two new MIDI outputs (A and B), two inputs of the same variety, and an additional input labelled 'Sync'. Any MIDI Time Code (MTC), MIDI sync, Song Position Pointer, or real-time related messages received at either input are routed to this port for sync'ing your sequencer to any external hardware. I found that some MIDI applications recognised and were able to use the interface first time (*Cubase Score* v2, *ReSample Professional*) but others refused to co-operate. These included *Sound Forge* 3.0's SDS MIDI sample dump ("An unknown error occurred opening the Flyer:A device") and the shareware sample converter *Awave* 2.5 ("Couldn't open MIDI input device"). Both of these problems disappeared immediately I installed the updated set of drivers that arrived during the course of this review (version 1.02, released August 1996, and also available via the MOTU website).

During use, I did have one big problem, which took a great deal of solving and which had the same totally bizarre symptoms with both interfaces and both sets of drivers. Trying to run an existing sequence resulted in total silence until I stopped *Cubase*, whereupon most of the notes from my melody would sound simultaneously, almost as if they'd been hiding inside and trying to pluck up courage to emerge! I examined the MIDI data emerging from the interface: there was plenty of it, but all nonsensical, such as 'All Notes Off' and random controller messages. This odd problem was finally cured by ticking the 'Force interrupts' option in the interface setup window (see screenshot, left). MOTU say in their readme file that "this option is intended for trouble-shooting only. If your MIDI interface is working properly, you should not check it. However, if you experience trouble receiving System Exclusive messages (especially if your computer has a slower 486 processor) try checking this option." Well, no SysEx was involved in my file, but ticking this option cured my notes of their shyness, and everything worked perfectly from then on. From conversations with Musictrack, the UK distributors of MOTU products, it seems that hundreds of people have bought these interfaces and no-one has reported suffering from my particular problems. It just goes to show that PCs take no prisoners when it comes to installing new hardware!

CONCLUSIONS

Both of these interfaces are rugged and, despite my own initial teething problems, reliable in operation. The PC-MIDI Flyer is recommended if your interfacing needs are straightforward, while the Pocket Express is the one to go for if you need the four MIDI Outs and/or the sync options. The use of the parallel port can be a godsend if you're running short of internal slots, and the LED status readouts make any fault-finding a lot easier. The biggest advantage of buying one of these has to be the two Ins and two Outs, which make using several synths a far less complex operation. My only niggle is the lack of a through-port, since most people still only have one parallel port on their PC, and unplugging the interface whilst still powered up, in order to attach your printer, might prove too tempting for some, resulting in possible electrical damage.

MIDI interfaces are not glamorous, even when fitted with multiple flashing lights, but parallel-port devices seem ideal as the insides of our PCs continue to fill up with multiple soundcards, SCSI controllers, fax modems and the like. By placing the box on the outside of the PC, you can ensure that valuable resources still lie untapped within — this has to be the way forward! SOS

info

E PC-MIDI Flyer £99; Pocket Express £219.
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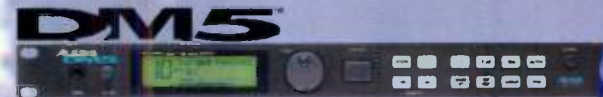

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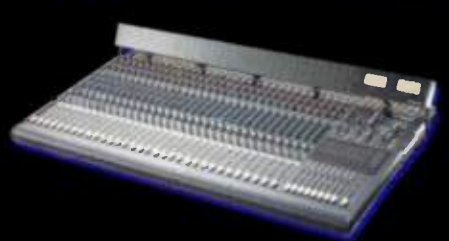

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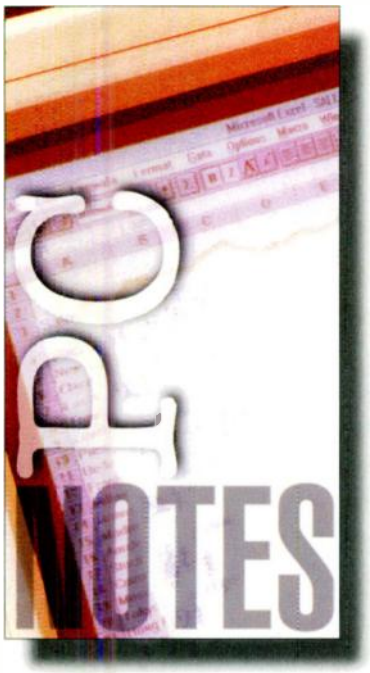

BRIAN HEYWOOD discusses the powerful new soundcard from Terratec, plugs a couple of musical web sites, and entreats software developers to stop trying to reinvent the wheel...

A coup'le of months ago I mentioned the Maestro soundcard from Terratec in this column, and last month's 'Shape of Things to Come' featured brief details of Terratec's new card, the EWS64. I've now had a chance to study some advance details about the latter card, sent to me by Terratec's UK distributors Digital Media. As you may already have guessed from the card's name, it has a 64-note polyphonic PCM-based wavetable synth, plus an additional feature that should make it very attractive to serious musical users: it will be able to use Akai S1000 samples and programs. I gather that the librarian software bundled with the card will be able to read Akai-format disks using the PC's floppy disk drive. The card comes with 5Mb of RAM fitted as standard, but can be expanded to 64Mb using standard SIMMs. This access to the extensive back catalogue of Akai samples will make it easy to use the EWS64 card in music production

The new card also has a digital effects processor that offers chorus, reverb, multi-band EQ, room simulation, and a 3D sound positioning effect. There will be a standard 'WaveBlaster'-type daughter board connector, and two MPU401-compatible MIDI ports — presumably one of these will be used by a daughter board (if fitted). The card will have full duplex audio, which means that users will be able to record and play back digital audio simultaneously (see part two of the 'Card Times' series, starting on page 184 of this issue for details on the significance of this) and supports sample rates up to 48kHz.

On the hardware front, the card also looks very interesting. It has three stereo analogue inputs (two line, one mic) with one of the line inputs having 18-bit resolution, plus two stereo line-level outputs. The jewel in the EWS64's crown is that it will have one S/PDIF digital input and two S/PDIF digital outputs, allowing you to transfer audio data to and from your PC in the digital domain. As the card supports both 44.1kHz and 48kHz sample rates, it is suitable for use with both consumer and professional DAT machines. The EWS64 will also come with a 'breakout' box that will allow you to connect to the MIDI and digital signals without having to bother with flying leads.

The projected price of the new card is less than £600, which will make it a low-cost way of adding a digital I/O capability to an MPC-based audio system. A bonus for buyers will be the bundled Steinberg software for Windows 3.1 and Windows95, which may well have features specific to the new card, since Steinberg and Terratec apparently have a close working relationship. For more details about the new card, contact Digital Media on 0171 607 2727.

REINVENTING THE WHEEL

One thing that occurred to me while reviewing the TripleDAT system from Creamware recently ▶

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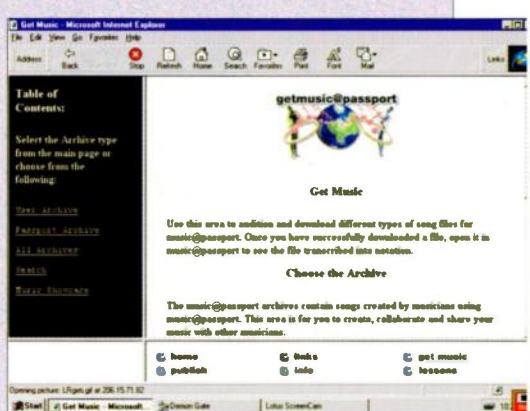
You can also call Perceptive Solutions on 01773 821120, or fax them on 01773 825278.

• PASSPORT TO THE INTERNET

Arbiter distribution have passed on some news about an intriguing new program called *music@passport*, which seems to be a sequencer, running under Windows 95, linked directly to a web site dedicated to support and information for users of the program. *music@passport* allows the creation of sequences with lyrics, guitar chords and text on up to 16 staves; notes can be entered with the mouse, via an on-screen keyboard, with a MIDI keyboard, or through the 'PitchWrite' feature. This latter function appears to utilise some kind of pitch-to-MIDI conversion process, so that the user can sing or play a guitar or other instrument (a microphone is provided) into their sound card; the pitched input is then converted to MIDI data. *music@passport* also includes drum and melodic auto-accompaniment files, for easy song construction in a range of styles, and more files are available on the associated *music@passport* web site. Internet-connected users of the program will have one-click access to the web site, where music made with it may also be published (Microsoft *Internet Explorer* 3.0 is supplied with the package). *music@passport* costs £99.95, available through leading music retailers and PC World superstores — more info from Arbiter on 0181 202 1199.

Derek Johnson



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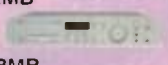

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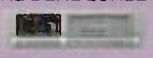

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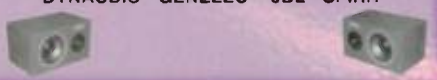

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▶ (the review can be found in this issue of *SOS*, starting on page 196) is a tendency that some companies — especially German ones, it would seem — have for 'improving' on the user interface provided by Windows. One of the strengths of the Windows operating system is that the keys, menus and mouse operations are fairly constant across different applications. So I can switch between *Cakewalk*, SADiE, *Band In A Box* and *Word for Windows* without having to remember how the right mouse button behaves, or searching for the 'cut' function in an unfamiliar menu structure.

This rather simple fact doesn't appear to have occurred to software authors when they set out to 'improve' on Windows. For example, some of Creamware's innovations are very sensible — for instance, using the right mouse button to move an audio clip and the left mouse button to edit the end points ensures that you don't accidentally move a clip while you're trying to alter its length. However, this method is different from both the Windows and Windows 95 convention, which is that you use the left mouse buttons to perform operations (select, move, and so on) and the right mouse button to find out things (properties, etc). If TripleDAT was the only system you were using, this wouldn't be an issue, but the PC's strength is that it is a general-purpose tool, and I think that software authors should keep this in mind when mucking about with the user interface.

There *is* scope for improving on the Windows interface: the re-sizeable scroll bars in the TripleDAT software, which allow you to both select the location and the 'magnification' within the Cutter and the Arrange windows, are a very neat idea. This kind of innovation — one that doesn't alter the function of the screen furniture — is great, but please don't throw the conventions overboard. My message to any software authors reading this column is to think twice before changing the basic user interface of your software. Sometimes 'compatible' is preferred to 'better'.

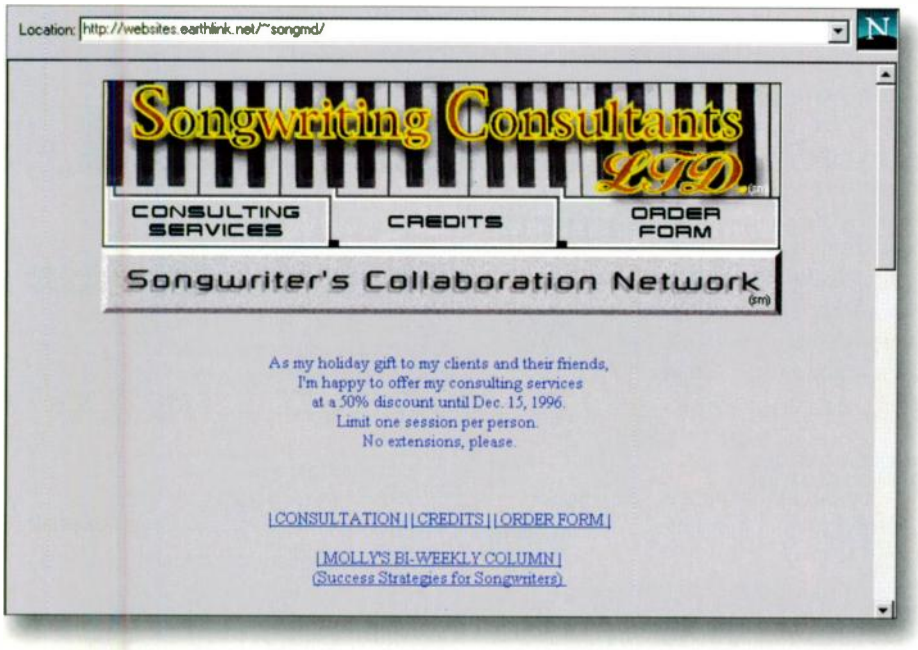
Musicians' Union on the net: advice on gigs, contracts and insurance.

ON-LINE NEWS

I've commented before on how difficult it is for musicians to get help and advice, partly because of the isolated nature of modern studio music making. Perhaps the internet, despite all its drawbacks, can help out. I've come across two web sites which are examples of how the 'net may be of assistance to 'wired' musicians.

The first is run by Molly-Ann Leikin (**http://websites.earthlink.net/~songmd/**), who is a songwriting consultant in Los Angeles and is making her experience available — for a consultation fee, naturally — to help good songwriters become hit songwriters. Molly-Ann has spent 20 years in the music business as a professional, award-winning songwriter and really knows the business of music, as well as every aspect of its creative side. She helps musicians polish and market their songs, using email to work with songwriters who have the talent to make it to the Top 40, but just haven't got there yet. Molly says "many bands out there have awesome musicians and stage presence, but don't quite have the hit songs yet, which is usually why they don't have deals. But I can change all that. One of my clients has a Grammy nomination, another won an Emmy, and in the past 31 months, 84 of my clients have made deals with music publishers and record labels." Without the internet this service would have been totally out of reach of UK-based songwriters.

The second page I want to mention this month is from the Musicians' Union and — although the site is still 'under construction' — shows just how far awareness of the internet has penetrated into the musical community. The MU provides a range of services to its members, including advice on contracts, and cheap instrument and Public Liability insurance. Visit the site, at **http://musiciansunion.org.uk/** for more details.



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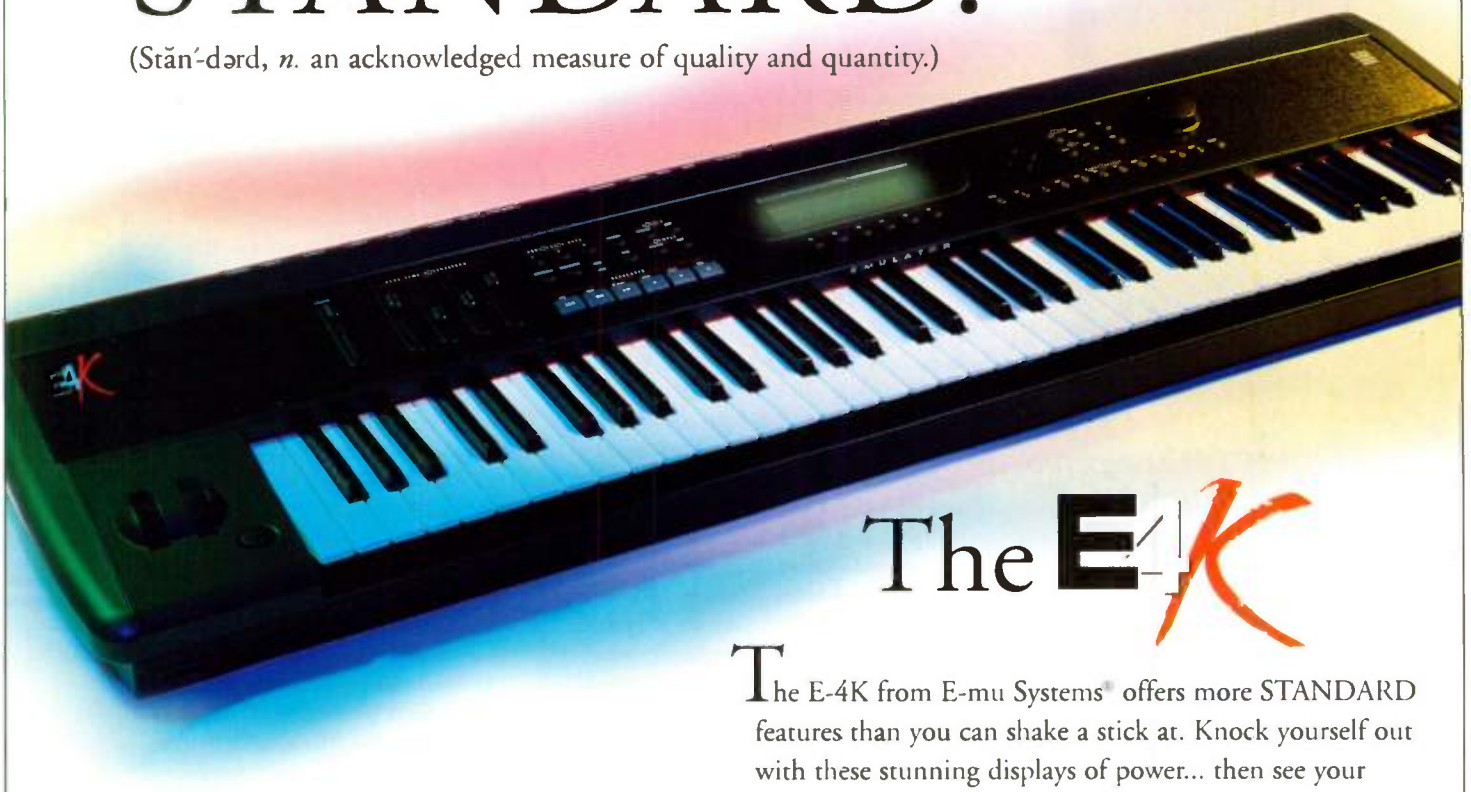

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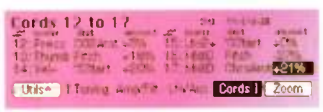

Cords. E-mu's Modular Synthesis allows you to route any modulation source to any modulation destination using Virtual Patch Cords (remember synthesis?) 18 cord routing per voice. 58 Mod sources and 55 Mod Destinations. Way easy.

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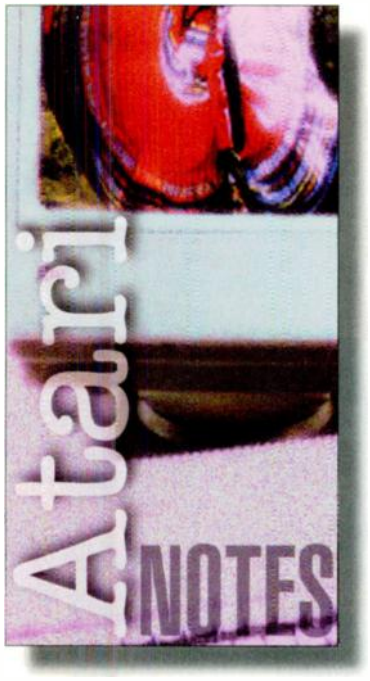


DEREK JOHNSON brings you more news from the platform that wouldn't die...

If proof were needed that the Atari ST still has something to offer the working musician, it comes in the form of producer Steve Levine: in the midst of his state-of-the-art 32-track digital home studio sits a humble Atari Mega 4 ST, with hard drive, happily chugging away as the sequencing centrepiece. As Levine says in Paul Tingen's interview in this issue: "I can do everything on the Atari that my Mac with *Notator Logic* software upstairs can do. I have the Atari in my studio because the majority of people I'm working with use an Atari, and it's absolutely fine for sequencing and synth editing. Unless you want to do hard disk recording there's no point in getting rid of your Atari." 'Nuff said!

ANALOGUE ATARI?

While indulging in a little web surfing recently (to compile the 'net address section elsewhere on this page), I spotted the intriguing *Groove Analogue Sequencer Simulator*. The author, Tim Wright, was inspired by Doepfer's excellent, but expensive, MAQ16/3 analogue sequencer for MIDI instruments, and decided it should be quite easy to simulate it for the Atari ST — which he did, as part of a music technology course, writing the software with *STOS*, which is better known for games creation. Talking to Tim recently reveals that he hasn't done much with the software since its release, although if he can find the time, he might have a go at fixing some bugs. As it stands, the software offers three channels of up to 16 steps each, and steps can be freely turned on or off, to alter the apparent length of notes. Note data can obviously be transmitted (with velocity), as can pitch-bend and other controller information. Patterns can be transposed in real time, played forwards or in reverse, and chained into songs. The interface is basically user-friendly, although some may find certain functions a little obscure — probably the result of the software having been written in *STOS*. However, experimenting is fun and rewarding, rather like the using the real (antique) thing. The only real problems are a lack of any kind of external synchronisation, and a strange — though useable — tempo control; the documentation also indicates that the software may not be compatible with Falcons or TTs. New users may wonder where the 'Quit' button is: [Control] C is what you're looking for. This command, apparently second nature to Unix users, isn't in the user notes. My copy was downloaded from the Shareware Music Machine (**http://www.hitsquad.com/smm/midi/atari.html**), a brilliant web site that contains a huge collection of MIDI, music and audio software for all platforms, not just the Atari. If you haven't got web access, give Goodman PDL a call (01782 335650); they should be able to get hold of the *Groove* sequencer for you.

SCSI BURSTING OUT ALL OVER

If you're looking for a cheap way to add SCSI peripherals to your Atari setup, Abingdon Synthesis Projects (01235 534152) are on your wavelength. They've just launched the SCSI Burster (£18), a cable which allows you to easily access bare hard disk and CD-ROM drives mounted within a basic PC case. PC cases and bare SCSI drives can be very cheap these days, and this could be much more cost-effective than buying ready-cased hard drives or CD-ROMs. The SCSI Burster consists of 90cm of cable which attaches directly to your ST (providing it's equipped with a SCSI host, such as the ICD Link 2); at the other end there's a special bracket and three internal 50-way IDC connectors. The cable mounts to a standard PC expansion bracket (where you'd normally install an ISA card), with the three internal connectors interfacing with whatever drives are in the case. The result is a tidier work surface, since the case will house your drives, cabling and power connections: power comes from one PSU, and many cases also offer a mains through connection that you could plug your ST into. Optional extras are further internal connectors, longer cable lengths, and external connectors to allow additional devices to be placed after the Burster-equipped case. This concept should also work with other SCSI-equipped devices — including samplers and Macs.

SOS

NET PROFITS

Paul Ward, in his *Long Live The ST* article in October 1996's issue, mentioned the internet as a valuable resource for back-up, contacts and software, and this month I've rounded up a few more URLs (Uniform Resource Locators) for you to check out. There are dozens of Atari user groups and fan pages worldwide, and one of the best is run by THE NOVA SCOTIA ATARI COMPUTER USERS GROUP (http://www.ccn.cs.dal.ca/technology/nsacug/nsacug.html).This site contains everything for the Atari user: FAQs, a worldwide FTP list, a software library, and a great list of links to other sites. Some seem to be a little cold, but there's still plenty to be going on with.

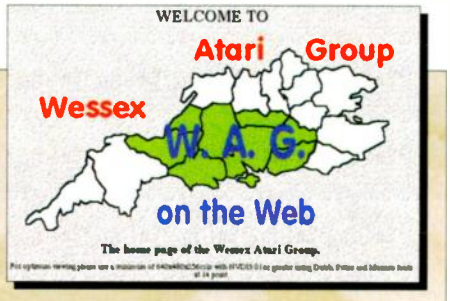
Playing with NSACUG's links led me to the WESSEX ATARI GROUP, here in the UK, on http://www.compulink.co.uk/~mrgs/wag/welcome.htm. This site is run by a local Atari club, and offers a good collection of Atari web sites and contacts.

In the same session, I visited THE ATARI WEB PAGES (http://www.mcc.ac.uk/~dlms/atari.html), which contain loads of tips, software, reviews and links to other web sites for all flavours of Ataris, whether it's STs, Falcons, or even Jaguars and 8-bits.

TUMBLEVANE PUBLIC DOMAIN LIBRARY's web site is on http://www.compulink.co.uk/~mrgs/pd/welcome.htm. It provides an on-line catalogue, with the majority of software available for just £1.75 per disk. There are no credit card facilities, but if you can scrawl out a postal order (or a cheque), then this site's worth a look.

You might also like to visit Toad Computing's ATARICENTRAL (http://www.ataricentral.com:80/). This site is run by a pair of Atari enthusiasts from way back — they started retailing the platform out of one partner's parents' basement in 1986! The company have grown over the years, and must be one of the largest Atari retailers in the States. Once again, this site is a great source of information and links. I particularly liked the Atari ST message board, where people can post tips, ask questions, and generally share information.

Interestingly, UK-based Atari specialists SYSTEM SOLUTIONS have their web page piggybacked onto Toad Computers' site; get to them via AtariCentral's Virtual Village page, or beam direct to http://www.ssolutions.com/.



EVERY PICTURE TELLS A STORY

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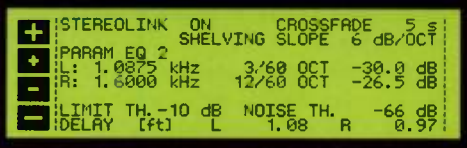

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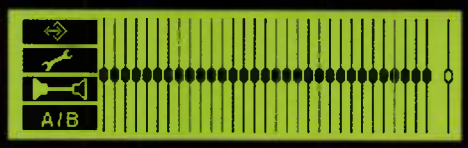

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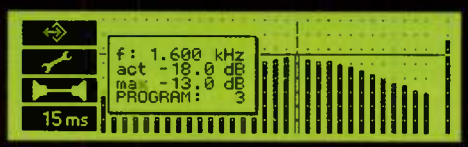

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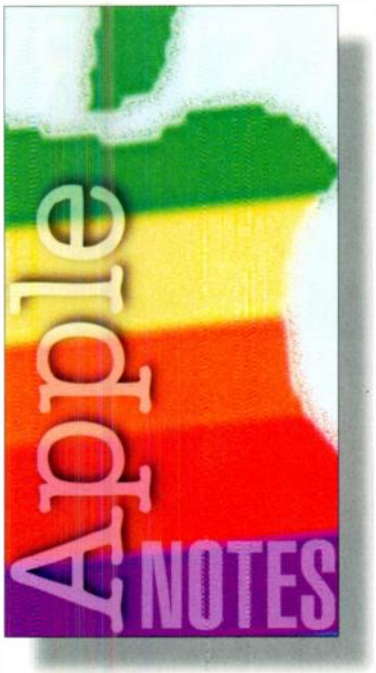


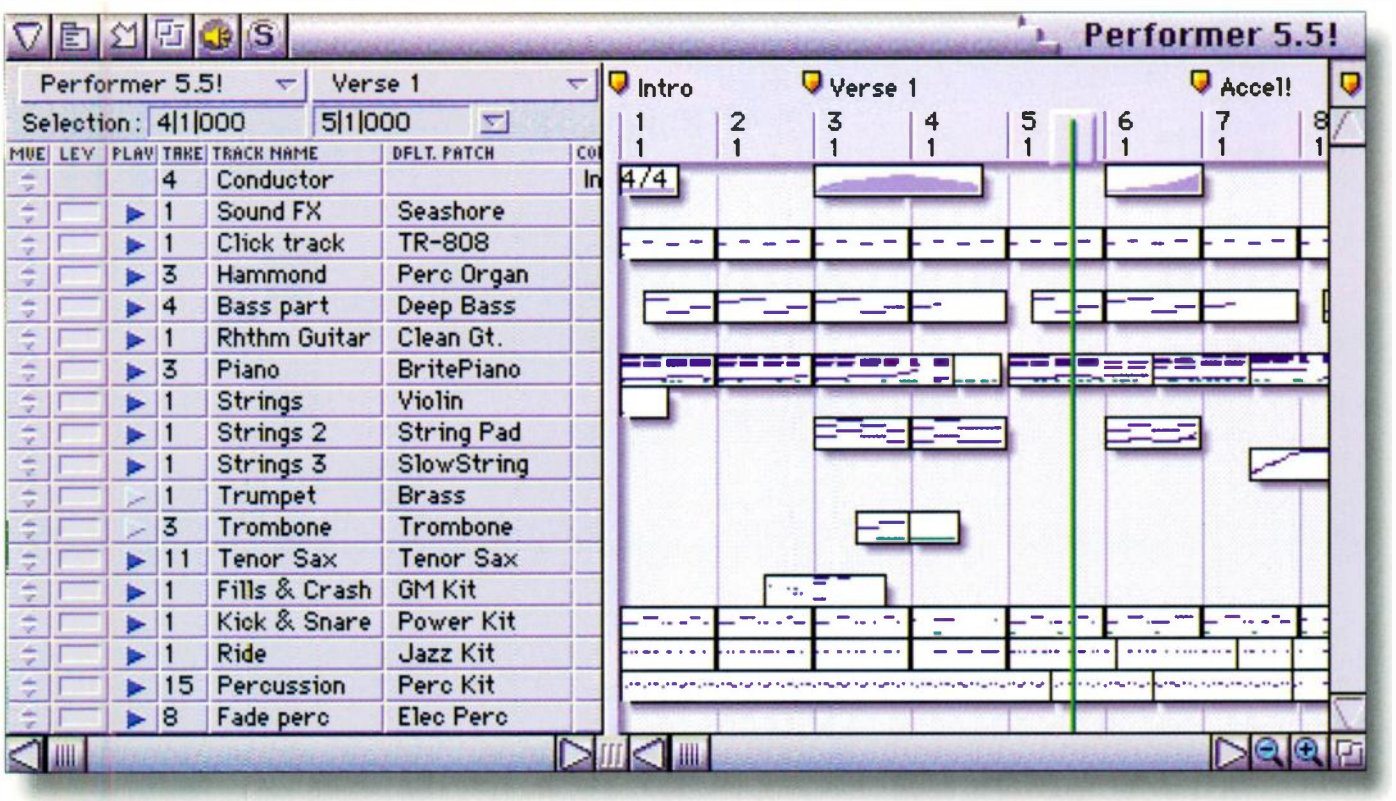
Astonished by the speed of software development, MARTIN RUSS wonders where it's all leading...

When I reviewed Mark Of The Unicorn's *Digital Performer v1.7* MIDI + Audio sequencer earlier th s year *[SOS September '96]*, I commented that the rather coarse track overview w ndow was due for an imminent update. So I'm delighted to be able to report that the first sighting of the new window has been made...

Performer v5.5 adds a substantial number of major enhancements, which might well have prompted a designation of v6.0 had this been a Microsoft product! For someone like me, who uses the track overview as my prime way of 'seeing' what is happening in my music, *Performer v5.5*'s new window is a refreshing advance: gone are the boxes which darken as the density of MIDI data increases (remember: *Performer* is a MIDI-only sequencer; *Digital Performer* is the MIDI + Audio version). In their place are tiny graphical representations of the track contents, piano-roll style. Not very original, perhaps, but adopting the best ideas from other software can lead to a pleasing convergence.

Less obviously innovative, but actually probably more clever, is the use of windows instead of modal dialogue boxes for many of the common manipulations that you need to carry out on musical information: Transpose, Quantise, Split Notes, etc. This means that instead of having to reselect a menu option to re-open a dialogue box every time you need to do a transpose, you can now leave the window on the screen and use it whenever necessary. *Performer*'s specialised window-control tools now begin to look like a very shrewd investment, as the number of open windows grows. The downside is that you may need to consider buying a larger monitor — but even here, the 'you need a large screen' emphasis of Windows 95 and NT are driving down the prices of larger monitors anyhow, so you may be pleasantly surprised when you do start to price them.

The fascinating thing about these developments is the pace at which they happen. It's not that long ago that new versions of the major music software programs took years in their gestation. But a gradual acceleration has resulted in the current



The new, improved track overview window from MOTU's Digital Performer v5.5.

situation, where the transition from one release to the next can be less than a year, with several incremental bug-fixes in between. In some cases, it seems extra features are added for no better reason than the manufacturer needed new bullet points in his advertising! With *Performer v5.5*, however, the changes make sense and actually enhance the operation of the program.

Even so, for Christmas, I've still asked Santa if he can persuade all software writers to spend a year sorting out the bugs in the current versions of their music software, ignoring the temptation to add new features. No bloat in 1997, please!

X2 MODEMS

The cunningly named X2 technology offers something which appears almost too good to be true. Fifty-six Kbits per second is twice the baud rate of the popular 28.8Kbit/s modems, and almost twice as fast as the 33.6Kbit/s leading edge models. But a combination of special network configurations and a one-way 'asymmetric' transmission mode (instead of the two-way approach of traditional modems) allows file downloading at unprecedented rates.

Currently, the X2 technology is restricted to US Robotics modems (via a software upgrade) and a service provider with the right hardware — plus it is not due until January 1997. As always with computer-based developments, the technology may be rapidly taken up by other manufacturers. All of which has an interesting side-effect: although MIDI's 31.25Kbit/s baud rate does not always comfortably fit into a 28.8Kbit/s bandwidth, a 56Kbit/s link may be much more accommodating...

HOT SAUCE ON THE NET

Apple's latest innovation used to be called Project X when it was under wraps at their research labs, but has now been released into the daylight as Hot Sauce. If you were wondering about their naming conventions, you need look no further than their search engine, called V-Twin, to be thoroughly confused.

Hot Sauce is an attempt to present information in a way which is similar to how people actually store things — untidily! Show me a studio, office, bedroom or garage that is actually like a furniture advert, and I can point to a frantic half-hour spent tidying it before I arrived. From considerable experience (MIDI consultants often see studios in the raw!) I can almost guarantee that the natural state of any working environment is chaotic. And yet most people can put their hands on any piece of paper, floppy disk, CD-ROM, sheet music, notepad, book, within a couple of minutes — because they 'know' where it is. Convert this spatial 'map' of where things are to a computer, and allow people to fly through it, and you have Hot Sauce.

Technically speaking, Hot Sauce allows you to navigate through a 3D space containing objects which represent content. The content can be almost anything: web pages, files, email, pictures, MIDI files, databases and more — all represented in a format called the Meta Content Format (MCF). In effect, Hot Sauce is a browser that allows you to move around within the content objects. As you might expect with a browser-type application these days, there's a plug-in for Netscape's *Navigator* — but for Mac users, there's a stand-alone application too, which allows additional customisation and is geared more towards authoring. (Windows users only get to fly around!). The plug-ins are less than 200 Kbytes, and so are worth attempting to download even with 14.4 Kbaud modems. The application is considerably bigger (6Mb for the largest version) and requires an FPU if you are running a 68K MacOS machine.

http://mcf.research.apple.com/
http://mcf.research.apple.com/hs/download.htm

TIP OF THE MONTH: FONT MINIMISATION

Last month's Apple Notes looked at rationalising the Apple Menu Items folder, plus some pointers on how to keep things tidy. This month the spotlight falls on the Fonts folder.

Surprisingly, quite a lot of software now automatically installs fonts into your system as a so-called bonus freebie. Word processors, graphics programs, and even music software can all add fonts — sometimes without even telling you. The simplest way to check what happens during an install is to use the Mac's 'Labels' control panel, something that has long been one of the almost-forgotten features of System 7.

When you first install a new Mac Operating System (7.5.5 should be available about now), you should go into the System Folder and select all the files and then colour them by selecting the required option from the Label menu. When you subsequently install any additional software, you can see which files have been added because they will not be coloured! Simple.

Font-wise, you can probably get away with a very simple set of basic fonts when you are exclusively music-making — although you may need to make sure that you leave any fonts which are used for on-screen notation displays! Usually, fonts used for music software have hints in their names: eg. 'SonataOpcode' or 'MOTUFonts'... Extras like ATM, Postscript and bitmap fonts are all superfluous to the basic operation of the Mac — just having a few TrueType fonts installed will suffice if you need extra fonts.

Before System 7, it was possible to see all of the fonts that were installed in the system, including the Geneva 9, Monaco 9 and Chicago 12 bitmap fonts which are used by the Mac Finder for filenames and menus. System 7 hides the essential system fonts away (inside the System File itself) and so you can empty the Fonts folder entirely by moving the contents to the Fonts (Disabled) folder to give you the bare minimum of fonts, and you will still be able to read your Mac's screen when it reboots.

In System 6 and before, the Mac would complain that you were trying to get rid of essential fonts and would not let you move them at all, but hiding them is a much better idea since no-one can even try to remove them. If there are any fonts you require for music notation, you can always move them back into the Fonts folder from the Fonts (Disabled) folder. This is a good time to find out what you actually do need font-wise! Depending on the number of fonts you remove, you may well free up extra RAM and gain a faster boot-up time.

APPLE NEWS IN BRIEF

• BETTER THAN REPORTS

November's Apple Notes contained another of those typographical blunders that can result from using email. The third quarter loss by Apple was 21 million dollars, not 321 million! Oops... And in fact, the fourth quarter results included a 25 million dollar *profit*! Apple Chairman and Chief Executive Officer, Gil Amelio, said that the question now was not 'will Apple survive?', but 'how will Apple establish leadership in the emerging digital era?'

• EPIC RELEASE

After a long wait, Apple have finally launched the 1400 (codenamed 'Epic') series of PowerBooks, their first with built-in CD-ROM drives. (It also marks the end of the line for the PowerBook Duo desktop plug-in range.) The (allegedly three) 1400 series models should finally put Apple back in the front-running of portable Macs; after all, many of the standard features that you find on portable laptop computers were first introduced by Apple: trackballs at the front/keyboards at the back; feet to angle the keyboard; glidepads to replace trackballs; and more. As an added bonus, comparing the price of the 1400 with equivalents in the PC world, the new PowerBook looks considerably cheaper.

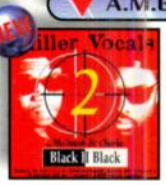
• PRO TOOLS 4.0

Digidesign's forthcoming Pro Tools 4.0 includes support for both the PCI-based and NuBus-based Pro Tools III hardware and native PowerPC software. Upgrades from existing Pro Tools software, plus NuBus-to-PCI hardware exchanges are available *[see this month's preview on page 9]*. For more info, check out http://www.digidesign.com/

SAMPLE PURE INSPIRATION

A SMALL SELECTION OF OUR SAMPLING CDs - SEE 100's MORE BEST SELLERS IN OUR NEW FREE COLOUR CATALOGUE

A.M.G. (England)



BLACK II BLACK KILLER VOCALS 2

AVAILABLE NOW! Another 2-CD package of vocals from McIntosh & Charles to follow-up the hugely popular Killer Vocals Volume 1 - this time a massive collection of almost 2000 vocal samples.

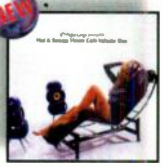
CD 1 (1287 samples) features hooks in a similar vein to volume 1.

CD2 (which is again completely license-free) runs for almost an hour, includes 689 samples and features 'Aaah' notes and chords this time, and is accompanied by a selection of license-free hooks too.

SO DON'T MISS PART TWO OF THE BIGGEST AND BEST VOCAL COLLECTION EVER RELEASED! Audio CD: £59.95

PASCAL's BONGO MASSIVE

Rhythm of Life Vol. 4 is a 2-CD set from Pascal Benadjaoud, the top percussionist whose credits include Stereo MCs, Bob Marley, Lisa B, Gypsy Kings etc. Also well known on the UK club scene, he's worked with top UK DJs like Paul Oakenfold & Danny Rampling, often adding live percussion to their mixes. Features long(ish) grooves with various mixes accompanied by solo patterns and hits. Lots of tight, inspirational performances to explore. All in all this is another high quality and useful collection from AMG that's sure to become another classic. Audio CD: £59.95



HOT & SWEATY HOUSE CUTS

This new dance sample CD produced by top US DJ Papa Large is in the Megabass 'REMIX!' mould but with a strong emphasis on house and a very commercial edge. Papa Large has been on the underground club scene for more than a decade and built up a huge sample library that he's now made available for the first time.

His CD features hard, bangin' drum and percussion loops, rolls, synth FX and sequences, guitar, organs, vocal hooks, stabs, hits, FX, and more, and runs for 73 minutes. Miss it at your peril ! Audio CD: £59.95

KICKIN LUNATIC BEATS VOLUME 2

By Keith LeBlanc. A major departure from his original CD. Largely recorded and mixed at Adrian Sherwood's On-U Sound Studios. A huge selection of extreme drum beats (many presented with a selection of alternative dubs) radically different from those on any other sample CD. Also a selection of beats that Keith has collected over the years, a very weird FX section, and some specially recorded hits. This is an awesome drum CD, perhaps closer to Gota Yashiki in style than any of AMG's other releases. A unique sample collection that could only be Keith LeBlanc.

Audio CD: £59.95. [CD-ROM coming soon].

ABRACATABLA

By Talvin Singh, a leading exponent of ethnic fusion (works with top acts like Massive Attack, Bomb The Bass). Huge selection of mostly ethnic percussion. Highly comtemporary ensemble grooves with extremely intricate, tight performances, broken into various mixes/combinations/sounds. Also solo patterns complete with very comprehensive sets of single hits. *"They don't come much more talented than Talvin Singh... these loops could add extra sparkle, spice and class to any music... Took three years to complete... This is one inspirational CD"* (Future Music, UK). Audio CD: £59.95

BLACK II BLACK VOLUMES 1 & 2

By Steve McIntosh & Joe Charles. One of the biggest & best sets of kickin' R+B samples around. All the loops, Vocals, Brass lines, & Drum hits were specially recorded. Features: Reggae, Ragga, Swing, Jazz house, Euro house, Mad house, Slo jamz, Rap, Guitar licks, Bass lines, Garage, and Disco. *"Monstrously funky, soulful rhythm loops... highly recommended for teachers of contemporary arranging"* (Keyboard, USA). *"Swingin' funky loops... a very good example of how to construct a sample CD... useful, well recorded and organised."* (Future music, UK).

"☆☆☆☆3/4" (Sound on Sound).

2 Audio CDs: £59.95 each, or 2 Akai CD-ROMs : £149 each

Spectrasonics (USA)

LIQUID GROOVES

Grooves that have existed only in your imagination.

Fluid rhythms forged by a synthesis of propelling live drum grooves and unusual, organic percussion loops performed by some of L.A.'s most creative session players. Unique sonic textures! State-of-the-art instruments such as Korg Wavedrum™. The full-blown CD-ROM version (organised to make mixing & matching effortless) includes a wider selection of grooves & killer Wavedrum™ single hits. The liquid concept is two-fold: Sparse "hand-played" grooves that feel great, combined with focus on uncharted sonic territory. Another inspiring & unique library from Eric Persing to reinforce Spectrasonics' reputation as second to none. Audio CD: £59.95, CD-ROM: £149

BURNING GROOVES

Devoted to raw, aggressive, in-your-face energy! Blazing, all-original live drum grooves by Abe Laboriel Jr. (drummer for Seal) with extreme remixes by producer Eric Persing (who brought you Bass Legends & Distorted Reality). Unrelenting alternative, power funk, progressive soul, rock'n'roll and grungehead loops in a wide variety of tempos put this collection in a class by itself. Each groove has a unique mix (edge, ambient, distorted, lo-fi, etc) and some have Hi-fi and Lo-fi re-mixes. Grooves also played without kick/snare for flexibility in customizing loops. CD-ROM version includes the Audio CD for instant auditioning, plus the incredible SMOKIN' KITS drum library. Attitude!

Audio CD: £59.95. CD-ROM (includes the audio CD): £149.00

SUPREME BEATS

The most comprehensive library of percussion grooves & instruments ever developed, featuring percussionists from all over the world. This highly acclaimed library is now available on 2 CD-ROMs:

1: AFRICAN/CONTEMPORARY, & 2: WORLD/DANCE. *"A feast of human feel, energy & emotion... a knockout... Supreme Beats is a winner. 20 stars out of 20."* (Keyboard, USA).

African/Contemporary CD-ROM: £149.00. World/Dance CD-ROM: £149.00. Audio CDs 1 to 4 (boxed set): £199.00. Audio CD 5 (NEW!): £59.95. (CD-ROM versions include all the sounds from Vols 1-5 audio CDs).

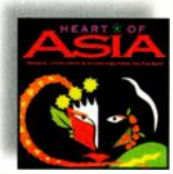
HEART OF AFRICA VOLUME 2

Following the success of Heart of Asia, the equally unique sequel is a smash hit.

The library comes in two parts. Volume 2 (shown) features all-new tribal phrases, vocals, performances and effects, mostly recorded at a huge tribal competition in Kenya. This material is very primitive & really enhances the volume 1 samples. "Heart of Africa" is heartily recommended to anyone seeking beautifully recorded authentic ethnic sounds & rhythms, and complements "Heart of Asia" perfectly.

Volume 2 audio CD: £59.95 CD-ROM: £149.

[Volume 1 audio 2-CD set: £79.95, CD-ROM: £199.00]



HEART OF ASIA

This product got a 5 star review in every magazine in UK, US & Germany! The most comprehensive collection of Asian instruments & phrases. This remarkable 2-disc set includes over 1Gb of exotic Chinese, Malay, Nepalese, Tibetan Javanese, Hindi, Sanskrit, Mandarin, Thai & Indian samples, including instruments, phrases, opera divas, chants, speech, gamelan orchestra, monks. Perfect for your next film score, album or remix project. *"A treasure chest of lovingly sampled performances"* (Keyboard, USA). *"The range and subtlety is faultless. You won't find a better collection of ethnic sounds anywhere else."* (Future Music, UK)

Audio 2-CD set: £79.95. CD-ROM 2CD set : £299.00

DISTORTED REALITY

And now for something completely different... Cutting Edge Textures, FX and Loops from the labs of top Hollywood sound designers and techno-heads. From 3-dimensional atmos transformed via Harmonic Sound Morphing, to incendiary fuzz mutations, Trance-inducing ambiences, loops, enormous modular drones and astonishing timbral contortions - an essential resource for the producer, composer, or sound designer in search of the magic noise. *"If you're making any kind of edge music, this is a library YOU MUST HEAR... gorgeous curtains of sound... will get your listeners' blood pumping... For the progressively minded this disc is a feast. 5 stars out of 5 in every category"* (Keyboard, USA). A spine-tingling sample collection, and about as unique as you can get. Audio CD: £59.95, CD-ROM: £149.00

Sounds Good (Sweden)

SAMPLE MATERIAL

Sample Material is a sonic collage from the sound libraries of visionary New York producer Bill Laswell and the 'Material' cadre containing Loops, Textures, Riffs, and Single Sounds. Atmospheric Ambiences, TranceScapes, Ethnic Loops & Riffs, Metafied Grooves & Kaos. A Sampling Product covering the broadest spectrum of musical genres. Ammunition for all Sonic Wizards who want to create music with no boundaries.

REVIEW: *"World grooves, basses and guitar loops, clavinets, synth effects, kicks, snares and ambient washes to back any atmospheric composition.... It's all here to some degree... Good sounds"* (Future Music, UK).

Audio CD £59.95, AKAI CD-ROM £149.00

NEW WORLD ORDER 1 & 2

Journey # 1: Fantastic Collection of Ethnic & Percussion loops. Tribal Rhythms, Ritual, Djembe, Talking Drums, Calypso, Reggae, Haitian Voodoo, Afro-Cuban, Latin Funk, Tabla Loops, Indian Ensemble, Rhythms from Japan, Ireland, Texas & New Orleans. Journey # 2: Extensive performances on a multitude of acoustic Instruments from all over the World. Loads of seldom heard Folk/Historical Instruments, plus vocals. Loops, Riffs, Slides, Chords, Scales etc. All sounds are original recordings.

Audio CDs: £59.95 each. CD-ROM (Akai): £149 each.

ON A JAZZ TIP

This is Hip Hop In Full Swing! This superb release from Swedish developer Sounds Good features stomping grooves, licks and loops, played in pre-determined keys and tempos to be used inter-actively:

Includes Bass, Guitar, Keys, Horns, Drums and Percussion, Jazz pads, riffs and chords.

Perfect for all HipHop, Rap, Soul, TripHop, Acid Jazz and Funky flavors.

"On a Jazz Tip" is ideal for any music project that needs a sting, swing or that Jazz Thing. Produced and played by musicians who love and respect music. Audio CD: £59.95

EUROTECH

☆☆☆☆☆ 5 stars...

A hit release"

(Sound on Sound magazine).

"Eurotech" specialises in Euro-dance and Euro-pop. This style of music has dominated the charts all over Europe over the last few years & seems set to continue. A very commercially attractive set of sounds, and all original.

The loops are fast (192 of them are over 140bpm!). A nice balance of the experimental & straight. All bpms are given. This is a hot & hard techno resource.

Audio CD: £59.95. AKAI CD-ROM : Now only £99.00

METHODS OF MAYHEM

Brutal & sweet sampling for Industrial/ Intelligent Techno, Goth Techno or anything in need of an Experimental Edge. Uniquely twisted, bizarre and savage stuff. Drum-, Bass-, Synth-, FX-, Vocoder-, Feedback- & Noise-loops. Grinding Guitar Riffs & Feedback. An Analog Heaven with Synth FXs, Sweeps, Zaps, Basses, Drum & Perc Sounds etc. All programmed on vintage equipment and treated without any mercy. Creepy & Cheesy Sound FX, Music FX & Voices. Over 1000 samples. A unique collection. Loops are in set tempos that match other Sounds Good titles. Audio CD: £59.95

SAMPLING SOUND SYSTEM

A new series of smaller multi-format libraries from Sounds Good in Sweden. Each disc in the series is mixed-mode Audio / PC WAV / Mac AIFF. £19.95 each, with Akai CD-ROM versions at £39.95 each. Titles include Drum Tools (Laidback, Brushed, & Popped), Country, Roots Reggae, G-Soul, House, and more! Loops are in set tempos that match other Sounds Good titles!

Call for more details and ask for our free multimedia product catalogue!

Ilio Entertainments (USA)

DOUBLE PLATINUM DRUMS

Multi-Platinum record winners, producer John Boylan and drummer Michael Botts have put together one of the smartest, most tightly assembled collections of live drum loops to date. Phenomenally well-recorded and mixed in true stereo with the same high quality you expect from platinum records. These acoustic kits are played with raw, rockin' energy and plenty of feel. Loops & hits, Dry & Room, Intros, fills & ends for assembling complete tracks!

Audio CD 2-disc set: £79.95, CD-ROM 2-disc set for Akai, Roland or SampleCell: £199.00

SYNCLAVIER LIBRARY (AUDIO)

The five-CD-ROM Synclavier Library from Ilio (USA) has been compiled into two audio CDs containing over 2000 samples. VOLUME 1: "ESSENTIAL" covers Electric and Acoustic Guitars, Electric Pianos, Synths, and Drums & Percussion. VOLUME 2: "ORCHESTRAL" covers Strings, Harp, Brass and Woodwinds, Grand Piano, Orchestral Percussion including Timpani, Bells, Chimes, Gongs and more! Accompanying manual gives loop points for every sample so it's extremely easy to loop samples quickly and effectively. Each CD: £69.95

Big Fish Audio (USA)

LOOPZILLA 2

Features over 2 hours of Hiphop, R&B, and Funk samples, on 2 CDs. The very latest grooves and construction kits for making funky, soulful music in the R&B and Hip Hop traditions. Reflecting the growth of these styles, Loopzilla 2 combines the best elements of programmed grooves & live playing with new melodic & hook elements destined to be the hallmark of new trends. Breakbeats, Guitar, Bass, Analog & Digital Synth loops, Horn Hits, Silky Vocal Harmonies & Pop Hooks combined in Slow Jams, R & B & Hip Hop from the Atlanta, Miami, New York, Oakland and "So Cal" schools of Hip Hop, Funk and R&B. Audio 2-CD set: £69.95

DRUM DOCTOR 2

With over 1500 new samples, Ross Garfield (known as the "Drum Doctor") has raised the standard even higher for this sequel to "The best drums on Earth". It features even better sounds, more takes per instrument, 5 dynamic levels and more performance patches. Like vol.1, it includes General MIDI Kits, High and Low Memory Configurations, Dynamic Articulations, Creative Filtering etc. The finest instruments from the 100 drum kit studio collection of Ross Garfield - Drum Doctor for the world's top studio drummers. When the stars need great drums for a session - they call the Drum Doctor! Audio CD: £69.95, CD-ROM: £199.

Sampleheads (USA)

ULTRA FREAKIN' BASS

The long-awaited sequel to "Will Lee Bass". This new 2-CD set has 5 all-new basses performed by Will Lee from his personal collection, including his most-requested Sadowsky 4-string. All basses are sampled chromatically from C1 to D4 with multiple dynamics & playing styles. Also a huge collection of BASS LOOPS recorded at multiple tempos & keys & styles. This package from Sampleheads in the USA is a superbly crafted sampling resource!

Audio 2-CD set: £79.95, CD-ROM: £199.00

Sound Hunters (USA)

SYMPHONIC ADVENTURES

This versatile orchestral phrase/sting library is perfect for film composers or for any music that needs powerful stings, effects, phrases, suspense, moods, etc. A huge set of immaculately performed and recorded stereo samples. A top-class orchestra and a famous composer, dedicated almost entirely to the darker side of the orchestra. *"Intelligent arrangements and orchestrations give this CD an utterly convincing big-budget movie feel. The depth of instrumental emotion is astounding. Made to measure for Batman 4 or the next Predator movie. Highly respectable and awe-inspiring."* (Sound on Sound, UK).

Audio CD: £69.95, CD-ROM: £199

TIME+SPACE

THE WORLD'S FINEST COLLECTION OF PROFESSIONAL SOUND LIBRARIES ON CD & CD-ROM

ORDER HOTLINE (Freephone) **0800 614 822**

e-Mail: sales@timespace.com

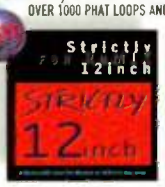
E-Lab (Sweden)

X-STATIC GOLDMINE 4

E-LAB have done it again! Over 1500 Ambient and Chill Out Loops & Samples from the dark side of the Moon. TRIPHOP & CHILL-OUT LOOPS, SPEEDY JUNGLE BEATS & SMOOKIN BASS BOOSTERS, ETHNIC CHANTS & BUBBLE BATH DIDGERIDOOS, WET CHILL OUT CHORDS & XPERI-*MENTAL* SYNTH VIBES, ANALOGUE SEQ FX & ENO-STATE VECTOR LOOPS, PSYCHADELIC DELAYS & DUB-ECHOES, AMBIENT BIRDS & JUNGLE WEATHER. SPOOK FX AND LOTS MORE! *"I will say this just once: GO OUT & BUY THIS ONE!... Absolutely brilliant."* (Musiker Magazine, Sweden). Audio CD: £59.95

X-FILES OF HOUSE

Hot new CD from E-LAB - a new goldmine of Deep & Progressive House loops & samples. To give you an idea, the loops and samples are in the style and mood of Armand van Helden, Tod Terry, or Deep Dish. These loops & samples will make your Hair Stand Out - pure joy. You won't be able to stop moving your feet when you hear this one. All samples provided with variations so you can create your own deep house tune instantly - perfect for injecting The new York club sound into your music - the sound of people like "Masters at Work". OVER 1000 PHAT LOOPS AND SAMPLES. Audio CD: £59.95



STRICTLY 12-INCH

Important new CD from E-Lab. Features Dance/Remix/House LOOPS & DRUMS. WHAT VINYLISTICS IS FOR HIPHOP, THIS CD IS FOR DANCE. The idea is similar: Loops, with variations, together with separate hits. A Remix CD for anyone in the need for good stomping House & Garage Loops. Very much 'DJ sounding', & produced by a Remix/Dj team. If You want the sound of the dancefloor - get this one. All Loops have been tested for reaction on the floor! Audio CD: £59.95

U.S.B. (France)

PITBULL JUNGLE LOOPS

New from Universal Sound Bank in France, a huge collection of original Drum'N'Bass, Hardcore and Intelligent. Enormous and Extreme loops for producers of Jungle. Also individual drum samples for customizing loops and adding fills etc. Loops grouped by tempo, in increments of 5 BPM from 150 BPM to 170 BPM, for easy mixing & matching. The CD-ROM version comes with the Audio CD version for easy auditioning and includes Temp'n Key™ programs that give you all the loops at 26 different tempos. The only Jungle library available on CD-ROM. Audio CD: £59.95. CD-ROM: £149.00

DEF HOUSE

A fresh new collection of House, Tribal and Garage loops from Universal Sound Bank in France. Over 1000 loops and samples including loops in up to 31 tempos, from 110 to 140 BPM.

Also features a host of bass and percussion sounds to complete the bottom end of your track. The sounds are bang up to date - exactly what's needed to create dance music that will keep the party moving! Available NOW in four formats: Audio CD: £59.95, or choose a CD-ROM for Akai, Roland, or Ensoniq samplers - £149.00.

MEDITERRANEAN INSTRUMENTS

Another new release from USB in France, drawing upon the rich and emotive tradition of Greek and Turkish folk instruments - Bouzouki, Electric Bouzouki, Baglamas, Tzouras, Oud, Saz & Jubus. Includes phrases and sets of multisamples. Very professionally recorded and organised. Also percussion loops. This collection is truly a unique source of inspiration. Audio CD: £59.95. CD-ROM 2-disc set: £199.00

WC Music (Canada)

RIDDIM ON FIRE

WC Music Research have done it again! Features: •200 Acoustic Drum and Remix Loops, •250 Electric Bass Loops, •200 Dancehall Loops, •75 Bass and Drum Loops combined, •Drums, Bass, Vocal Hooks •200 MIDI Files, •200 DNA Grooves in Cakewalk, Cubase, Logic, Performer and Vision formats. Recorded in Jamaica to get that round nasty bass and the raw, pulsating riddim. This CD is destined to uphold the great tradition of Reggae DrumSplash, only now you're getting the other half of the riddim twins!!

A masterpiece! Release scheduled for late 1996. Audio CD: £59.95

Invision (USA)

PERCUSSION SLAM

Hot new disc from Invision (USA), comes with loops, samples and standard MIDI-files. Multiple layers of percussion instruments were played live and the MIDI-files were created directly from the loops. Killer material for Dance, Pop, Latin, R&B, HipHop, etc. Enhanced construction kit format includes: multiple tempos of each groove, alternate instrument mixes, fills, MIDI-files & samples. Gives you the power to quickly create and modify tracks. Performed by Rafael Padilla and meticulously recorded at Mama Jo's Studios.

Audio CD: £59.95 Akai CD-ROM: £149.00

<< NEW FREE CATALOGUE

Call for your free copy - It's bigger than ever, featuring 100's of the world's best CDs & CD-ROMs. Or use the INTERNET to take a detailed look at what's available RIGHT NOW by logging on to our newly re-designed internet site (see below).

FREE* CD WITH EACH ORDER>>

Each time you order from Time+Space you'll receive one free showcase CD from one of the following sound developers: Time+Space, Sounds Good, Spectrasonics, Ilio Entertainments, Best Service or AMG. (*Offer limited to one of each per household).

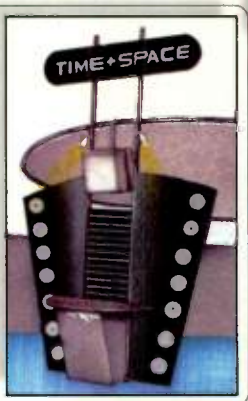
Come and see us at The Show!

Time+Space have an absolutely massive stand at the National Music Show this year:

STAND No. C125

(NEXT TO AKAI)

We'll be selling our FULL RANGE of titles. Come and see our live demonstrations, try out the sample-CD jukeboxes, pick up loads of very special show-only bargains and generally get better acquainted with the Time+Space team!



Major Web Site Update

In case you hadn't noticed, the Time+Space internet site has been totally revamped and updated and will now be updated frequently with all the latest news.

There are also plenty of free demo samples to download! The address is:

http://www.timespace.com

LISTEN BEFORE YOU BUY

Over 40 Time+Space Jukeboxes now installed!

Listen to our CDs at dealers nationwide...

The dealers listed below have demonstrated their commitment to keep your sampler fuelled with inspiring new sounds! You have the opportunity to visit one of the following locations and listen to the entire contents of the sample CDs that interest you most - there you'll find the world's top 100 audio sampling CDs in one of our Sony 100-CD Sample-CD Jukeboxes - and they can supply any CD or CD-ROM from our catalogue!

A selection of our JUKEBOX LOCATIONS :

(*Stores marked with * will have a jukebox installed during Oct / Nov '96):

A1 Music, 88 Oxford St.	MANCHESTER.	Tel: 0161-236 0340
Andertons, 58/59 Woodbridge Rd.	GUILDFORD, Surrey, GU1 4RF.	Tel: 01483-38212.
*Axis Audio, 3 Waterloo Road.	STOCKPORT, SK1 3BD.	Tel: 0161-474 7626.
Carlsbro, 22 Humberstone Rd.	LEICESTER.	Tel: 0116-262 4183
Carlsbro, 11-13 Hockley.	NOTTINGHAM, NG1 1FH.	Tel: 0115-959 1888.
Carlsbro, 720 City Road.	SHEFFIELD, S2 1GJ.	Tel: 0114-244 0000.
*Cranes Music, 5A High Street.	CARDIFF, CF1 2AN.	Tel: 01222-398215.
C.T.I., Fumbally Court, Fumbally Lane.	DUBLIN 8, Ireland.	Tel: Dublin 45 45 400.
Dawsons Music, 65 Sankey St.	WARRINGTON, WA1 1SU.	Tel: 01925-632591.
*Dawsons Music, 1A Princes Street.	STOCKPORT, SK1 1SL.	Tel: 0161-477 1210.
Emis, Old School Hse, Cossham St, Mangotsfield.	BRISTOL, BS17 3EN.	Tel: 0117-956 1855.
*G, A & K Centre, 79-80 North Road.	BRIGHTON, BN1 1YD.	Tel: 01273-676835.
*Gig Sounds, 195 London Road.	CROYDON, CR0 2RJ.	Tel: 0181-686 4546.
*Gig Sounds, 86-88 Mitcham Lane, Streatham.	LONDON, SW16.	Tel: 0181-769 5681.
*Intasound, 70 Narborough Road.	LEICESTER.	Tel: 0800-627 627.
*Marcus Musical Instruments, 125 Royal Ave.	BELFAST, BT1 1FF.	Tel: 01232-439955.
*Millenium Music, 1, Hurts Yard.	NOTTINGHAM, NG1 6JD.	Tel: 0115-955 2200.
Musical Exchanges, 89 Old Snow Hill.	BIRMINGHAM.	Tel: 0121-236 7544.
*Musical Exchanges, 198-202 Binley Road.	COVENTRY.	Tel: 01203-635766.
*Music Connections, 202 New Kings Road, Chelsea.	LONDON, SW6.	Tel: 0171-731 5983.
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hard facts

THINGS YOU SHOULD KNOW ABOUT HARD DISK RECORDING

Hard disk recording is what everyone seems to be talking about, with new systems being released, at all levels of the market, almost every month. For the benefit of anyone confused about how hard disk recording works, MARTIN RUSS points out a few things you might not have considered...

The wave of the moment is hard disk recording — the 'multitracker' of the '90s. Instead of recording audio onto magnetic tape, computer memory chips and hard disk storage are used to hold digitised audio signals. There are advantages to doing this: the limitations of physical tapes are transcended — you can re-record the same segment of audio without waiting for a tape to rewind, and without worrying about wearing out the tape through over-use or destroying it accidentally. In the digital domain there's no need to ever cut or splice a tape, and so there are no problems with sticky splicing tape, dropouts, shedding...

But there are disadvantages too. Because the technologies used in hard disk recording are so different from conventional audio recording, it is all too easy for the unwary to overlook the traps. So how do you find out about the other side of hard disk recording? Read on.

IT'S ABOUT TIME

Magnetic tapes follow a convention that is so obvious and subtle that you may never have even considered it, because it looks like plain common sense. When you buy a tape, it has a length and a width: the length determines how long the tape will play for, whilst the width of the tape limits how many audio tracks of a given quality you can have.

How long the tape will play for can be calculated by knowing the length of the tape and the speed at which it plays — although some tapes are commonly known by their time 'capacity' at a specific speed. Cassettes are an everyday example of this use of time to describe the length of a tape: a C90 lasts 90 minutes. Calling a cassette a C90 is really a way of saying in short that the tape has enough length to provide 90 minutes of recording at the standard cassette tape speed. Double the speed of the tape passing across the record/playback head and a C90 cassette becomes a C45; halve the tape speed and it becomes a C180. This time-squashing is familiar to users of cassette multitrackers which can run tape faster to improve audio quality.

When we're talking about magnetic tapes, their capacity can be expressed using their recording time and the number of tracks they provide. An 60-minute half- or quarter-inch open-reel tape used for 8-track recording will be able to record eight separate tracks, each lasting one hour. This actually gives a total recording time of eight hours, but it is very unlikely that you would ever hear anyone refer to it as an eight-hour tape! The reason is that the tracks are all tied together physically — when you play the tape, the tracks all play simultaneously. You can't take the tape and play it continuously for eight hours — at least, not without stopping it and reversing direction, or rewinding!

But for hard disk recording, this 'obvious' relationship between tracks and time does not exist in anything like the same form. The figure which is quoted for the 'record time' may be the total time that can be recorded across all the tracks — which is the equivalent of describing an 8-track, 60 minute tape as an eight-hour tape. The reason this figure is sometimes quoted for hard disk recorders is because it can be easily determined from the size of the hard disk and the data rate of the digital audio.

For example, suppose we're recording mono, CD-quality audio — one track of 16-bit sampled audio, at a sampling rate of 44.1kHz. At the time of writing, the price of 1000 Megabytes (1Gigabyte) of hard disk storage was under £200, and it's possible to calculate that this would provide over 11,000 seconds of digital audio storage, which is just under 189 minutes, or about three hours and 10 minutes. The 'record time' calculation represents the idealised total capacity of the hard disk to store mono digital audio. As the number of tracks increases, so the time goes down to match. Stereo audio requires two tracks, so the capacity of a 1Gb drive is just under 95 minutes. For four tracks, the calculations give a capacity of just 47 minutes.

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JUST SAMPLE IT

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Hard disk Facts

between time and number of tracks, the term 'track minutes' is being adopted by some manufacturers as a way of describing the capacity of a hard disk recorder. A 'track minute' is exactly what it says: a minute's worth of recording on one track. So a machine which has a capacity of 60 track minutes will be able to record 60 minutes on one track, or 30 minutes on two tracks, or 15 minutes on four tracks, or even 7.5 minutes on eight tracks.

Roland's VS880 8-track HD recorder, designed to be used as an all-in-one studio.

To complicate matters even further, whereas with a stereo tape recorder you can reasonably expect to consistently have an audio signal on both tracks throughout the length of the track, with a multitrack tape recorder this is not necessarily true. On a simple 4-track recording, two of the tracks might contain the bulk of the audio material, with the two remaining tracks used for additional parts, double-tracking, and so on.

If the hard disk recorder only allowed the allocation of time to tracks on a strict capacity/number of tracks basis, there would be wasted capacity whenever you didn't have an audio signal on a track. A much better solution is for the hard disk recorder to allow the flexible assignment of time to tracks. In this case, the figure of 15 minutes for four tracks might well be larger: perhaps 20 or 25 minutes depending on how fully the tracks are actually used. The same applies to eight or more tracks, where utilising the unused time within the tracks might allow 10 minutes or more of total record time in a system which only has the capacity for just over seven minutes of fully-used tracks. This is very different to how an analogue tape recorder works.

THE NUMBERS GAME

One of the ways in which cassette multitrack manufacturers manage to produce versatile portable studios at low cost is by reducing the number of tracks which can be recorded simultaneously. Many of the budget 4-track machines can only record two tracks at once, although all four can be replayed together. Almost all other tape recorders do not suffer from this limitation — the ability to record all the tracks at once is almost taken for granted.

A single mono digital audio track, recorded using 16-bit samples at a rate of 44,100 per second, requires the hard disk recorder to move 88,200 bytes onto the hard disk every second. Four tracks requires 352,800 bytes per second to be moved, which is approaching the typical continuous throughput of an ordinary SCSI or IDE hard disk interface. So recording eight tracks or more at once may well require some more advanced interfacing — which is fine inside a hard disk recorder box recording to an internal hard disk, but may cause problems for an *external* hard disk connected via SCSI. This can mean that there is a physical limit to the number of tracks that you can record simultaneously on any given system — due solely to the huge amount of data which needs to be moved around.

One temporary solution to this limitation is to record into the read/write (RAM) memory instead of to a hard disk. Although possible, this requires large amounts of RAM, so it severely restricts the length of time which can be recorded without saving to hard disk. The 4-track, 16-bit, 44.1kHz sampling-rate system outlined above needs just over 1Mb of memory to store every three seconds of audio, so 8Mb will yield 24 seconds of 4-track audio, 16Mb will give almost a minute, and a typical 'pop' single would probably fit into 64Mb — with the RAM costing around £500. Once stored in RAM, the digital audio could then be saved to hard disk, thus freeing up the RAM for more recording.

COMPRESSION

One method of reducing the demands made by a hard disk recording system is to reduce the amount of data which needs to be stored. In a computer context, this is called 'compression', and it is very different from the compression that you might apply to a vocal track, or the compression that happens when you record aggressively onto analogue tape. There are two basic forms of computer-type compression: lossless and lossy.

• **Lossless** compression squashes the data in some way so that it can be stored, and then recovers all of the original information again when it is read back. Although this sounds impossible, there are several methods which can achieve it. The underlying aim is to exploit the characteristics of the data. For example, suppose we were noting down the number of cars which crossed a bridge every hour. The first few hours might read like this: 312, 294, 287, 301, 295... and so on. If we take the first figure, and then note down the differences between successive totals, then we get 312, -18, -7, 14, -6. The first number is the same, but all the rest are much smaller. By taking the first number and adding or subtracting the increments, it is possible to restore the original numbers exactly. Audio data has properties which can be exploited by compression schemes — for example, it turns out that the change between successive bytes of audio data is often quite small, so if differences are sent instead of complete sample values, the amount of storage required can be significantly reduced. More sophisticated schemes look for patterns of data, and then code these with shortened 'pointers'. But each process is designed to save all of the original set of data, and subsequently restore it completely. The audio data which is saved to the disk is recovered unchanged, and so will sound exactly the same as previous playbacks before the save to disk.

• **Lossy** compression attempts to store just the significant parts of the data, and then to recover a close approximation to the original. Many of the techniques for lossy compression are similar, in that ▶

HARD DISK CHECKLIST

Here are a few of the things to consider when looking at hard disk recording systems:

- What's the total record time available?
- Is it long enough for my requirements?
- How many tracks can be recorded simultaneously?
- If a data compression system is used, can I hear it? If so, can I live with it?
- How will I back up?

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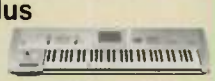

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Yamaha's MD4 Minidisc multitrack uses data compression to squeeze four tracks of audio onto an MD data disc.

> "One method of reducing the demands made by a hard disk recording system is to reduce the amount of data which needs to be stored."

▶ they exploit the characteristics of the data in some way, but decisions are made about just how much detail needs to be stored. Using the 'cars crossing a bridge' example, if the information required from the counting of the cars was the peak number of cars, then only one number needs to be stored: 312. Alternatively, if only the total number of cars crossing per hour is required, then we could approximate the hourly counts to the nearest 10 or even 100 cars — '300 cars cross the bridge every hour' may be perfectly adequate. For audio data, some parts of the waveform or the spectrum might well be superfluous to the audible content, and so can be mostly discarded. This is exactly the type of processing that is used by Minidisc and DCC (Digital Compact Cassette) — the most prominent sounds are stored with the most detail, while any background sounds that they 'mask' are not stored with the same depth of detail. When designed carefully, lossy audio compression techniques can provide significant reductions in the amount of data which needs to be stored, whilst remaining almost inaudible to the listener.

With any audio compression system, your approach should be to audition it closely to see if it is acceptable for your music. Unlike the clipping distortion that you may be familiar with in digital systems, compression can introduce much more subtle changes to the sound. If you want to hear these effects, you'll need to make A/B comparisons with a range of material to become familiar with them — and try to concentrate on the background, not the foreground sounds: listen out for a slight coloration.

GET YOUR BACKUP

As you know, an analogue tape recorder stores its audio on a removable tape. Hard disk recorders store audio on internal hard disks which normally can't be removed and stored away. So what happens when you've filled the hard disk with music?

Hard disks tend to fill up more quickly than you expect, and they can occassionally fail catastrophically. In order to prevent the accidental loss of painstakingly recorded and edited digital audio data, or just to save it so that you can put something new onto the disk, its contents need to be stored on at least one other alternative storage medium.

Hard disk recorders offer two options for saving digital audio. The simplest and lowest-cost systems provide access to the digital audio only — so the only way to save the contents is to record them onto DAT using the digital I/O sockets. This is truly 'real-time' storage, where the time taken to store the digital audio is about the same as half of the total length of all the tracks — assuming that the data is stored using the two tracks of the DAT as two mono audio tracks. Re-loading data backed up in this way will also take the same amount of time. For example, if a three-minute single is made up of eight continuous mono tracks, each lasting three minutes, it will take at least 12 minutes to store onto DAT tape, and the same to re-load.

If the hard disk recorder does provide direct access to the hard disk, this will almost certainly be in the form of a SCSI socket. SCSI (Small Computer System Interface) sockets allow you to copy the entire contents of a hard disk to another storage medium. This could be a data tape, another hard disk, or an optical disk.

The DDS (Digital Data Storage) DAT is one of the most popular data tape formats. It offers storage of at least a couple of Gigabytes on a 90-minute tape. Tape storage can be slow: a 90-minute DDS DAT tape will take at least 90 minutes to fill — and probably more because of how files are written to the tape and then verified.

Hard disk drives can be fixed or removable. With a removable drive, you buy the case, the power supply and the interfacing circuitry once, and just change the hard disk. With a fixed drive, you buy the whole lot every time. The capacities and performance of removable drives are increasing all the time, with 1Gb removables costing only just over twice the price of a similar fixed drive — and buying a second 1Gb cartridge is much cheaper than buying a second fixed disk!

Optical drives store data on something very similar to a CD-R. Until very recently, optical drives have suffered from a lack of standardisation, although the forthcoming DVD (Digital Video/Versatile Disc) may sort this out and should provide just under 5Gb initially, with the promise of 15Gb longer-term.

CONCLUSION

Despite appearing to be nothing more than a computer-based version of a tape recorder, hard disk recording is actually very different, and understanding these differences can help you to avoid expensive mistakes. Because the technology of hard disk recording is new and expensive, a range of alternative approaches are appearing, which are intended for specific applications. Trying to use one of these application-specific products in another way can be frustrating and occasionally disastrous — but you're now armed with some appreciation of the potential pitfalls and hopefully, you can avoid them! SOS

HARD DISK RECORDING TIMES

HD Size (Mb)	Seconds	Minutes	Hours
10	113.4	1.9	0
20	226.8	3.8	0.1
50	566.9	9.4	0.2
100	1133.8	18.9	0.3
200	2267.6	37.8	0.6
500	5668.9	94.5	1.6
1000	11337.9	189	3.1
2000	22675.7	377.9	6.3

These times are for monophonic 16-bit audio recorded at a sample rate of 44.1kHz.

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Master Piece

TC ELECTRONIC FINALISER STUDIO MASTERING PROCESSOR

Danish company tc electronic have become very well known over the years for their sophisticated range of signal-processing devices. Their latest offering, the Finaliser, is described as a studio mastering processor, and certainly appears to be well up to the high standards we have come to expect from tc. Just what is a 'studio mastering processor', though? In short, a device such as this one uses DSP (Digital Signal Processing) technology to provide a chain of very sophisticated signal processors, which may be used in combination to add that final tweak to a stereo mix.

The Finaliser offers:

- A high-quality, 20-bit analogue-to-digital converter.
- A 5-band equaliser.
- A de-esser.
- An 'analogue warmth' feature.
- A stereo width and balance adjuster.
- An automatic volume controller.
- A multi-band expander.
- A multi-band compressor.
- A multi-band limiter.
- A 20-bit digital-to-analogue converter.
- A digital format converter with SCMS (Serial Copy Management System) control.
- Digital word-length reduction with re-dithering.
- A peak level meter and phase display.
- A line-up tone generator.

KNOBS & LIGHTS

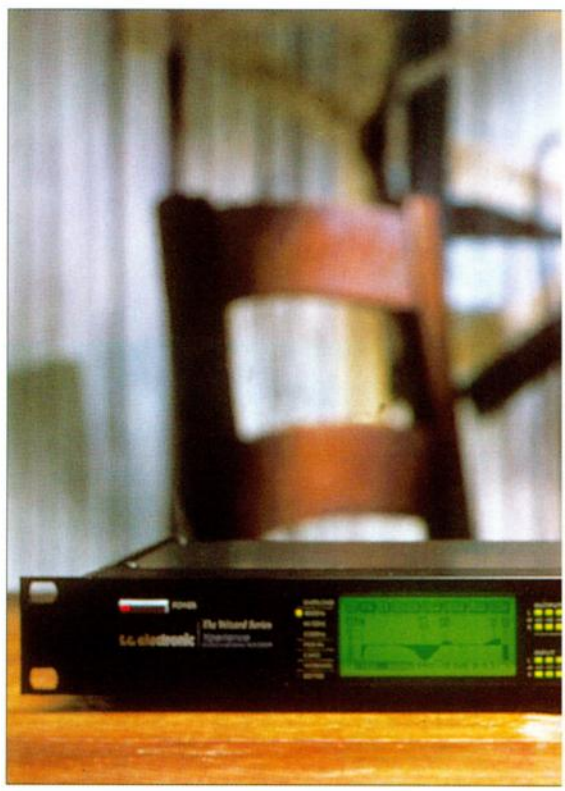
The Finaliser is housed in a sturdy, 1U-high 19-inch rackmount box, made from steel, with an anodised black aluminium front panel. The rear is fitted with an impressive selection of socketry, which includes an IEC mains inlet (with switch), balanced XLRs for stereo analogue signals (in and out), pairs of XLRs and phono sockets for digital (again in and out, in both AES-EBU and S/PDIF formats), the familiar trio of MIDI connectors, and a quarter-inch jack socket for a footswitch.

The unit can be configured for analogue signals at either -10 or +4dBu levels, and conversion to and from digital is available at 44.1 or 48kHz (32kHz operation is also available when slaved to a digital input). The specifications for noise, distortion, frequency response and dynamic range are all very respectable, and the Finaliser easily makes the grade for use in a mastering room or high-end studio.

The centre of the front panel is dominated by abundant arrays of LED bargraph meters, with an LCD display to the left, and 18 buttons and a control wheel to the right. On the extreme left are a power switch (actually a standby button, as the mains breaker is on the rear panel) and a slot for a PCMCIA memory card for archiving custom settings.

The LCD display is the heart of the machine, as it provides 26 different graphical pages, allowing the user to observe and modify every aspect of the Finaliser's signal processing. A column of LEDs to the left of the display indicates internal overloads, the selected sampling rate, when MIDI data is incoming, and so on. Other LEDs here confirm recognition of a PCMCIA card, and indicate when the DSP system is being re-configured and when a memory preset is being modified.

The stereo input bargraphs, located at the bottom centre of the panel, are relatively crude, with only 3dB resolution at the top end and a 60dB range, but the output meters are extremely detailed — which is appropriate, because this is where you need the information. These level meters are accompanied by three red gain-reduction bargraphs reflecting the action of the compressor and expander sections. Six separate, but associated, LEDs indicate when the limiter and expander sections are operating (independent LEDs for each band).



The keys on the right-hand side of the control panel vary in size, with the larger ones calling up the operational modes and the smaller ones being used for menu navigation. Normal Finaliser operation is selected by pressing the Main Page button in the first column, with additional facilities, such as the phase display and calibration tone generator, being accessed through the Tools key below it. The Utility button at the bottom provides an extensive range of options for MIDI, memory

pros & cons

TC ELECTRONIC FINALISER £2056

pros

- A very impressive and powerful device, easily capable of producing very high-quality and commercial-sounding master recordings.

cons

- Requires high level of technical understanding to really get the best from it.
- Fiddly multi-button operation and busy LCD pages make it frustrating and slow to set up.

summary

Probably not a tool for everyday use, but rewards patience and techy know-how with very polished results.

SOUND ON SOUND

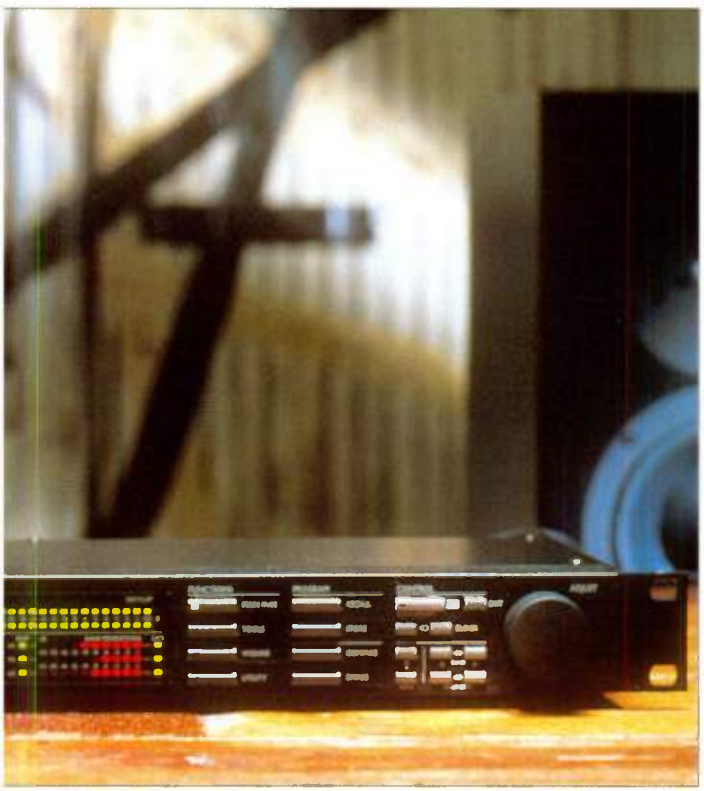
management and security (all functions can be protected by a PIN number!) and the fourth button initiates a 'Wizard', which requires the user to define the type of material being processed and the level of processing required, before it automatically conjures up a 'perfect' setting. The second column of buttons is used to recall and store memory presets, compare settings (between original signal, stored preset and modified preset), or bypass processing.

The most important buttons are in the third group, adjacent to the Adjust wheel. Eight half-sized buttons provide the means of navigating around the various control screens and their parameters, while a full-sized button above them engages the desired signal-processing blocks or confirms actions, as appropriate. A ninth small button calls up an on-line help system, and the rotary control is used to adjust the various parameters selected in the control pages and choose processing presets.

PROCESS BLOCKS

The order of signal processing in the Finaliser is fixed — which is a bit of a shame — but on the whole, the given sequence should be satisfactory for 99% of applications. The input module is followed by the 5-band equaliser, a special effects unit, the gain normaliser block, and then the three, 3-band dynamics units (expander, compressor and limiter). The chain finishes with an output module.

• The **Input block** allows you to select the system's operating level and fine-tune input gain and balance. It also determines the input source (analogue or digital), and the sampling rate or digital format. There's also an adjustable high-pass filter with a default cut-off at 2Hz, for sub-bass and DC removal.



• The **Equaliser** block provides high and low sweep shelf bands (with adjustable slopes between 3dB and 12dB/Oct) plus three bell-shaped bands (with adjustable Q and full 20Hz-20kHz ranges). I often have problems with 20-20 digital EQ sections because it's so easy to forget which band is modifying which part of the spectrum (not a problem in conventional overlapping-band designs, of course). However, the Finaliser includes a real-time frequency response display with floating markers to identify which of the five bands are responsible for each 'lump' in the response. This latter feature is such an obvious solution to the problem that

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BITS & PIECES

The Finaliser's Tools page provides a Phase Meter, which draws a wiggly line showing the relative phase between the left and right channels, and its Calibration Tone can be adjusted to all the common standard digital line-up levels. Unfortunately, the frequency is fixed at 1kHz, and it would have been nice if this was adjustable. There are two metering tools pages: the first shows a bargraph output meter with a long-term peak-hold display, and the second shows six bargraph displays indicating the notional internal signal level at each stage of the signal path. The final page concerns the digital inputs and outputs. The input side translates the received status bit data flags, showing whether the recording is pre-emphasised, what bit-resolution is being used, and so forth. The output side allows the SCMS flags to be manipulated to define 'copyrighted', 'single copy' or 'no copyright' modes.

The Wizard page requires the user to define the type of programme material, the level of compression, whether to optimise gain and what kind of EQ effect is needed. Once the information has been entered, the system will automatically insert and optimise the various processes to create generally acceptable results. Manual adjustments will always produce better effects, but the Wizard gets pretty close with most material.

Hugh Robjohns is a lecturer at the Centre for Broadcast Skills Training at BBC Wood Norton. The views expressed in this article are the author's own, and are not necessarily those of his employer.

▶ it makes me wonder why the designers of half-million pound digital consoles haven't thought of it. Definitely one up for the Finaliser! Below the response graph, a numerical readout shows the turnover or centre frequency for the selected band, together with the gain and Q, or slope.

• The **Special Effects** section provides three processes (only one of which may be used at any one time): a de-esser, a stereo width/balance control, and a 'Digital Radiance Generator'. The latter adds second-harmonic distortion, to lend warmth to your 'cold and clinical' digital recordings. The DRG has just two controls, which determine how much of the effect is added and invert its polarity for a subtly different effect. The stereo width section has a graph which plots left/right against mono/stereo, so that the current balance or width setting can be seen at a glance. The de-esser is quite sophisticated, with controls for threshold, ratio, attack and release times, frequency and filter shape (bell or shelf).

• The **Normaliser** section display draws the modulation envelope of the programme sound; a pair of dotted lines represent the peak level. Turning the control wheel can cause these dotted lines to be drawn in towards the envelope, thereby adjusting the signal gain. The system includes a soft limiter, and a counter which logs clipped samples.

• Skipping over the dynamics processes for a moment, the **Output** block allows the user to select the digital output resolution (which is properly re-dithered, with the addition of a low-level random noise signal to reduce quantising noise), the output format, and the system operating level. The output is actually available at the analogue and digital outputs simultaneously, and there is a built-in automatic fader with selectable curves and times for the master fade-in or out. This may be remotely controlled by a simple footswitch or a real fader.

DYNAMICS

The most impressive aspect of the Finaliser is its multi-band dynamic processing. The three processors available (compressor, limiter, and expander) offer broadly similar control facilities, and together comprise an extremely comprehensive and powerful creative toolkit. Audio is split into three bands (user adjustable, but common to all three dynamics processes), with each band having separate threshold, ratio, attack and release times, and, in the case of the compressor, make-up gain. Parameters may be linked across all three bands for easy basic adjustment, and then fine-tuned individually, as needed.

All three sections share a 'look-ahead' facility: a delay is inserted into the main programme path, to give the side-chain advanced information about what the audio is doing, allowing very precise dynamic control. In practice this means an overshoot-free limiter, very accurate compression, and an expander which is hard to catch out.

• The **Expander** page features a graph showing threshold and the slope ratio, which is a great help in understanding what you're doing. The Finaliser manual also provides some very sensible and clear advice about adjusting the attack and release times for the individual bands, to obtain the best results.

• The **Compressor** is very similar to the expander in terms of its control parameters, but it has an additional facility which fine-tunes how it responds to peaks in the signal, as compared to the average RMS value. This is an unusual facility, but one which allows extremely accurate matching of compression characteristics to the programme material.

• The **Limiter** is similar again, but this time has a control which determines how hard or soft the clipper function is. It also has a fine level adjuster which sets the Finaliser's digital ceiling in 0.01dB increments below 0dBFS (0dB Full Scale, or maximum modulation) — the handbook suggests that this can be used to avoid erroneous overload indications from the master digital recording.

IMPRESSIONS

Versatile as the Finaliser undoubtedly is, its extraordinary level of flexibility is both a strength and a weakness. It is a phenomenally powerful machine which can work wonders on pretty much any kind of material when used with care and an understanding of its underlying technical principals. Unfortunately, though, it could also be described as being over-burdened with capabilities, making it rather complicated, fiddly and above all, time-consuming to set up.

If you are patient enough (and have sufficient understanding) to set up each processor section carefully, the results are nothing short of superb — but in the wrong hands, the Finaliser can wreak more havoc on your music than a second-hand Chinese cassette in a well-used 4-track!

I was very impressed with what could be achieved with the Finaliser. Across a complete stereo mix of rock or pop material, it could produce a very tight, commercial sound, free from the usual side-effects of poor dynamics units. I also had excellent results with a factory preset on a voice-over recording, which added a lot of warmth and clarity. The expander was surprisingly effective at reducing background noise, and was never caught out by opening too late.

The supplied memory presets cover a wide range of requirements, and they offer an easy way to use the Finaliser. However, unless they are tweaked to optimise the various sections and parameters for specific programme material, you will be missing out on the real strength of this machine. SOS

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'...DAT is starting to get out of reach with its escalating, almost elitist price range...The DCC730 is much better and cheaper than the recordable MiniDisc; it even makes a handsome partner for a direct-to-disk system. If only you could use it to back-up data I'd give up on DAT altogether. Go out and buy one...' ***The Mix***

'Philips allegedly invested £500 million in the research and design of DCC... the low-cost DCC730 could seriously challenge DAT's hold on the high-tech market. ...could encourage small studios to adopt the format over the increasingly expensive DAT alternative.' ***Future Music***

'I've used a good quality DAT machine for years and am no stranger to the way digital tape can render analogue sound dry and antiseptic. But the Philips simply wouldn't entertain the possibility, giving a surprisingly warm and fulsome rendition. The bass was particularly well-rounded and lacked the sense of sterility so common with digital. There was no trace of hardness higher up the frequency range.' ***Hi-Fi World***

'All DCC recorders will accept a digital input at 32, 44.1 & 48khz, which is good news for anyone who wants to transfer a DAT collection to DCC. DCC's ability to handle any sampling rate you can throw at it might even precipitate a glut of second-hand DAT machines!' ***The Mix***

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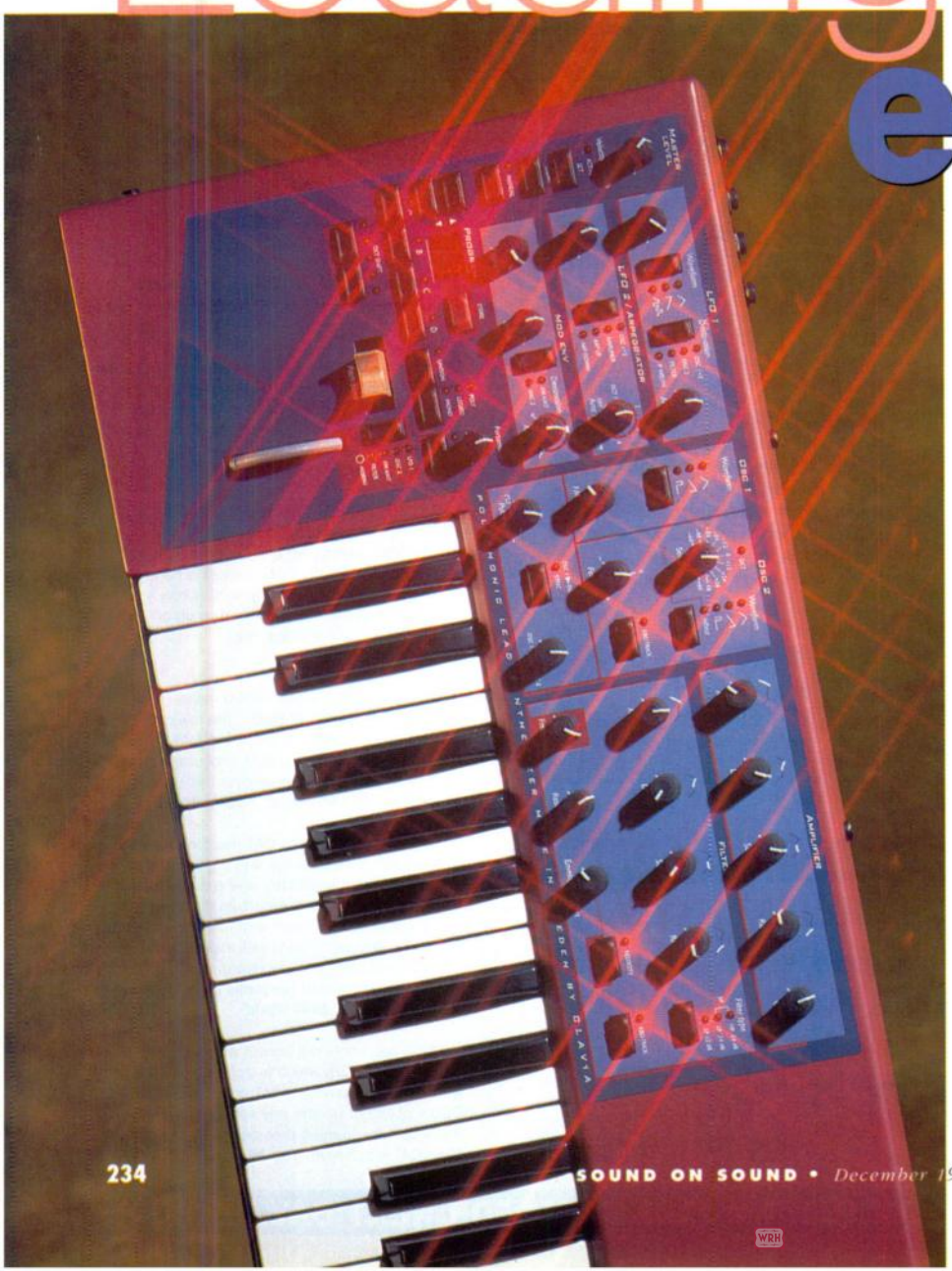
Leading edge?

CLAVIA NORD LEAD VERSION 2.0 VIRTUAL ANALOGUE SYNTH

Clavia have taken advantage of the software-based nature of their virtual analogue Nord Lead to release a comprehensive upgrade, installed as standard in new instruments and available to existing users for a small fee. GORDON REID checks it out.



When I reviewed the original Nord Lead Virtual Analogue synth, for *SOS*'s May 1995 issue, I found that the instrument was beautifully designed, beautifully implemented, knobby, simple to use, and sounded great. Eighteen months later, a Nord Lead version 2 has just arrived, complete with enticing upgrades. However, I'm feeling nervous: the original Nord was so great that any upgrade has a lot to live up to. It may even detract from the essential quality and purpose of the original — and that would be a great shame. So, are my fears justified?

NORD APPEAL

First things first: the appeal of the Nord Lead was two-fold: firstly, the user interface; and secondly, the sound. As far as I'm concerned, it doesn't matter what new goodies lurk beneath the surface — if the simplicity of that user interface were compromised it would be, in my opinion, a significant step backwards. More fundamentally, if anything were to compromise that *sound*, we should shoot the designers. Fortunately, the Nord supplied for the review is still bright red, it's still very sexy, and all the knobs and buttons are still present. The only visible differences between versions 1 and 2 are in the legending, with five new scripts: Demo, Panic, Echo, Random, and Notch+LP. What's more (and as far as I can tell without an original 1 Nord for direct comparison), the sonic presence and authority of the original are undiminished. This continuity also extends to the inside of the instrument where, apparently, nothing has changed. The Nord is still driven by a Motorola 56002 DSP and a 68331 host processor. It's just that Clavia have updated the clever stuff in the software EPROM and the voicing ROM. So let's now get stuck in and find out what the differences are.

TEACH AN OLD NORD NEW TRICKS

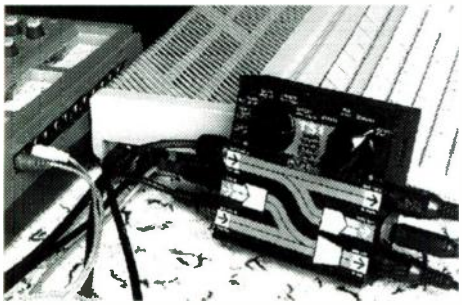
The original Nord emulated, using digital technology, a two-oscillator-per-voice synth with two LFOs, a resonant filter, two ADSR envelope generators, and an independent AD modulation envelope generator. Version 2 adds to these facilities a notch filter (see box) and aftertouch (pressure) sensitivity that you can route to either of the LFOs, the pitch of OSC2, the frequency modulation amount, or the filter cut-off frequency. The omission of aftertouch was a huge oversight on the original instrument, and it's just as well that Clavia have sorted it out. Mind you, the Nord Lead's keyboard still fails to *generate* aftertouch and, like the Nord Rack rackmounting version, it will only respond to controller data received over MIDI.

On the performance side, there are two improvements. The first is described as 'echo', although it is not a delay line, but simply a facility which replays a patch up to eight times (as determined by the LFO2 Amount knob) with decreasing velocity. Of course, if the patch in ▶

Talented tape sync

You can use the ***TS1*** to sync your MIDI sequencer to any decent tape machine. When you start, stop or shuttle your tape back and fore, ***TS1*** tells your sequencer to play in time, just as if your MIDI voices were extra tracks on the tape.

The ***TS1*** can generate and recognise the usual four SMPTE formats. The ***TS1*** will convert SMPTE to MIDI Time Code (MTC). Alternatively, you can use the ***TS1*** by way of Song Position Pointer/SRT format.



The ***TS1*** merges MIDI data received with its own sync data. You won't need to swap around the MIDI wiring, as ***TS1*** has four MIDI ports and automatic signal routing.

The ***TS1*** has a built-in mains power supply.

TS1 **MIDI Tape Sync Unit £99.00**

Amazing MIDI to CV

For an amazing ultra-low price, the ***Little MCV*** lets your MIDI system control your analogue synths with their great sounds and friendly knobs.

This versatile interface unit can generate control voltages for the 'one volt per octave' (logarithmic) or the so-called 'volts per hertz' (linear) systems.

The gate output can be set to five volts positive, ten volts positive or S-trig.

High resolution sixteen-bit conversion allows accurate pitch across the full 128 note MIDI range with smooth modulation, pitchbend and portamento. The CV output also has a wide bipolar voltage swing and a tuning preset is provided.

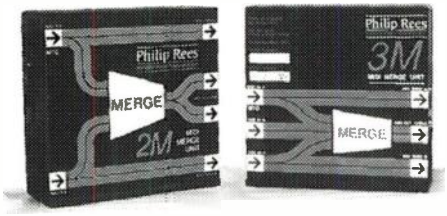
The MIDI sustain commands are comprehensively implemented. MIDI reception can be set to any channel, using the straightforward front panel rotary control.

There are MIDI IN, CV OUT and GATE OUT sockets. The mains power supply is built-in.

Little MCV **MIDI to CV Converter.. £75.95**

Smarter merge units

You can't combine MIDI signals by joining wires together, so you may need a merge unit - we make the best! The ***2M*** merges two sources, while the ***3M*** merges three.

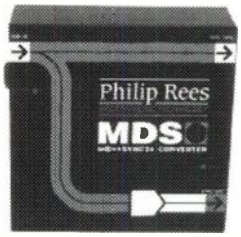


These units both have built-in mains power supplies. They can handle all types of MIDI data, including Time Code and SysEx. Many automatic features enhance performance and convenience.

2M **MIDI Merge Unit £69.95**
3M **MIDI Merge Unit £99.00**

MIDI to DIN Sync box

When connected up via ***MDS***, slave devices equipped with Sync24 ("DIN Sync") inputs should start, play in time, and stop automatically by remote control from your MIDI master equipment.



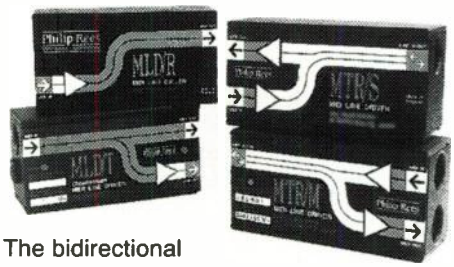
The unit is compact and contains an integral mains power supply.

MDS **MIDI to Sync24 Converter.. £69.95**

MIDI line driver choice

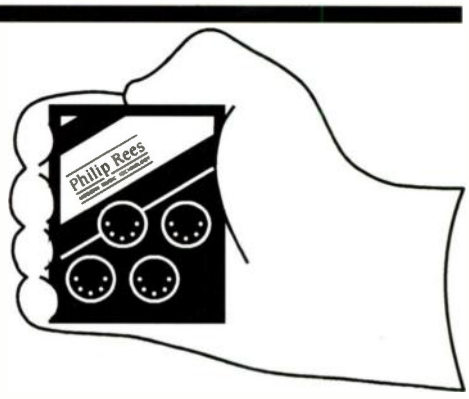
Our line drivers overcome the 15m limit of standard MIDI hardware, by converting the signal to a differential (balanced) format.

MLD has a range of 1km and consists of a pair of compact units. The mains-powered transmitter includes waveform restitution. The receiver is powered via the line and features a noise filter.



The bidirectional ***MTR*** system has a range of 150m. It too consists of a pair of compact units. The first unit is a mains-powered master transceiver. The second unit is a phantom-powered slave transceiver.

MLD **MIDI Line Driver £89.95**
MTR **MIDI Line Driver £99.00**



Functional Simplicity

Select a selector

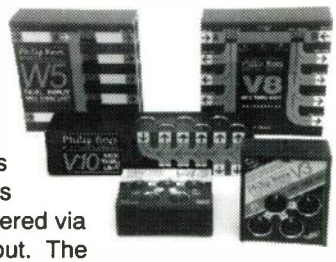
These handy low cost switch-in-a-box gadgets solve many MIDI routing problems and avoid the inconvenience of recabling.

The ***3B*** is a novel changeover switch, which will let you bypass your computer or sequencer without moving cables.

2S **MIDI Selector £11.95**
5S **MIDI Selector £29.95**
3B **MIDI Selector £29.95**
9S **MIDI Selector £39.95**

Low cost thru units

Some MIDI gear may lack thru sockets. Chains of more than three MIDI devices can suffer from data corruption. You can solve these problems at low cost with *Philip Rees'* MIDI thru units.



The ***V3*** is a battery powered 1-into-3 thru box. The ***V4*** has four outputs and is powered via its MIDI input. The ***V8***, which has two inputs and eight outputs, requires an external power source. The ***V10*** is a mains-powered 1-into-10 unit. The mains-powered ***W5*** has independent source selection for each of its 5 outputs.

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W5 **Dual Input Thru Unit £55.95**

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question is not velocity sensitive, you simply get nine repeats of exactly the same sound. Furthermore, the echoes chew up polyphony, so beware those choked envelopes! On the positive side, since the 'echoes' are identical to the sounds generated by re-playing the keyboard, they will morph in the same way as any conventional Nord sounds — so if you move the Nord's Morph controller while the repeats are playing, the echoes will morph from the original tone to whatever end-point you select. I'm not sure what I'd use this for, but I'm sure that somebody will think of something.

More importantly, the Nord's arpeggiator has now been expanded with the addition of a 'random' function — absolutely invaluable for creating all your favourite Jupiter 8 effects. I noted the lack of 'random' as a serious omission in the original review, and I'm delighted that it's now been rectified. As a sprinkle of angel-dust for your recordings, a well-implemented random arpeggio is unbeatable. Where would Nick Rhodes and Duran Duran have been without it? Thank you, Clavia. While I'm handing out the accolades, the Nord now transmits arpeggio notes over MIDI, so you can use the arpeggiator to drive any other MIDI synth. Excellent.

THINGS THAT MAKE YOU GO "BMMM"

Many players will find the most important part of this update to be the inclusion of ten 'Virtual Analogue' percussion kits. Each kit has eight sounds, grouped in combinations that have a good chance of being useful together. Consequently, there's a Latin kit, a TR808 emulation, an Indian percussion kit, and so on. For those of you worried that the percussion sounds, which are held in ROM, may be a step away from the Nord's analogue emulation roots, fear not. Editing a sound proves that there's not a PCM sample in sight. Simply modify the envelopes to sustain the percussion sound and tweak the knobs to discover which facilities are creating the atonality. Editing itself is a doddle. Simply press one of the black keys within a range (say, C#2 to edit sound1) and the usual edit controls become active. You can continue to play the kit as you edit the sound, provided that you don't brush against another black key, at which point you'll find yourself modifying the wrong sound.

The drum sounds are allocated to fixed key ranges across the keyboard — sound1 resides on the white keys between C2 and E2, sound2 from F2 to B2, and so on. This is not good. In fact, it's ridiculous. After all, you've possibly spent years becoming proficient at laying down grooves from the keyboard, and now you'll have to learn new techniques to reproduce drum fills on keys that have been almost perfectly chosen to be unplayable. This aspect of the Nord is going to drive you crazy, and means that there's no way to use Nord percussion in existing sequences, except by editing the sequences themselves.

There are further important limitations. For one thing, you can't save your edited kits inside the Nord itself, only onto a PCMCIA card. And, as you may or may not know, you can't do that unless you've bought the optional 8-voice expander. You can, however, dump a kit via SysEx, although you must do this in Program mode, or the sound-generating parameters will be omitted! (In Performance mode, SysEx only tells the Nord which kit to use, not the parameters that define the sounds within it.) Secondly, all the sounds in a kit share the same LFOs. Whether this is a consequence of the Nord running out of processing power, or whether a further software upgrade will rectify matters, I have no idea. Mind you, I don't really care, because it's not a facility for which I can see a great deal of use. You may disagree. There's one other thing to worry about: if you change the voicing of a kit in any given Performance, you change it for *all* the Performances that use that kit. This was a common limitation in the mid-'80s on synths such as the Roland JX10 (in which the voices that made up the Patches came from a common pool), but it seemed to pass away with the D50, in which all the partials in all the patches were separate entities. Maybe this is yet another example of the Nord's 'retro' nature.

But what of the percussion sounds themselves? Well, the Nord is no different from any other flexible analogue synth. Most of us have, at one time or another, messed around with Minimoogs and the like, coaxing all manner of drum-like sounds from them. The only difference with the Nord is that, rather than producing a single sound, it gives you access to eight at a time or, if you put percussion Programs in all four zones, an impressive 32, subject always to the instrument's 4- (unexpanded) or 12-note (with the 8-voice expander installed) polyphony.

Just as many of the Nord's conventional voices are imitations of Moog sounds, so too are its percussive timbres. This means that they are no replacements for sampled percussion but, unfortunately, neither do they exhibit the peculiarly lovely/ghastly nuances of a TR808 and its ilk. But lest this criticism gives you the wrong idea, the sounds

FILTER FACTS

The Nord filter now offers five modes. In addition to the original low-pass, high-pass and band-pass modes, there is now a fifth, called Notch+LP. This combines a notch filter with a 12dB/oct low-pass filter. Unfortunately, there are no separate controls for the centre frequency of the notch and the resonant frequency of the LP filter, so the notch always lies immediately below the LP cut-off frequency. Secondly, there's no 'Q' control for the notch, so you can't control its severity. This makes Notch+LP more of a curio than an important new facility. Nonetheless, with moderate resonance (so that the part of the spectrum immediately above the notch is emphasised before the LP filter takes effect) the new mode generates a sound that can't exactly be emulated using any other synth short of a fully-featured modular.

Unfortunately, and in common with the version 1 Nord, the filter implementation still refuses to self-oscillate. Consequently, while it will ring at maximum resonance, it still separates the Nord from the big analogue polysynths. It's impressive, sure, but it's somewhat cold and featureless when compared directly to the Prophets and Moogs it seeks to emulate.

pros & cons

CLAVIA NORD LEAD VERSION 2

pros

- 100 new Performances and excellent Prophet 5 emulations.
- Now recognises aftertouch.
- Random arpeggiation added.
- Arpeggiation now transmitted over MIDI.
- Extra filter mode offers new voicing possibilities.

cons

- No way to re-allocate percussion sounds to sensible key numbers.
- Too few outputs.
- Disappointing 'Hammond' Performances.
- Still no filter oscillation.
- Screen not really adequate.

summary

Version 2 is a worthy development of a desirable instrument. The drum mode has shortcomings, but overall there are enough additions here to justify the upgrade price for the existing owner and make the Nord even more attractive as a new purchase.

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▶ are still very much analogue and many players will lust after them. Add to that their simple re-programmability and the immediacy with which you can manipulate them in real time, and overall I think the Nord's percussion is going to find favour.

WHAT A PERFORMANCE

I've left the best till last: without a PCMCIA card, the original Nord could only hold one of its 4-patch arrangements (Performances), which contain the MIDI channel information for each patch, layering information, pitch-bend, output mode, unison detune settings, and a number of 'special' MIDI settings. Version 2 is significantly better developed in this department. Less alluring than the drum sounds, maybe, but ultimately far more useful are the 100 new Performances stored in ROM. Each of these holds up to four preset patches, including 53 true 'Nord' sounds, 11 Hammond organ impersonations, 45 Prophet 5 factory patches, and backups for the first 40 factory presets.

Describing the new Nord patches will be an exercise in cliché, so I'm sure you'd prefer that I keep it brief. You know... searing leads, grunting basses, warm strings, fat analogue pads, and pulsating arpeggios. Less impressive are the so-called Hammond sounds. Generated using the Nord's four zones in what Clavia correctly call "pseudo-additive" synthesis, they aim to emulate genuine drawbar configurations, such as 888600000 with Leslie. But this reduces the Nord to monophony or, with the expansion board, 3-note polyphony, and causes some strange voicing quirks if you play too many notes simultaneously. In short, they're a dog's dinner.

"The Nord is now clearly better value for money."

It's the Prophet patches that have given me the most fun. Held in 12 Performances, these are remarkably successful and, if you think about it, for good reason. The original Prophet was developed from Dave Smith's ideas regarding a polyphonic Minimoog, so it follows that a polyphonic synth that accurately imitates four Minimoogs, as does the Nord Lead, will be very similar to the Prophet. The Nord can't *really* emulate a Prophet, since its filter is not self-oscillating, and is therefore incapable of creating those biting patches that occur when you drive the filter to the edge of self-oscillation. Consequently, the Nord is more courteous and maybe even a little over-polished. But in use, it's more than adequate.

There are other developments worth noting. For example, the Nord now incorporates a number of 'demo' songs that demonstrate its suitability for dance and trance styles of music. It also has a 'Panic' button (which, I assume, works, but which I never had cause to investigate). There's a spanking new manual that every manufacturer should read and learn from — it's clear, well laid out, written for novices as well as experts, and very informative. There's even a library of sounds, some on PCMCIA cards, others free from Clavia's web site (www.clavia.se). And while I'm talking about cards, the new Nord will update old cards to handle the new parameters without losing or damaging existing programs and performances.

CONCLUSIONS

What you really need to know, if you're an existing owner, is whether the version 2 software is worth the £95 upgrade charge. And if you're not an existing owner, should the new facilities tempt you to become one?

Paradoxically, one of my first impressions was that the inclusion of the new parameters and the expanded memory highlighted two of the original Nord's failings. Firstly, you access many of the Nord's system, MIDI, and special features using a decidedly un-analogue system of 'Shift' functions, and the two-digit LED screen has to resort to little dots to indicate some values and identify some functions. If this system was arcane before, it's even more so now. Secondly, the Nord is now in even greater need of multiple outputs. It's all very well offering up to 12-note polyphony and simultaneous access to 32 percussion voices, but sticking the whole bunch down a stereo pair is plain stupidity. Everybody knows that snares need radically different treatments to, say, hi-hats, so the existing arrangement goes a long way to making the Nord's percussion useless for serious recording. It may be adequate in certain live situations, but beyond that, it's unacceptably limiting.

In contrast to that somewhat stinging criticism, however, the Nord is now clearly better value for money. Indeed, with its Prophet-style patches and 4-note polyphony, it offers very reasonable value when compared to the excessive prices being demanded for Rev 3.3 and other MIDI-retrofitted Prophet 5s. As for mint Memorymoogs or Roland MKS80s with programmers... well, these make the Nord look almost cheap. I'm not convinced by the percussion sounds or facilities, but if you treat the Nord's percussive capabilities as freebies (the version 2 Nord sells for the same price as the original) you won't go far wrong. Furthermore, if you treat each percussion patch as a repository for *any* eight sounds, you don't need to limit yourself to four conventional patches. You can have 32, provided that they don't need to be played across more than a handful of keys.

All in all, the new Nord is a much more attractive proposition than its already desirable predecessor, but maybe not for the reasons that you might have thought. Forget the drums, dial up the Performances, and start playing with the arpeggiator and aftertouch. Now that's what I call analogue synthesis! SOS

info

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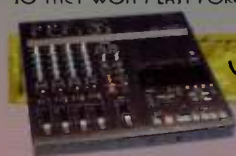

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The so-called guitarist's dream has failed to deliver on so many occasions that many guitar players now seem sceptical about the whole concept of MIDI guitars. Does the Yamaha G50 give us cause to rethink our prejudices, or does it simply reinforce them? PAUL WHITE finds out.

Seductive though the concept of playing MIDI sounds from a guitar is, past attempts have been plagued by delay problems, tracking problems, or a combination of the two. Furthermore, guitarists are used to having very precise control over their sound via their playing technique, yet traditional MIDI sound sources tend to be relatively inexpressive unless you patch in a lot of real-time controllers. In the light of these historic problems, is it worth pursuing the MIDI guitar dream further, or should we simply conclude that the guitar was never meant to be anything more than a guitar? Yamaha obviously feel they have

G WHIZZ!

YAMAHA G50 MIDI GUITAR INTERFACE

something new to bring to the party, so perhaps it's best to reserve judgement until after putting their new product, the G50, to the test.

G50 DESIGN

Housed in an innocuous black, 1U-high rackmounting case, the Yamaha G50 is simply an interface between a guitar fitted with a G1D split pickup system and an external MIDI sound module — there's no on-board synth here, as there is with Roland's GR1 or GR09. If the split pickup looks familiar, that's because it was designed specifically to be interchangeable with *Roland*'s GK2 pickup unit; presumably the idea is that existing Roland users will find be more tempted to change horses if they don't have to invest in a new pickup. It is possible to use the Yamaha G50 without a split pickup, but in this mode the conversion is purely monophonic and the success (or otherwise) of the process depends to a large extent on how cleanly you can play.

Looked at simply, the G50 receives information from each of the six sections of the split pickup, analyses the pitch, then translates this to MIDI note, velocity and pitch-bend information. However, analysing the pitch of a guitar string is difficult because of the rich harmonic structure of a plucked guitar note. Furthermore, until the noise of the pick against the string has passed, there is no pitch to track, and even when the note has steadied, the process of extracting the pitch takes a finite amount of time. The usual outcome of this process is inaccurate pitch recognition and a noticeable delay, especially on the lower strings.

Current systems attempt to address these problems by using fast digital analysis algorithms to make a quick guess at the pitch, then as the note stabilises, constantly updating the pitch data. If this is done fast enough, the tracking gives the illusion of being both instantaneous and accurate. Though no specific details on how the Yamaha system works have been released, it has been mentioned that advanced neural net technology (computers that learn) was used at the design stage to help the system differentiate between intentional notes and misinterpreted harmonics or noise.

The G50 provides memory locations for 128 user programs, though as the unit contains no sounds, you might be forgiven for wondering why it needs any at all. The idea is that you can set up different picking sensitivities for different songs, make use of split functions, which place different sounds on different strings, or save custom settings for the new picking position feature, which allows the sound to change depending on how close to the bridge you pick. A program can also contain a MIDI patch change, so that the appropriate sound is called up automatically.

USER INTERFACE

Though its primary use will probably be with a 6-string guitar, the G50 will also work with a 4-string bass, providing that the bass is fitted with a suitable divided pickup. A switch on the rear panel selects guitar or bass operation. Sharing the rear panel are the MIDI In and Out sockets, a Sustain/Hold pedal socket, a direct output for the regular guitar pickup, and an input for the obligatory (and exceedingly irritating), external power supply. I don't mind separate power supplies too much on dedicated studio gear, but ▶

pros & cons

YAMAHA G50 £550/ G1D £149

pros
- Easy to set up.
- Reasonably fast, accurate tracking.
- Sensible price.

cons
- External PSU less than ideal for live use.
- Tracking not always perfect.
- Sequencer users may have to work harder when editing data from a MIDI guitar.

summary
A good combination of price and performance. Not quite the Holy Grail, but a very nice pewter tankard!

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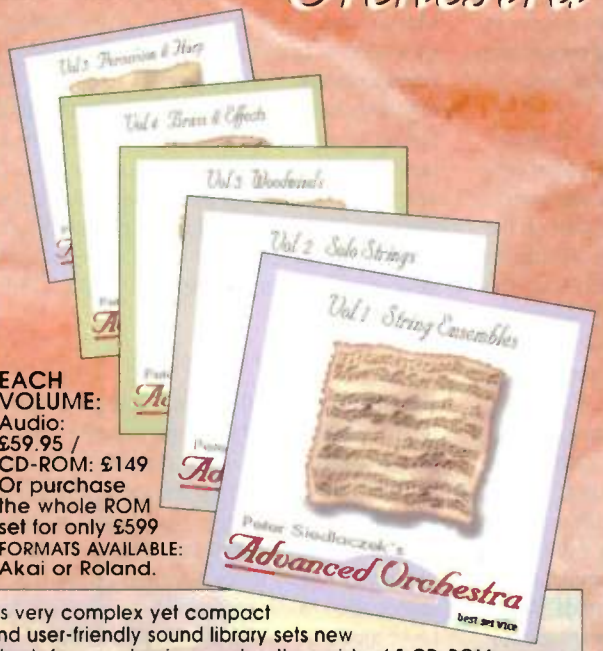

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- A collection of unconventional, interesting sounds played on classical instruments: scratches, whistles, thumps, buzzes and other effects, which can be technically modified in many ways, adding a new colour to your music.
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The strength of this sound material lies not only in its use in classical "real sounding" or "natural" structures and arrangements - the complex phrasings and articulations especially, such as runs, trills or glissandi, are eminently suitable for all types of distortion and unorthodox treatment. Your imagination is therefore free for experimentation.

A short sketch demonstrating the potential of this library - titles "A Day in a Philharmonic Hall" - can be heard on the first disc. It consists (with the exception of the drum loop) solely of samples from this library. For those with little experience of acoustic instruments, the accompanying booklet presents definitions of terms, as well as some comments and tips on classical instruments and orchestration.

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Vol 2 - Solo Strings
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Vol 3 - Woodwinds
INSTRUMENTS: 3 Flutes, Solo Flute, Alto flute, Piccolo flute, Oboe, English horn, 3 Clarinets**, Bass clarinet, Bassoon, Contrabassoon.

Vol 4 - Brass & Effects
INSTRUMENTS: 3 Trumpets, Solo trumpet, Piccolo trumpet, 3 Trombones, Solo trombone, 4 French horns, Solo French horn, Tuba, Clarinet**, and unconventional sounds.

Vol 5 - Percussion & Harp
INSTRUMENTS: Cymbals 'a due', Cymbal 24", Cymbal 18", Timpani, Gran cassa (Bass drum), Snare drum, Large tam-tam (gong), Thai gongs (tuned), Chinese opera gongs, Triangles, Vibraphone, Marimba, Xylophone, Orchestra bells (glockenspiel), Tubular bells, Harp.

** Due to the limited storage capacity of a single audio CD, the solo clarinet samples can be found on Vol 4 - "Brass & Effects", and not on Vol.3- "Woodwinds"

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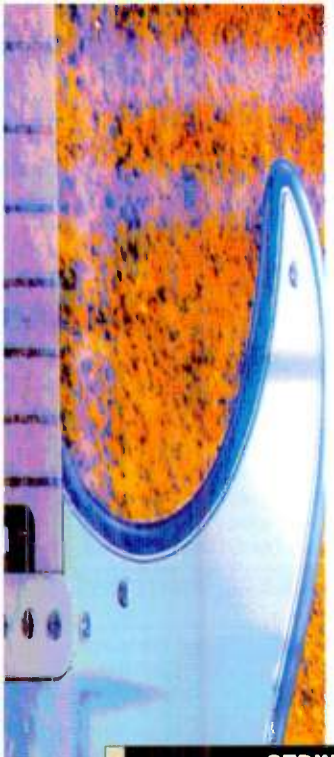
YAMAHA G50



I would hope that Yamaha have enough confidence in the G50 to expect some people to use it live — and flimsy push-in power connectors are in no way compatible with my experience of the live performance environment!

Aside from the G1D pickup input, and the jack for a regular guitar input, the front panel has only eight buttons, an LED display, and a power switch. There's also a printed parameter crib sheet on the front and top panels, which saves having to constantly refer to the manual. Editing is via the usual menu system, with parameter select and value buttons doing most of the work.

Operationally, the G50 has three distinct MIDI modes:

• **Multi-Channel Mode:** in this mode, any six consecutive MIDI channels (excluding channel 10, which is reserved for drums), can be selected, and each guitar string transmits data on its own MIDI channel to an external multitimbral synth set to polyphonic mode. All the strings can thus play different sounds, if required, and because the mode is polyphonic, fretting a new note on a string won't kill off the sustain of the previously-sounded note on that string. However, because the strings are on different channels, independent pitch-bending is possible. This mode may also be used with synths that support Mono mode (one voice per MIDI channel), though playing a new note on the same string will obviously cut off the note that was previously playing. The Oberheim Matrix 1000 is a good choice for using in this context, as it has a dedicated guitar mode, which places each of its six voices on consecutive MIDI channels.

• **Single-Channel Mode:** in this mode, polyphonic operation is possible, but because MIDI pitch-bend information affects all notes played on the same channel, the ability to bend individual guitar strings by different amounts is lost. Pitch-bend data is derived from the last note played, and if the note is bent by more than a semitone, it will jump to the next semitone up. Though this sounds rather restricting, it's a viable way to work if you have a non-multitimbral sound module that doesn't support Mono mode. It's also useful for monophonic tone generators such as the Yamaha VL series.

• **Mono mode:** this is selected automatically if the regular guitar input is used instead of the divided pickup. In this mode, all the data is transmitted on one MIDI channel and only one note can be played at a time. In addition to the regular user programs, the G50 contains three further preset programs specifically for use with generic General MIDI devices, Yamaha's own MU50, MU80, VL7m or VL1m (version 2).

USING THE G50

Before using the G50 for the first time, the divided pickup must be fitted to the guitar, either using the sticky pads and shims provided or, more permanently, with a screw and spring arrangement which provides conventional pickup height adjustment. Once the pickup is in place, the string sensitivity needs to be adjusted so that all the strings are equally responsive — a special Input Level mode button is provided for this purpose. Activating the G50's inbuilt guitar tuner is also a one-button operation, after which you need to pick the appropriate MIDI mode to suite your synth and, most importantly, ensure that the pitch-bend range of the G50 is set to the same value as your synth. A range of 12 semitones is probably best for most guitar styles, in order to accommodate string bends and hammer-ons. Unlike most other guitar synths I've used, the G50 has separate parameters for string level, note trigger-on intensity and note trigger-off intensity, the latter two being a part of the program information. This is a great help in preventing false triggering. There are also several different velocity curve options.

The various parameters are set via the display, where the four LED characters do their best to convey both letters and numeric data information. After setting the guitar sensitivity characteristics, there's a chromatic mode which can be set on or off, transpose, and numerous parameters relating to whatever tone module you're using. These latter include program number, bank change information, volume, pan, and four assignable controllers.

Real-time controls include string split and playing position split, both of which require that a second program number be specified for the second sound, and the guitar loudness envelope itself may also be converted to MIDI controller data.

Accessing and setting up the various parameters is quick and reasonably intuitive, but I was rather confused by the program change section, which can be set to 'off' to mute the MIDI output completely, but can't be set so as to send no patch change data at all, unless the MIDI note data is also muted. In practice, this means you either have to play by the G50's own rules and program your synth patch numbers into the G50 programs, or you have to disable program change on your synth. If you don't do this, every time you pick a new program on the G50, a MIDI program change will be sent and your synth will change patches. ▶

STRUM KIT: G1D DIVIDED PICKUP

The G1D is fixed to the guitar as close to the bridge as possible, and with around 1mm of clearance between the pickup poles and the strings. Fixing is by means of sticky pads, spacer shims, Velcro or screws, all of which are provided. Connected to the pickup is a small control box which must be fixed to the guitar body. As well as the aforementioned methods of fixing, there's also the option of using three small plastic suckers or a metal bracket that fits on the strap peg.

Located on the control box are two buttons and a three-way selector switch which chooses guitar, synth, or both as outputs. A short lead, also included, connects the regular guitar output to the control box, whereupon the signal makes its way to the G50 via the same lightweight multicore used to connect the G1D. A conventional guitar lead is then used to connect the guitar output jack of the G50 to the guitar amp, as usual.

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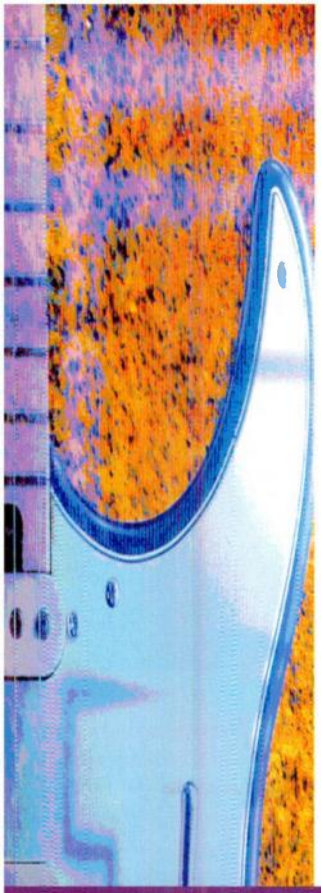
YAMAHA G50



The split and picking position features work well, but the success of the 'position' split depends on your synth. Whenever you move across the section of string that decides the positional split, the G50 sends out a patch change (which you have to specify as part of setting up the split), but as the note and patch change data are sent at effectively the same time, if you have one of those synths that takes a finite time to change patches, you could lose a note every time you switch sounds.

The positional split-point itself can be varied, via the setup menu, from very close to the bridge to a few inches away from it, and though no mention is made of how this works, I can only assume that it is related to the harmonic content of the string.

ON THE RIGHT TRACK?

Now to the serious stuff — the tracking. Getting any MIDI guitar to track half decently is firstly a matter of getting the divided pickup mounted securely and at the right distance from the strings. I found that, with my Strat Plus, there was no spare room for sticky pads between the pickup and the scratch-plate at the top string position, and only a little spare under the bottom string, so I stuck the pickup down with double-sided tape for test purposes, which left it about the right distance from the strings. To make a permanent fixing, it would have been necessary to counter-bore the scratchplate under the mounting screws to accommodate the strings.

> "Once set up, the G50's tracking is surprisingly good, but it isn't totally foolproof."

Once set up, the G50's tracking is surprisingly good, but it isn't totally foolproof. As with other MIDI guitars, errors are more likely to occur when several strings are being played at the same time, or when the tremolo arm is being used — presumably because of the amount of controller data flying around. Indeed, performance is really only acceptable in the one-string-per-channel mode — working in single-channel, poly mode precludes hammer-ons, and notes in scales occasionally play a semitone flat. You also have to be quite careful not to strike harmonics with the side of your picking thumb, something that guitarists tend to do without even thinking about it. Failure to observe this can lead to false note detection, whatever mode you're in.

However, apart from these potential pitfalls, the tracking is quick and generally accurate, and the positional cross-switching works like magic. There's no obvious delay, though if you try to play notes too close together by trilling on the same string, some notes invariably fail to register.

SUMMARY

Given the extraordinary technical problems of converting a guitar's output into MIDI data, Yamaha have succeeded in building an effective, sensibly-priced guitar-to-MIDI interface with some nice controller functions thrown in. It isn't perfect, but providing you play reasonably cleanly, and take the time to set the system up properly in the first place, the results are pretty good.

We're often asked about whether MIDI guitar systems can be used for sequencer programming, and yes, it is possible, but there are several factors you need to be aware of. One is that the notes you see in the edit pages may not always be the notes you played. For example, a hammer-on is recorded as a single note followed by lots of pitch-bend information, not two discrete notes. For parts that don't require pitch-bend, Chromatic mode produces sequences that are generally easier to edit, in that you don't have endless streams of bend data surrounding each note — but then you lose the ability to perform bends. Hammer-ons, however, work fine in Chromatic mode. When limited pitch-bend is required, Auto mode is sometimes more satisfactory than simply leaving Chromatic mode switched off, as the G50 will switch from Chromatic mode when you're playing chords to non-Chromatic mode when single notes are being played.

Another factor to consider when recording data in the 'one-channel-per-string' format is that you have to find some way to record on six channels at the same time, and while some sequencers do this easily, others require more fiddling about. Personally, I think all sequencer packages should have a dedicated MIDI guitar recording mode, but until their designers feel the same, we'll have to do it the hard way.

People will inevitably ask if there's any real difference between the Roland GR1 and GR09 and the Yamaha G50. Roland's system has the advantage of internal sounds, and tracking when using the internal sounds is exceptionally fast and surprisingly positive. When you try to access external MIDI sounds, however, the performance of the Roland systems falls off quite noticeably, so I feel Yamaha may have a slight edge if you need to work with a sequencer or external MIDI modules.

Somehow, I don't think we've heard the last word yet when it comes to MIDI guitar systems, and though the G50 is impressive, it still doesn't feel or respond quite like a guitar — you have to discipline yourself to meeting it halfway. If you're prepared to spend a little time getting to know it, you can achieve spectacular results — it's good, but it's not quite magic! SOS

info

E G50 £550; G1D £149. Prices inc VAT.
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BURNING GROOVES

(AUDIO CD & 2 CD-ROM SET)

When I heard that Eric Persing of Spectrasonics was working on a couple of grooves libraries, I was intrigued, since his *Distorted Reality* CD is probably the definitive work on textural and tonal weirdness.

Burning Grooves features the work of ace drummer Abe Laboriel Jr, which was recorded to ADAT, then treated to various degrees of processing by Eric, using, amongst other things, a Boss SE70 and GL100, and AMS and Lexicon reverb. Compression was applied using vintage Neve and RCA tube compressors, while EQ was provided by Langevin and API units.

Disk 1 of the CD-ROM set comprises mainly 4/4 stereo loops with a selection of fills at the end, though some programs have a selection of fills to go with the main loop. The sound varies from a solid, live-room studio-kit kind of feel, to a heavily compressed or 'grunged' style, for dance work; the quality of both the playing and recording is first class. Creative use of EQ, delay and reverb creates an almost industrial effect on some examples, while others feature a cavernous reverb that somehow manages not to swamp the sound. What's more, there seem to be lots of different drum sounds, rather than the same kit for everything. Some loops on the audio CD have been recorded minus kick drum, so you can add your own. The tempi of all the loops is listed on the sleeve notes (56- 218bpm), as is the sample memory required — typically 3-4Mb, though some fill selections need up to 14Mb.

What I like about this collection is that the rhythms are almost all right on the money and very usable. The treatments are interesting, but don't detract from the power of the playing, and even with very processed examples, it's obvious that you're hearing a real drummer.

Disk 2 in the CD-ROM set has the individual drum sounds broken down and mapped into 25 kits, with additional 'modules' that allow you to enhance or modify the kits by adding new snares, kicks, toms, hi-hats, and so on. Two further kits are provided for Akai users, to demonstrate how the modules might be used. Emu users can load up kits directly, and Ensoniq ASR users have versions especially for them.

Most of these kits are simply excellent, and tip a nod in the direction of General MIDI note mapping as regards the kick, snare, hi-hat and cymbal assignments. However, the toms are each programmed over a pair of keys so that you can play two-finger rolls and fills — a practical touch. Because the samples are allowed to run their natural course rather than being truncated to save memory, they sound extremely natural (and many include an impressive degree of dynamic responsiveness), but a typical kit needs between 10 and 16Mb of memory, so take advantage of those low RAM prices while they last!

The audio CD features a preview of the forthcoming *Liquid Grooves*, which promises to show Eric Persing at his ethereal and textural best. I can hardly wait... *Paul White*

£ Audio CD £59.95; CD-ROM £149. Prices include VAT & UK p&p.

FUNK BASS

(CD-ROM)

Funk Bass is a double CD-ROM from Time and Space's Zero G label. Each volume loads up between two and several dozen complementary bass riffs, all mapped to different keys. The tempo for each volume is given in the sleeve notes, as is the key of each loop. Sometimes all the phrases are in the same key, though at other times you might get 'A's and 'D's, for example, to allow you a little more musical flexibility.

All the examples are played on either electric bass guitar, upright bass or Chapman stick; the two channels of the stereo sample are mainly used to carry DI'd and miked versions of the sound (to provide a wider choice of timbre), or the straight and effected version. A little compression has been used, but other than on the examples created using filter or fuzz effects, the playing sounds very natural.

The playing itself is very slick, and you'd be surprised at how creative you can be with a keyboard full of three dozen or so phrases, a couple of intros and some slurs to play with. You can completely change the feel of what's provided by combining half of one phrase with half of another. The phrases are identified using a standard code to show their length, whether or not they have a 'run-in' beat or start with a rest, and so forth. All the bass-playing cliches are there, but superbly played, with bent harmonics, double-note slides — the works. There's a vast amount of material on this double-disc set, and being able to get so much on the keyboard at one time is very gratifying. Most volumes will load into 16Mb or less, though one section is split into two volumes, totalling over 24Mb.

The upright bass parts are particularly atmospheric, as are the Chapman Stick lines, and the only thing in short supply is fretless bass. There are no multisamples on the CD-ROM, but an audio CD which does contain multisamples of many of the basses is supplied free with the CD-ROM. If you happen to own the audio version of *Funk Bass*, by the way, you can upgrade to the CD-ROM at reduced cost. Contact T&S for details. *Paul White*

£ £149 including VAT & UK p&p.

PERCUSSION SLAM

(AUDIO CD & CD-ROM)

Rafael Padilla is a latin percussionist of considerable talent, having recorded and toured with the likes of Gloria Estefan, Whitney Houston, Elton John and Aretha Franklin, and this 73-track audio CD is both a showcase for his talents and an excellent musical sampling tool.

Track 1 provides a good musical introduction to the disc, with a short voice-over from the performer himself. By the time track 2 starts, the talking stops and the drumming begins, and

we're left in no doubt as to where Mr Padilla's real strength lies.

Using practically every Latin percussion instrument known to man, *Percussion Slam* presents 23 different grooves and loops in a number of interesting and flexible ways. Each track starts with a full version of the complete loop (usually two or four bars) followed by 10 or so 'deconstructed' versions of the same loop. These can be simpler versions of the main loop, or just the individual percussion parts (Congas or Tambourines only, for example). This allows you to sample just the sections you want, and is particularly useful if you're working with a full loop for the chorus of a song, but need a slimmer mix of the same loop for a verse section.

The sound quality is very good, and instead of mixing everything dry, the producers have opted for a more finished sound, adding interesting but tasteful effects to certain instruments where needed. It's in the performances, however, that these loops really shine. Rich South American flavours, that groove along with the innate toe-tappability of this kind of music, will bring your percussion tracks to life. Not only the faster tempos are explored: there are a good number of slow and sultry grooves, as well as Salsas, Shuffle and some outstanding Funk styles too.

In a spirit of interactivity, a disk of MIDI files for each loop is included (PC/Atari or Mac format), and with this you could, in theory, adapt and change the loops to fit the music you're working on. As this would involve sampling, editing and programming each percussion sound and assigning them all to specific keys (with the audio CD), I think most users will opt for the more sensible option of sampling the loops in their entirety and stretching their music to work round the percussion.

Twenty-three percussion grooves may not sound like very much material, but believe me, what this disc lacks in quantity it more than makes up for in quality. The inclusion of MIDI files, as well as deconstructed loops and two or three tempo options for each loop, makes this a sample CD well worth checking out.
Paul Farrer

£ Audio CD £59.95; CD-ROM £149. Prices include VAT & UK p&p.

X-STATIC GOLDMINE 4

(AUDIO CD)

The X files are usually high on content, low in fidelity, and generally pretty useful (*XG1* was a bit large when it first appeared, being pretty much the first CD to be crammed with up-to-date hard dancefloor classic samples.) What have we here?

Tracks 1-10 sport five ambient but rhythmically conventional demo tunes, followed by their component samples. Fortunately, the restricting 'workstation' format is abandoned after five examples, and the remainder of the CD reverts to a sensible content-grouped library. From track 11, we hit trackloads of tempo-grouped patterns, 14 per track, arranged as two banks of seven loops, panned hard left and right, playing in sync. As loops are tempo (and feel) matched, auditioning in stereo is quite palatable: the end result sounds rather like wide stereo rather than two hard-panned mono samples.

Content includes effected classic breakbeats — plenty of vinyl in evidence. Usual X-files grungy quality is the order of the day, and much source material is recyled from earlier X (and other) sample libraries, with a blurry edge to give it that 5am feeling. More exciting are the vocoded loops of track 13. Also special are the very low frequency loops (everything above around 150Hz eliminated). Great trick — space and feel combined. Sometimes effects or chords are cross-panned against percussion. The presentation of two sounds simultaneously helps the listener to understand the value of the samples in context, and the CD is a good listen as well as being an education in dubtronix. Other sounds are presented in true stereo — refer to the sleeve if you can't trust your ears: the same name will appear in both Left and Right channel lists.

Ethnic elements are better and fresher than many I've heard before. Other samples include transformed loops, ambient chords, synth bubbles, dub basses, common sounds like piano in unusual settings, Prophet VS 'Deep Space Nine' noises, electro weather, insects, nightlife — the list goes on. After the ambience come ragga fills and Latin and Indian percussion loops, followed by breakbeats. The loops sound as though they were recorded in-house and not lifted from a third party source — too clean. These samples are presented with one side straight and the other gated, for sending to effects. This is a neat trick I use myself, by placing a gate on the aux send. It enables you to put reverb on (say) a snare, without messing up the whole pattern.

Sleeve notes are good, and all the essential info is there. It's worth mentioning (again) the 'Loopmap' system (which developers e-LAB seem to think is unique to them, though I and probably hundreds of others have been doing

something similar for years). All loops are tempo-matched, at one of maybe a dozen tempos, to enable them to be auditioned and/or layered quickly in a song. Tempos correspond to semitone intervals, so if you choose the correct key transposition, any loop will fit with any other. This scheme applies across all current e-LAB products.

To sum up, the non-vinyl source material is much cleaner than the vinyl stuff, though never over-bright or poppy. The genre seems to be generally faithfully pursued in terms of sound and content — deep, fulfilling tones emanate from the speakers in perfect intellectual and rhythmic harmony. If I have a criticism, it is that too many sample pairs sound as though they're part of a track already, without any input from you! Bare essentials encourage original thought and effort — parts of this CD simply invite plagiarism.

The producers of this CD wear their influences (literally) on their sleeve, and these include King Tubby, Eno, Metalheadz, Future Sound of London, Alex Paterson, Can and Mixmaster Morris. e-LAB are the first to admit that this CD is aimed at a minority of composers who are not aiming for chart success, but if you want to join that ever-increasing band of ambient warriors dedicated to producing music to accompany *Jobfinder*, this CD is by far the most relevant purchase you can make right now. It gives you instant access to the sounds you need, as well as showing you how to blend and use them. It also gives you ideas on how to create your own chill-out loops from common source material, using far-out EQ and effects. Five stars. *Wilf Smarties*

£ £59.95 including VAT & UK p&p.

A All this month's sample CDs are available from: Time & Space, PO Box 306, Berkhamstead, Herts, HP4 3EP.
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WIN

Yamaha MD4 MiniDisc Multitracker

Yamaha's MD4, reviewed in SOS's September issue, brings the 4-track portable studio format right up to date, substituting the modern, compact and convenient data MiniDisc recording medium for analogue tape.

The MD4 has everything you need to make high-quality multitrack recordings, including integral mixer with aux send, locator points, 3-band EQ, varispeed, and auto punch in and out, plus 'Cue List' digital editing. This allows you to set an order for playback of different sections of a song, with up to nine repeats each, which enables the creation of remixes or different versions of your masterpieces. Up to 37 minutes of audio can be recorded onto a single MiniDisc, using ATRAC (Adaptive Transform Acoustic Coding) data compression, with a resulting subjective sound quality that SOS reviewer Paul Ward called "leagues ahead of any analogue cassette recording". Instant search and locate facilities cut down on waiting time and speed up the recording process, and direct track outputs mean that you can connect an external mixer at any time if you need more sophisticated mixing facilities.

We've teamed up with Yamaha (Info line 01908 369269) to offer SOS readers the chance to win this superb £899 digital studio. All you have to do is answer these simple questions, produce a witty tie-breaker, and mail us your entry by Friday 10th January 1997. *Thanks to Yamaha-Kemble UK for donating this great prize.*

the small print

1. Only one entry per person is permitted.
2. Employees of Sound On Sound Ltd, Yamaha, Yamaha-Kemble, and their immediate families, are ineligible for entry.
3. No cash alternative is available in lieu of the stated prizes.
4. The competition organisers reserve the right to change the specification of the prizes offered.
5. The judges' decision is final and legally binding, and no correspondence will be entered into.
6. No other correspondence is to be included with competition entries.
7. Please ensure that you give your DAYTIME telephone number on your entry form.
8. Prizewinners must be prepared to make themselves available in the event that the competition organisers wish to make a personal presentation.

questions

1. What's the maximum number of tracks of audio the MD4 will record?

a. 1 ☐
b. 2 ☐
c. 17 ☐
d. 4 ☐

2. Which of the following features does the MD4 not offer?

a. Auto punch in and punch out ☐
b. 3-band EQ ☐
c. Varispeed ☐
d. Microprocessor-controlled teasmade ☐

3. What method of data-compression is used to enable the MD4 to record up to 37 minutes of 4-track audio onto a data MiniDisc?

a. WYSIWIG ☐
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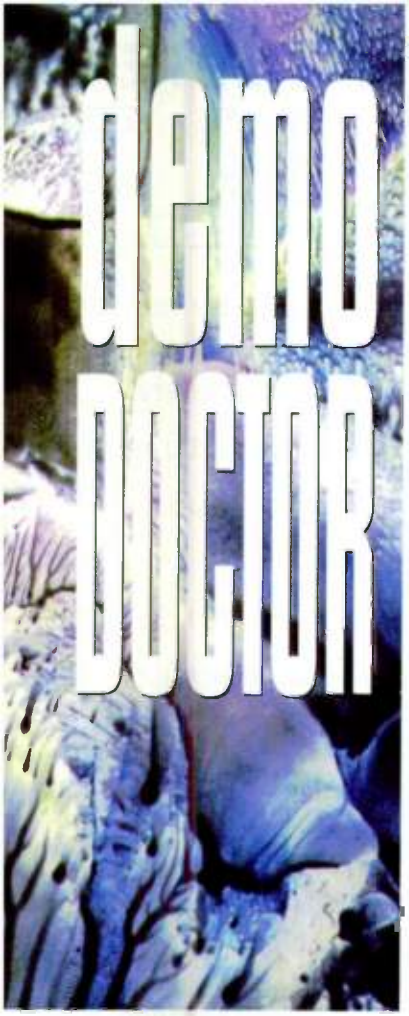

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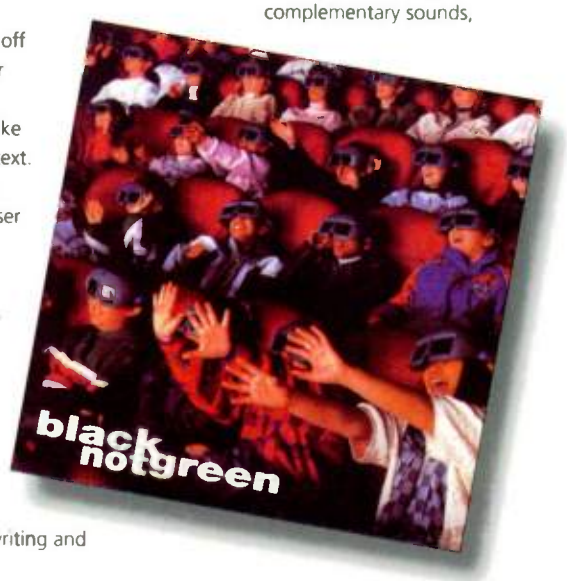
BLACK NOT GREEN

Recording Venue: Meadowside Studio, Wisbech St Mary.
Recording Equipment: Soundcraft desk, two Fostex D80 digital recorders, Phonic compressor, Alesis and Yamaha reverbs, AKG mic, Tannoy Monitors, JVC VHS tape recorder, Sony PCM.

This 10-track demo CD kicks off with a powerful first number which proves that you *can* program drum parts and make them work, in the right context. This context is influenced by Soundgarden, King's X, Senser and the inevitable Rage Against the Machine. Influences notwithstanding, programmer Matt, vocalist Roger and guitarist Tim have put together an interesting and well-recorded CD that shows maturity in songwriting and technical control.



All the drum sounds are well chosen, whether they're toppy, jazzy snares, ethnic percussion or cymbals. Strong rhythmic feel is also very much in evidence, and the music just couldn't work without it: from the cerebral heaviness of 'Is Anybody Out There?' to the jazz and heavy guitar of '270 days', the drumming is solid and all the sounds hit the mark. I also like the how effects like delay and backwards loops are used to enhance the rhythm.

Part of the skill of mixing is using complementary sounds, and on the third track on the CD, the band take a fairly muddy drum loop as a basic rhythm backdrop. The lack of treble is not a problem — it's an opportunity to apply plenty of presence to the up-front vocal sound. Backing vocals are treated to a heavy dose of room reverb, for creative purposes as well as to increase separation, and the tabla loop alongside the synth sitar is, I suppose, the icing on the cake.

This CD shows plenty of good ideas, all well executed, played and performed. This is definitely a band to watch out for if you like music that's more demanding than the norm. ❑

WILL HOGAN

Recording Venue: Home.
Recording Equipment: Fostex R8 8-track and 812 desk, ART SGX effects processor, Sony MiniDisc recorder.

Will plays all the instruments on this two-track demo himself, and he's obviously a bit of a guitar fan. In fact, he's a dab hand on the old fretboard and I notice some Gilmour-style licks coming through! The tape sometimes has the feel of a Mike Oldfield album too, in the overdriven lead sound and the vibrato technique.

In the mix, Will has taken care to pan the lead guitar and the clean rhythm to opposite sides of the stereo image. It isn't really necessary to pan them so hard, as the sounds are quite different in frequency-strength characteristics. Another technique to try is using a stereo effect, like chorus or harmoniser, on the clean guitar and panning that wide in the stereo soundstage. The lead guitar — the focus on this tape — can then be given centre stage, with effects like echo on the lead guitar panned slightly. Where there are two lead guitars with a similar sound later on in the piece, it does pay to pan them, as Will has done.

Since each track lasts for a whole side of the cassette, this must have been a mammoth task to arrange and mix. The different instrumental themes run together seamlessly enough, but I'm pretty sure that some compromises had to be made with the limited effects and desk. For instance, the drums suffer from a little too much reverb on the lighter section, about 15 minutes in. I also think that more could have been made of the softer keyboard sounds, which provide the perfect foil, in terms of frequency, to guitars. The washes of chords that I hear are just too low in the mix, resulting in a hole in the lower-mid area of the mix. Another criticism is of the bass guitar sound, which doesn't have any real low bass and so lacks punch. It sounds as though it's been EQ'd to bring out the upper frequencies in the sound, but they're not needed because the guitar takes that space throughout the entire recording.

In short, this tape is fairly self indulgent, but good fun

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ALL LIVING FEAR

Recording Venue: Home.
Recording Equipment: Otari 1-inch 8-track, Sansui 12:6:2 mixer, Yamaha sequencer, Peavey Multiverb 2 effects, Drawmer compressor, Shure SM58 mic.

Using some borrowed equipment to bolster their own, Matthew North and Tim Chandler have recorded a CD entitled *The Widow's Blame*. The music is firmly in the goth rock genre and the band opened the show at the Whitby Goth Festival this year. (I didn't know such a thing existed!)

It always seems strange to me when bands which base their music so much in the rock idiom use drum machines on their recordings. Somehow, the polished, even and enhanced sounds of the machine don't sit that well with the dynamics and histrionics of rock instruments. On this album, the Alesis SR16 is in the driving seat and performs well on backbeat, with solid kick and snare sounds, but as usual it's the tom fills, hi-hats and cymbals that fail to deliver. It's fair to say that there is a lack of the sort of heavy accenting in the hi-hats that you would expect from a real drummer. The use of sixteenth-note hat patterns is also pretty much out of context — I'd have at least phased them for some interest and to disguise them a little.

The guitar sounds are pretty good, with punch supplied by the overdrive stage of a Marshall 9000 transistor preamp, which gives plenty of top end. Most of the guitar work sounds as though it's been recorded in stereo, and the use of echo on the guitar enhances the sound, smoothing out some of the more abrasive upper mid. Personally, I'd have been tempted to make even more of a wall of guitar sound by using more echo in the guitar mix. Guitarist Matthew has achieved a fine sound on the fifth track, 'Crimson', where clean guitar (possibly acoustic, or some of the dry electric guitar mix) is combined with overdriven electric. On this occasion, the electric has less treble and the clean sound provides the edge and punch.

On the goth albums I've had anything to do with, the vocalists usually place the singing pretty low in the mix, but here they're loud and clear. The delay effect is the standard for this type of music, and is completely appropriate, but somehow the vocals are less dangerous for having such clarity. More growling bass in the voice would have helped too, especially on a moody song like 'Dark out Here'. Experiment with getting singer Andrew Racher right up to the microphone, to take advantage of the bass proximity effect, and load some heavy compression onto the signal next time you record. ❑

PLAN BEE

Recording Venue: Band home studio.
Recording Equipment: Fostex R8 8-track, Tannoy Eclipse/B&W 570 speakers, Behringer Eurodesk mixer, Atari 1040 running *Cubase*, Tascam MTS30 MIDI/tape sync, Alesis 3630 comp/lim and Quadraverb GT effects, Lexicon Alex LXP1 effects, Boss SE50 effects, ROD10 and Palmer speaker simulators, AKG C3000 mic.

This is a slice of fun Euro-pop from the Netherlands, sent in by Andre Szachhnowski. Recorded at his band's home studio in the wonderfully named Flushing area of Holland, the opening track is heavy on the American rock/pop influence, circa mid '80s. What this means in practice is big harmony vocal choruses, big snares, processed guitar and brass stabs — but all done with some panache, it has to be said.

The drum sound on all the songs is so heavily processed that it's hard to believe that there are

Continued on page 254 ▶

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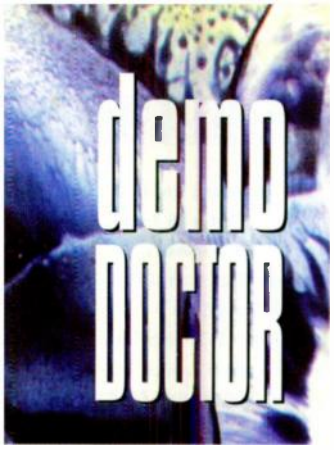


PLAN BEE Continued...

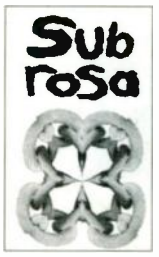
real drums in there somewhere. I guess that some, at least, must have been triggered, as the grainy upper mid of the samples and the less than dynamic fills are a bit of a giveaway. Still, it's all solid rock drumming, and suits the nature of the other sounds to a tee. Where a real kit is used, heavy compression and gating has been employed, and it's good to hear that the kit punch is still there, demonstrating that the band have a good grasp of compressor threshold and attack characteristics.

Strong vocal performances, delivered in faultless English from Rudy Lockfeir, make the most of the songs. Yet I have to point out that the arrangements sound like those of a good rock club band, especially the snappy endings, and upbeat, zippy style. Some

flavour is added by vocal delay effects in rhythmic style on the last song, but overall, more thought needs to be given to the production. Plan Bee are not above a bit of plagiarism, either. The verse from 'Your Eyes' is about as close to George Michael's 'Careless Whisper' as you could get. ❑

QUICKIES

SUB ROSA made the sensible decision to record all the loud bits in a bigger studio and then transfer the result to their home recording setup, to finish off. The result is a good demo with a few little mishaps, such as low-level backing vocals, passing quality control on the way. All the band performances are up to the mark, with Ian Smith coming through with some energetic and tight drumming, in what was probably limited time in the hired studio. Chris Wang's vocals are a bit low in the mix for me, but the echo helps the voice sit well with the other instruments. On tape, this helps reinforce the notion that the band are more heavy rock-orientated than indie, and the guitar work suggests that they're a little too clever for their own good (musically) to be in the pop or indie market. It's time for the band to decide what they want to be before the production decides for them.



THE SMELL OF SUBURBIA was produced by Rob Stride and Mick Groom, who both have a pedigree from rock bands, well known and otherwise, and is a compilation CD of unsigned artists from the Hemel Hempstead area. Worthy of note are Rob and Mick's own band (but take care with the reverb on the lead vocals), modern rockers Nectar (great vocals, bit heavy on the bass in the mix), and the Ogilvys — if only for the name and the quirky '60s pop, way ahead of its time.

THE DEEP PUDDLE DWELLERS, Chris Dawes and John Watson, have produced a really tasteful cassette sleeve but are suffering from two things. The first is an addiction to recording equipment — they just keep buying the stuff! The second is a result of the first. As they upgrade they just *have* to re-record songs with the new gear. Does this sound familiar? Unfortunately, there's no helpline for this problem, but remember that all the time you spend with your head stuck in a manual could be spent writing songs! Chris and John have produced a nice demo that reminds me of early Tears for Fears, especially in the vocals. However, they've fallen into the trap of recording the vocals to tape with too much effect. This, as they explain, is because they're not that confident in their vocal abilities. Unfortunately, it also means that the effects are permanent and the vocals can't be remixed. Come on, lads — get a vocalist in who can do justice to your well-arranged and well-played backing tracks, and add the effects on the mix.

While the guitar sounds on the opening track of **CLAUD HAMILTON**'s tape are rather good, the stiffness of the drum programming makes the song uptight. I'd recommend using some swing or a slight shuffle on the SR16 drum machine for the backing track, and mixing the hats (half open on quarters, I hope) a bit louder. As the tape progresses, though, the drums do improve, and the mixing is solid and well balanced on all the songs. However, I'm left with the impression that the demo as a whole lacks a few of those little touches that give a recording a more produced sound. For example, the odd touch of echo to catch a vocal phrase, backing vocals that provide a counter-melody instead of simply harmonising to the lead vocal, or a touch of stereo modulation on the organ.

AUTOGEDDON: Good vocals and appropriate use of vocal effects from Andrew P grace this tape of electronic music, with occasional real drums in the rhythm section, and electric guitar integrated to 'humanise' the sound. The feel is pretty underground and could be deliciously heavy in places, but the lightweight mix thwarts it. Still, this could be rectified with some mid cut at 1kHz to alleviate the harshest grainy digital excesses, and some weight added to the bass end with a bit of boost at around 100Hz. The best mix on the tape is on 'Love, Power, Sacrifice'. This is well into the demo, but is the first track with any weight in the bass end. Incidentally, it's also got a terrific vocal performance — Andrew obviously got the 'vibe' from the backing mix.

Leaning towards the "dark and moody side of house and techno", the **RED DEVIL CREW** are a pretty cosmopolitan duo, moving between Berlin and London to record this demo. Chugging along on analogue bass eights, the beat is soon joined by a pounding, low-bandwidth kick on fours, and a broken bass pattern with filter modulation. The Crew use many of the standard sounds on this track, but a nice touch is the short break into a mellow string/vocal combination, with pulse-wave blips flying round the stereo image. The second mix moves into handbag house territory, using the voice of Denise Williams for lead and harmony vocals. It's not a terrific performance really, lacking sparkle and enthusiasm, but it's compensated for by the raucous, fat, octave-jumping bassline in the chorus. Sounding very droll and very Berlin, the third track, 'I Want It', is by far the moodiest. Good drum loops and flip vocal samples punctuate an otherwise standard backing, and for some reason it reminds me of basement clubs in Europe.

SPEEDCLOCK PILGRIMS are based in Newcastle-upon-Tyne, and are a three-piece with a basic guitar/bass/drums line-up. The quality of the cassette is a bit dodgy, with some drop-out at the start, but I found it worth persevering to hear a good song (their favourite recent recording). Of the many strong points in the song, the altered bass notes under chords and the excellent chorus are worthy of note. At their best, the band sound like the Icicle Works; at their worst (for example, the instrumental workout), they could be a dodgy Rush. The recording quality is pretty poor — the bass is mixed too high, the vocals are too low, and the drums lack punch. That opening song, though, has plenty of potential if the extended instrumental sections are ditched.

Things are obviously pretty financially tight for the **LAVER BABIES** — they only seem to be playing off one side of the cassette! So I won't even comment on the first track. By the second, the sound has returned to both sides and their mellow dance thing is progressing nicely. Warm sounds and spacey synth effects characterise a recording which is constructed on minimal gear. Quite a lot of demos are digital, harsh and grainy these days, but the Babies tape has the better elements of what used to be an underground low-tech dance sound. The ideas don't develop that much, but they're looking for comments on the potential of the material. Thematically, the use of children's TV-style synth sounds is fine, but by the the third track on the tape, some of the wah, bleep and buzz synth noises are beginning to grate. ❑

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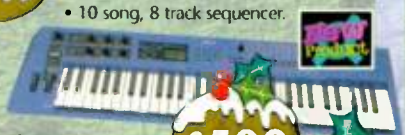

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Wave Hello

PPG WAVE 2.3 & WAVETERM B

Once the plaything of the rich and famous, this hybrid synthesizer/sampling system introduced the world to wavetable synthesis. JOHN MOLLOY reflects on Germany's finest hour.

When the microprocessor first began to have an impact on the music industry in the early '80s, pop music itself underwent a technological jump. Things we take for granted now, like sequencing, sampling and digital manipulation of sound, were indeed revolutionary and the bands that embraced them changed the way that music sounded. Analogue synthesizers were being replaced with samplers, and new forms of synthesis began to appear. Machines with previously undreamt of levels of power were becoming more affordable all the time. They were known as 'Computer Musical Systems' or 'Computer Musical Instruments', and the big three were the Australian Fairlight CMI, the American NED Synclavier, and the German PPG (Palm Products Gmbh) Wave and Waveterm. All offered slightly different means of achieving the same goal: computer-generated sound. The Fairlight was an exclusively sample-based workstation, the Synclavier initially used a form of FM synthesis and later added sampling, while the PPG Wave introduced a new form of synthesis — wavetable synthesis — and if you bought its companion computer module, the Waveterm, it too offered sampling.

Wavetable synthesis has subsequently been adopted by manufacturers such as Korg (Wavestation) and PPG-offshoot Waldorf (Wave, Microwave). You may be used to hearing the kind of sounds the Wave is capable of producing, but may not realise how innovative this machine was when it first appeared.

PPG was an electronic development company run by German inventor Wolfgang Palm. As well as musical equipment, they also developed lighting control equipment for band and theatre use. One useful thing about the Wave system was that you could buy it in sections. If you could only afford the synthesizer, you could shell out five grand or so for an 8-voice synth with onboard sequencing. When you wanted to have more control you could purchase a Waveterm; this added the computer, a monitor and dual disk drives for around another five grand.

By today's standards the technology is laughable, but at the time it gave musicians and recording studios far more control of their music than had ever been possible. And the new technology also brought with it new sounds and the promise of editable perfection — spend around £10,000 (at the time the Fairlight cost around £30,000 and the full Synclavier system was nearer £120,000) and you too could have almost perfect pop songs.

SONIC STRUCTURES

Instead of using analogue oscillators for its sound source, the PPG uses very short digital sound samples — waves — each just 256 bytes long. These waves loop round to produce the sound of the 'oscillator', with 64 waves combining to form a 'wavetable'. In all, 30 wavetables are available on the PPG Wave

PPG ON RECORD

The Wave was a sought-after item in the mid-'80s, helping create that bright sound that was British pop music at a time when two men and a synthesizer were a highly fashionable commodity. Check out most material from The Pet Shop Boys and Stock, Aitken and Waterman.

Two albums which contain classic PPG Wave sounds are Propaganda's *A Secret Wish* and Thomas Dolby's *The Golden Age Of Wireless*. Amongst current users are Nine Inch Nails.

2.3. These are processed by an analogue 24dB/octave low-pass filter, with sounds ranging from the obviously digital (if you keep the filter wide open) to much more mellow, analogue sounding noises, with the filter adding warmth to the sound.

In addition to the filter, the PPG incorporates two ADSR (Attack, Decay, Sustain, Release) envelope generators and one AD (Attack and Decay only) envelope generator. You can even assign one of the envelope generators to force the 'oscillator' to cycle through a given wavetable. This produces some extremely complex sound sources, helping make the Wave a unique machine in its day.

The PPG has 16 digital 'oscillators' driving eight voices. Each voice has two possible sound sources: one stored in bank A and the other in Bank B. This setup is referred to as a 'program' and the Wave 2.3 can store up to 87 of these. You can also store 20 complete snapshots of the machine in a special 'combi-program', with a different sound assigned to each of the eight voices.

So much for the sound generating aspects of the machine. What did you *physically* get for your hard-earned readies? The Wave 2.3 is a large yet surprisingly lightweight keyboard, four feet wide by around two feet deep, and some eight inches high. The Waveterm, however, is a different story — it's a 19-inch rack-mounting monitor with dual disk drives, and I, for one, would not recommend lifting it alone!

FULL FRONTAL FEATURES

The keyboard is housed in a black metal case while the front panel features white text and graphics on a striking blue background. It has a 5-octave, 61-note keyboard with Minimoog-style smoked perspex pitch and modulation wheels. The keyboard itself is a pretty tacky affair, so these machines frequently end up looking like someone with a bad set of teeth. Even though it is both velocity and aftertouch sensitive, the keyboard itself is not physically up to the kind of treatment it typically received. Consequently it bent and warped, often damaging the key contacts.

The big blue front panel is split into two sections. The left side is labelled 'Multiple Function Analog Control Panel' and contains all the analogue knobs to control the envelope and filter settings. There is also a button on the right side of the machine, labelled 'Panel', which puts the knobs into a second panel mode, which changes the function of the knobs. I'll explain this in more detail shortly.

The basic analogue functions are themselves split into sections. The section labelled 'Low Freq Osc' has three knobs, labelled Delay, Waveshape and Rate, associated with it. The Delay knob sets the amount of time before the LFO kicks in, which is good for emulating vibrato on a natural instrument. The Waveshape knob produces a triangle wave when turned to the left and a square wave when turned to the right,

passing through various sawtooth wave shapes in between. Rate sets the speed at which the LFO plays. (In 'second panel mode', this knob controls the playback speed of the sequencer.)

Below the LFO section are three knobs associated with Env3, the simple AD envelope. These set the attack time, the decay time and the envelope level. Next comes two rows of four knobs which control ADSR1 and 2. Each stage of the envelope has a discrete knob. In 'second panel mode' these eight knobs control the volume of each of the eight 'oscillator' outputs.

The next section contains the sound modifiers. The first two knobs control the low-pass filter: VCF Cutoff sets the cutoff frequency, while VCF Emphasis sets the resonance of the filter. The next two knobs are involved with the manipulation of the wavetables. Waves-Osc controls which of the 30 wavetables your oscillator uses, while the Waves-Sub knob sets which of the 64 waves within your chosen wavetable is to be used by the oscillator as its start wave.

Underneath the modifier section are three red LEDs. The first two display which bank is active: A, B or A *and* B. The third LED indicates when the machine is in 'second panel mode'. The three remaining knobs set the amounts of envelope control to various functions. The first assigns Env1 to control the filter, the second assigns Env2 to control the volume of the sound, while the final knob assigns Env1 to the wave played. So the envelope's attack rate can set the speed at which the sound cycles through the selected wavetable, permitting a huge range of expressive control.

At the left side of the front panel, the lower of two knobs controls the master volume of the machine while the other, called 'Basis', controls the position of the sound in the stereo field. If you use the PPG's stereo outputs, turning the knob to the left outputs the sound centrally, in mono. Turning it to the right assigns each sound to a different side of the stereo field; the further to the right you turn the pot, the wider the stereo field. If you use the PPG Wave as a keyboard for stereo pads, you can create interesting, moving parts with the simple turn of a knob.

> "Although several modern synths (Korg Wavestation, Waldorf Microwave) deliver much of what the PPG Wave 2.3 offers, none are quite as good."

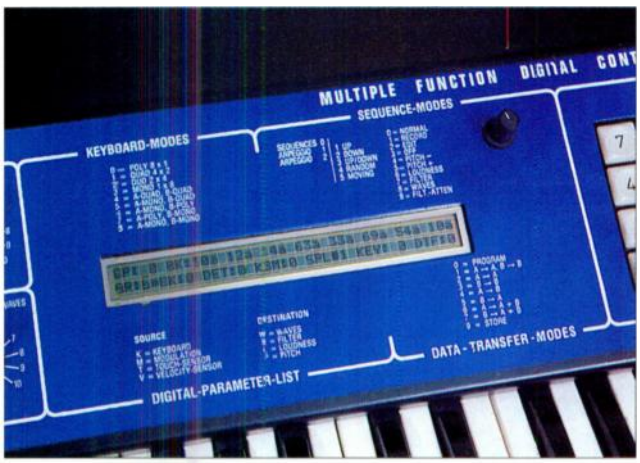
CONNECTIVITY

The back of the keyboard features a large number of sockets, giving you plenty of control. From left to right: a 5-pin Cassette port for storing data if you have no Waveterm; Headphones on a stereo jack socket; CH1 and CH2, the main stereo outputs; Sustain Pedal, CV in, VCF in, Trigger In, Trigger Out and Program Change all on jacks; Clock Rate (selected using the non user-friendly collection of 12 mini DIP switches!); Communication Bus, a special connector used to connect the Wave to the Waveterm; MIDI In, Thru and Out.

In addition, eight separate audio outputs are provided on mono jack sockets. Finally we have the power section, which includes a fuse, voltage selection switch, a standard Euro socket and the power on/off switch.

DIGITAL CONTROL

The right side of the front panel is labelled 'Multiple Function Digital Control Panel'. Its ▶



green, backlit display features two rows of 80 characters, with a small knob to adjust the display contrast, a numeric keypad, and a 10-button pad for switching the machine into various modes.

The problem with the display is that Wolfgang and friends attempted to cram too much information into too small a space, resulting in almost meaningless abbreviations. As part recompense, the display section has some useful notes printed upon it as a reminder to the cryptic content of the display. For example, keyboard modes are numbered 0 to 8 and keyboard mode 0 equals 'Poly 8 * 1', which means you have selected 8-note polyphony. Modulation sources and destinations are also specified with letters: sources being K for keyboard, M for modulation, T for Touch Sensor ('aftertouch' to you and I), and V for Velocity Sensor. Modulation destinations include W for Waves, F for Filter, L for Loudness (volume) and P for Pitch. The Data Transfer modes are equally cryptic. The heady days of computer music, eh...

The aforementioned dedicated 10-button keypad is labelled 'Display Select' and is used to change the status of the machine. Options include Program, Digital, Tuning, Analog, Sequencer, Group, Datat, Keyb, Panel and Run/Stop. Pressing the Tuning button, for example, lets you customise the pitch of each of the eight voices. You can even programme it to play a tune on one note; as you repeatedly trigger the note, the machine cycles through the tuning table.

REAL-TIME SEQUENCER

By today's standards the PPG Wave's onboard sequencer is downright weird. It is a real-time affair and not terribly easy to work with, especially given the small display. Even with the Waveterm monitor attached, it's still not much better. Unlike the Fairlight, whose Page R sequencer forces you to sound like early '80s Peter Gabriel or Kate Bush, the Wave sequencer doesn't have an identifiable character. As the PPG is equipped with MIDI anyway, it's probably best to drive it from an external sequencer and forget about the integral facility altogether.

The comprehensive arpeggiator, however, is definitely worth exploring. To access the arpeggiator you must put the machine into a special sequencer mode — either mode 1 or 2. You can then select how the arpeggiator runs, ie. up, down, up and down, random or moving. All of these modes are very useful for creating rhythmic parts of a sequence, and when used in conjunction with the Basis (pan) control, can produce some really good stereo effects.

STICK OR TWIST?

Coupled with the Waveterm, the PPG Wave 2.3 is a grungy-sounding Germanic sampling machine which can produce both sweet noises and unholy rows. It truly is a weird machine but is definitely worth the effort of using it. Although several modern synths (Korg Wavestation, Waldorf Microwave) deliver much of what the PPG Wave 2.3 offers, none are quite as good. PPG's analogue filtering definitely has the edge, and these days you should be able to pick up a system for between £500 and £1000 — a tenth of the original asking price. SOS

> "...the PPG Wave introduced a new form of synthesis — wavetable synthesis."

PPG WAVETERM

Adding the rackmount Waveterm computer terminal to the PPG system provides even more control and more features, sampling being the main one. The original Waveterm A provided 8-bit sampling, while the 'improved' Waveterm B offered the dizzy heights of 12-bit sampling. The maximum sampling time, however, is extremely short — three seconds at a pretty grungy sample rate! But the 24dB filters can treat the samples, so that even though the original samples might be crap, you can do a hell of a lot with them.

Sadly, the Waveterm has no user-friendly WIMP environment. The entire user interface consists of an 80-column text display with two rows of buttons beneath the monitor screen. These act as 10 programmable soft keys, and the display prompts you as to their functions at any particular time. To the right of the case are the two vertically-mounted 5.25-inch floppy disk drives.

Below the disk drives are two knobs: the left one looks after the screen brightness, while the other sets the input level. Audio input is via a 3-pin XLR socket, with a switch to change impedance from mic to line level and a little red LED indicating input overload. A small button marked 'Restart' lets you reset the computer whenever it decides to do something on its own — ie. crash!

The rear of the Waveterm features three connectors: the 'communications buss' connects the Waveterm to the Wave, while two smaller connectors handle a printer and a QWERTY keyboard.

On power-up, the Waveterm checks its communication buss to see what is connected to the system. The disk drives are of the dedicated variety — the left drive must contain the system disk and the right drive the data disk. If you put the wrong disk in the left drive, pressing the Restart key with the correct disk in the drive is the only way to recover! Once the master disk has booted, you're presented with the communication management screen, or Page 0, as it is also known.

From Page 0 you can load up the eight voices with samples or wave compound files (wavetables). Unfortunately, this is one of the places where the names have been changed to confuse the innocent. The Waveterm refers to the memory locations where these files are stored as memory banks 0 to 7 (1 to 8 in computer jargon). Just to confuse you, these are completely different from Banks A and B in the Wave!

The rightmost function key is misleadingly labelled 'Help'. To call up the help files for each function key, you have to press the Help key twice in succession. The first time you press Help you are actually taken to the File menu. From here you can copy; make a new disk; merge samples together; get, store, delete and list files. This is where the Waveterm is really grim. The only way to recall and save files is by entering a combination of highly descriptive digits like 'T023', 'T201', 'T803' etc. Thankfully, the PPG library disks have a whole 80 columns of characters to describe them (OK, 75 if you remove the filename).

Pressing the Page function key followed by a single digit takes you to the selected page (screen), where you can carry out various functions. Waveterm pages are provided for computing waves, creating wavetables, inputting transient sounds (sampling), editing events (sequencing), and so on.

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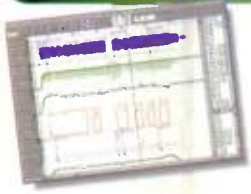

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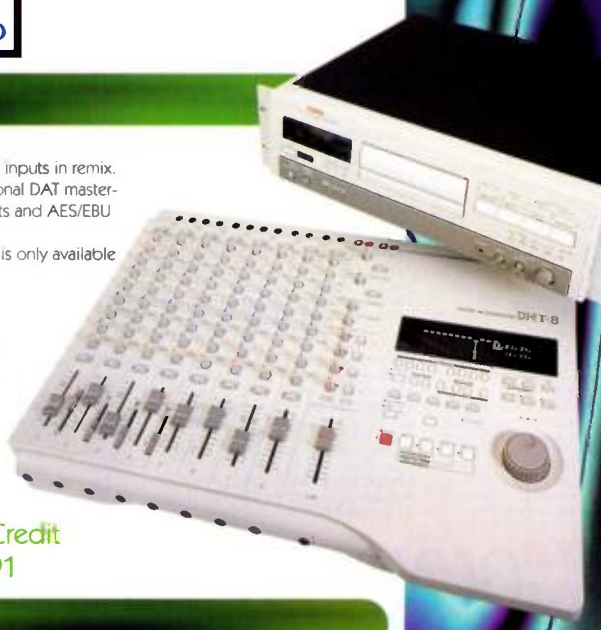

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SPL Stereo Vitalizers: £299!

SPIRIT Absolute 2's £229!!

BEHRINGER Ultrafex IIs: £189

Starts Monday 18th November and must end Friday 29th November 1996

Profe[illegible]udio at CRAZY prices!

OUTBOARD

BEHRINGER Composers: £199!

Product	Status	RRP	Sale
ALESIS Quadraverb 2 **(V2.0 software)**	New	699	599
ALESIS Midiverb 4	NEW	329	299
APHEX Model 612 Expander/Gate	USED	n/a	250
APHEX 104 Type C2 Aural Exciter Big Bottom™	NEW	299	199
APHEX 105 logic assisted gate 4 chan	NEW	399	289
APHEX 106 Easy rider™ 4 channel compressor	NEW	399	289
APHEX 107 Tubessence™ thermionic preamp	Ex-Demo	546	399
APHEX 108 Easyrider™ 2 channel compressor	Ex-Demo	269	199
BEHRINGER EX3100 Ultrafex II	NEW	250	189
BEHRINGER MDX1200 Autocom	NEW	199	149
BEHRINGER XR1400 Multigate	NEW	299	249
BEHRINGER MDX2400 Multicom	NEW	299	249
BEHRINGER MDX2100 Composer	NEW Special Offer	299	199
BEHRINGER SNR1000 De Noiser 2 chan	NEW	199	169
BEHRINGER EX2100J Dualfex	NEW	150	99
BEHRINGER EX2000 Intelligate	USED	299	149
DBX 1066 dual compressor	Ex-Demo	479	399
DIGITECH Studio Quad	NEW	529	439
DIGITECH Midi Vocalist	NEW	449	389
DIGITECH Studio Twin	NEW	249	199
DIGITECH Studio 400	Ex-Demo	799	689
LEXICON Alex reverb	NEW	389	289
LEXICON Reflex reverb (+midi & 128 registers)	NEW	469	339
LEXICON LXP-15 MkII **special purchase**	NEW	979	679
LEXICON PCM-80	NEW	2113	1899
MUTRONICS Mutator	Ex-Demo	582	469
PEAVEY Autograph programmable EQ	USED	n/a	149
SPL Stereo Vitalizer	NEW	499	299
TL AUDIO PA2 2 chan valve preamp/DI	NEW	405	345
TL AUDIO CL1 2 chan valve compressor	Ex-Demo	1169	945
TL AUDIO EQ2 2 chan 4 para band valve EQ	NEW	1521	1199
TL AUDIO *Indigo* dual chan valve compressor	Ex-Demo	703	579
YAMAHA R1000 mono dig reverb	USED	n/a	50
YAMAHA REV 1 mint condition	USED	n/a	1295

MICROPHONES

Product	Status	RRP	Sale
AKG C1000 Condenser	NEW	280	199
AKG C3000 Condenser	NEW	351	265
AKG C414B-ULS Condenser	Ex-Hire	1035	799
AKG C451E + CK9 rifle mic	USED	n/a	295
AKG C451E + CK8 rifle mic	USED	n/a	249
AUDIO TECHNICA 4033 Incl 8441 shock mount	NEW	695	399
AUDIO TECHNICA 4050 Incl 8441 shock mount	NEW	995	799
BEYER M420 dynamic	NEW	187	99
BEYER M260 ribbon	Ex-Demo	445	199
GROOVE TUBES Model 2 valve mic kit	Ex-Demo	1299	999
NEUMANN TLM193	NEW	1173	799
NEUMANN U47 FETi g'teed - new capsule	USED	n/a	1450

TAPE RECORDERS

Product	Status	RRP	Sale
ALESIS Adat V4.03 95 hours only	USED	n/a	1299
FOSTEX G16-S mint condition	USED	n/a	2250
TASCAM 34 four track	USED	n/a	450
TASCAM 38 eight track	USED	n/a	599
FOSTEX R8 + MTC-1 boxed manual etc	USED	2068	949

MONITORS (Pairs) & AMPS

Product	Status	RRP	Sale
ALESIS Monitor Ones (pair)	Ex-Demo	399	279
ALESIS Monitor Twos (pair)	NEW	799	499
ALESIS Matica 900 2x450WPC amp	NEW	649	399
DYNAUDIO BM10 (pair)	Ex-Demo	734	599
FAR CR20 (pair)	NEW	799	679
FAR DbW80 (pair)	NEW	1445	1199
KRK K-ROK near fields (pair)	Ex-Demo	351	299
KRK M7000B (pair)	Ex-Demo	1169	895
MASS 500 2 x 250wpc	Ex-Demo	399	299
MASS 550 2 x 125wpc	Ex-Demo	349	259
OMNIPHONICS Footprint Series 75	NEW	382	259
SOUNDCRAFT Spirit Absolute 2's (pair)	Ex-Demo	258	229

Definitions of NEW, EX-DEMO and USED

All equipment listed as 'NEW' is sealed in it's original carton and carries a minimum 12 month gaurantee. Equipment listed as 'Ex-Demo' has been on display in our showroom for varying periods but otherwise is as new and similarly carries a minimum 12 month guarantee.

Guarantees available on used equipment

Items listed as 'USED' are generally in top condition and have been overhauled in our workshops. These items do not carry any specific manufacturers warranty, however a 30 day money back guarantee is offered at no extra charge. In addition, you may extend the warranty period on used equipment by 12 months from the date of purchase for an extra 10% of the advertised price.

SAMPLERS / KEYBOARDS

Product	Status	RRP	Sale
APPLE Performa 460 + 14" mon 4/500	USED	n/a	450
AKAI CD3000i 8Mb + SCSI + Sampling	Ex-Demo	2599	1599
AKAI S11000 with 10M & scsi	USED	n/a	1250
AKAI S1000PB (2 available)	USED	n/a	499
ALESIS Quadrasynth Plus	Ex-Demo	1299	999
ENSONIQ EPS keyboard	USED	n/a	345

MIXING CONSOLES

Product	Status	RRP	Sale
ALLEN & HEATH GS3V 16 input ***Automated***	NEW	n/a	1600
ALLEN & HEATH GS3V 24 input ***Automated***	NEW	n/a	2450
ALLEN & HEATH Saber 32:16	USED	n/a	3750
ALLEN & HEATH Sigma large frame 32 i/p	USED	n/a	4500
BEHRINGER Eurodesk 24:8:24	Ex-demo	2199	1499
BEHRINGER Eurorack MX2642	NEW	748	599
BEHRINGER Eurorack MX2802	NEW	648	489
BEHRINGER Eurorack MX1602	NEW	229	199
MACKIE CR1604 ***ONE LEFT!***	Ex-demo	949	599
MACKIE CR1604	USED	949	549
MACKIE 8•BUS 32:8	Ex-demo	*4395*	3499
MACKIE 8•BUS 24 chan expander	Ex-demo	*2749*	1979
MACKIE 1202 VLZ	NEW	399	349
MACKIE 1404 VLZ	NEW	549	479
MACKIE 1604 VLZ	NEW	949	799
SAMSON MPL2242 22:4:2	NEW	749	499
SAMSON MPL1502 15:2 compact mixer	NEW	299	249
SAMSON MPL1640 16:4:2	NEW	599	399
SAMSON Mixpad 9	NEW	199	169
SECK 12:8:2 (Black one)	USED	n/a	300
SOUNDCRAFT SPIRIT Folio Lite	USED	320	229
SOUNDCRAFT SPIRIT Folio 4 20:4:2	Ex-Demo	1173	975
SOUNDCRAFT SPIRIT STUDIO 16:8:16	NEW	1537	1099
SOUNDCRAFT SPIRIT STUDIO 24:8:16	NEW	2081	1399
SOUNDTRACS Topaz Project 8 24 + M. Bridge	Ex-Demo	2937	2250
STUDIOMASTER Mixdown Gold 8 ch expander	USED	n/a	199
TASCAM M2600 series 32 input - as new	USED	n/a	2250
TASCAM M06ST 12:2 stereo mixer	Ex-Demo	n/a	149
YAMAHA Pro Mix 01 (absolutely as new)	USED	1999	1295

MISCELLANEOUS

Product	Status	RRP	Sale
AKAI IB-302D digital i/f for S3000	NEW	349	259
AKAI IB-804A adat i/f for DR8	NEW	249	179
FOSTEX 3045 16 chan Dolby C unit	Ex-Demo	799	199
FOSTEX 4030 synchroniser	USED	n/a	250
JL COOPER Cue Point + adat card	Ex-Demo	948	350
LEXICON MRC	USED	399	199
ROLAND JC-120 combo	USED	n/a	195
STEINBERG SMP24 midi sync	USED	n/a	125

DIGITAL RECORDERS

Product	Status	RRP	Sale
ALESIS Adat (original) 95 hours	USED	n/a	1299
ALESIS Adat XT	Ex-Hire	2699	2199
HHB/AIWA Pro-1 portable DAT	USED	n/a	499
FOSTEX D5 Pro DAT recorder	NEW	999	799
FOSTEX DMT-8	Ex-Demo	1199	1099
PHILIPS portable DCC recorder	Ex-Demo	249	199
SONY DTC-690	USED	n/a	350
SONY TCD-D7 portable	USED	n/a	299
TASCAM DA30	USED	n/a	699
TASCAM DA20	NEW	799	649
TASCAM DAP-1 portable pro-DAT	NEW	1599	1299

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ROLAND JV1000 mint as new £1100, Yamaha TG500 module as new £425 ☎ Steve 01207 270759 or 0802 583242 can deliver.

ROLAND JV1080 synth module. The ultimate monster module, absolutely immaculate, manual, boxed £899 ono Akai S1100 digital sampler 18 Mb RAM, SCSI SMPTE, boards effects immaculate, manual, boxed £1600 ono ☎ 01384 410853.

ROLAND JV1080 synth module 16 part multitimbral. 512 sounds, ROM 1 RAM card expandable 64 note polyphonic, in built effects. The ultimate synth module. Still under warranty, immaculate, boxed £899 ono ☎ 01384 410853.

ROLAND JV1080 module, brilliant sounds, never used, complete with manuals, tutorial video, box, memory card and 'experience' expansion board, excellent condition £900 ☎ Paul 01536 761014.

ROLAND JX3P with PG200 programmer, flight case and stand £395. Emu Proteus MPS, brilliant performance controller keyboard with great effects £495 ☎ 01305 774367.

ROLAND JX3P £245 ono, Juno 6 £225 ono RE201 Space Echo £225 ono Proformance + £195 ono GS6 £175 ono Fender Strat £350 ono Marshall JCH800 £285 ono accept £1500 for package possible swaps ☎ Ian 01539 723631.

ROLAND JX8P analogue polysynth, home use only, excellent condition, bargain at £395. Yamaha R1000 reverb unit £75, Laney Linebreaker 65w bass amp £180 ☎ Chris 01793 495551 Swindon.

ROLAND MDC1 dance module, Fatar 610 plus keyboard with Amiga A1200, 340mb hard drive, music-x sequencing software, all leads, manuals etc. Everything immaculate condition £900 ono ☎ 0181 5007824.

ROLAND PC200 MKII MIDI keyboard with manual and midi cable £110 ☎ 0171 720 3702.

ROLAND PG800 programmer £245, Roland JX-8P, vgc, manual £345, Casio V2-8M, vgc, all manuals, Atari editor RAM card (doubles memory) boxed £145 ☎ Dave 0191 3722621 Durham.

ROLAND SH5 rare analogue combo model synth in hard case plus manual and MIDI converter, 20 years old and working perfectly £600 ono ☎ Colin 0181 851 1856.

YAMAHA PSR6000 flagship model. superb sounds and accompaniments for musician or songwriter, sequencer, disc drive effects, hardly used , this year, £750 (cost £1300) ono ☎ 0191 2373006 Newcastle.

ROLAND RD250 plus case £450; Korg poly 61 needs attention £100; Casio HT3000 including RAM card £90; Spirit Folio mixing desk 12 into 2 £350 ☎ Richard 01452 302632.

ROLAND S10 synth with analogue sounds £295 ☎ after 7pm 01684 893648 Mobile 0402 181543.

ROLAND SC55 MKII 28 voice polyphony 354 sounds & Dynamic sounding drum sets, MIDI interface and sound effects set, excellent value at £350 ono ☎ Birmingham 0121 420 1585 evenings 01523 160 360 daytime.

ROLAND SH101 rare red version mod grid and strap £260, Alesis 3630 compressor £170 or swap both plus Akai 3000XL for £64 ☎ Dave 01327 260484.

ROLAND SH1000 analogue mono synth, bargain £85, Jen SX 1000, mint £120, Korg M1 £570, two tier stand £30. Brother wordprocessor L W 200 £160, boxed. mint ☎ Mark 01782 849019.

ROLAND U20 Keyboard £400, Korg 05R/W MIDI sound module £350. Carlsbro Colt 100 watt keyboard Amp £250, all home use and hardly used offers ☎ 01372 361761(Surrey).

ROLAND U20 £195,Boss DR5 sequencer £175, Zoom1010 £85, all in excellent condition, priced for quick sale ☎ 01603 622550.

ROLAND U20 RS PCM multitimbral keyboard, mint condition with manual £400 ono ☎ Mark 0181 859 6951.

ROLAND U220 Roland D110, both with manuals and in perfect working order (boxed) £280 and £200 respectively ☎ Alan 0181 959 0971.

ROLAND VINTAGE synth module MVS1 £399 ono Fatar Studio 900, immaculate £395 ☎ Paul 01482 447308.

ROLAND W10 sound module, immaculate condition, boxed with manual £180 ☎ 10222 229404.

SEQUENTIAL PRO ONE £385, Moog Prodigy £230, Roland SH3A £195, JX8P £325, Oberheim DPX1 sample replay unit for Emu II S900 Mirage and Prophet 2000 disks £295 ☎ 01726 66715.

SEQUENTIAL PROPHET S Rev 2.1 £795, Octave CAT £250, Roland SH101 £250, TR909 £995, TR606 £95, TB303 £695, Jupiter 8 midi £995, wavestation AD £850, OSC Oscar midi £850, CR800 £120, M64C £30 each ☎ 0181 309 0615.

workstation with backings and built in speakers, never used due to illness hence, immaculate condition £1495 ono ☎ Paul 01300 830828.

TECHNICS WSA1 pro workstation 5-octave keyboard 64-note polyphony 32 multitimbral sequencer etc. Reviewed in SOS Dec 95, offers also XX large kiiler, halleluliah CD ROMS £75 each, Ambient II Audio £25, Vocal spectral audio £20 ☎ 0171 720 3702.

TECHNICS WSA1 synth, brand new with manuals and 2 sound disks £1300 ☎ Adam after 6pm 01380 721591 invoices available.

WASP SPECIAL classic analogue synth in full working order £200 or part exchange for effects unit ☎ Cambndge 01223 276311.

YAMAHA CS1X new unwanted gift £500ono; Casio VZ 10M for Yamaha DX7 or Roland R70, it has one card extra, would exchange for Moog Prodigy ☎ 0181 244 3358.

YAMAHA CS1X and Casio VZ10M sell, exchange with Korg wavestation plus difference or Roland 106, must be mint, plus Roland SH101 ☎ Dan 0181 6987557.

YAMAHA CS5, analogue synth, good condition through limited home use only £125 could deliver depending on area ☎ 01983 521051.

YAMAHA CS80, mint, never gigged, complete with original travel bag for legs, pedals, music stand, everything working, £1500, Alex Martin 01889 504211.

YAMAHA FB01 £50. ☎ 01543 454253 Mobile 0973 540571.

YAMAHA KX88 MIDI control weighed keyboard, good condition £600 ono, Roland P55 piano module, excellent condition with manual and box £250 ono ☎ Jason 0113 2629212.

YAMAHA MU30 sound module 64-note poly, 32 part 700+ sounds 21 drum kits, as new £400,Boss DR660 drum machine £180 ☎ Dave 01223 300488 or 01223 423123.

YAMAHA PFP100 flightcase as new £100. softcase as new £50 ☎ Peter 01202 827118 day 01202 886632 eves.

YAMAHA PSR500 interactive workstation keyboard built in effects, nearly new condition £250 ono, Novation Bass Rack £275, Novation Drumstation, new £350 ☎ 01344 891110.

YAMAHA PSR2700 in-built sampler sequencer, 61 touch sensitive keys, 128 sounds, 8 drum kits plus sample Data/Demo disks, manual perfect condition £575 ono ☎ 01332 381708 Derby.

YAMAHA SY35 boxed, hardly used, swap for Alesis SR16, any 4 track tape recorder in good condition and Roland D 10 synth or/any similar exchange considered ☎ William 01789 765796.

YAMAHA SY35 multitimbral synth, extra sounds on disk, excellent condition £350, Carlsbro Colt 45K keyboard Combo amp, 2 channels, four inputs £95 ☎ Duncan 0121 444 2681.

YAMAHA SY77 synth workststion, over 1000 sounds, 2 cards,manuals £750, Korg Poly 800, mint, boxed £100, speaker/cabinet, 15 inch bass £60, leave name/number ☎ 01429 866401.

YAMAHA SY77 mint condition and box, manuals and quicklock stand £649, Roland R8M immaculate condition, boxed and manuals £349 ono ☎ Malcolm 0191 5654334.

YAMAHA SY85 in immaculate condition with disks, leads, manuals £700 ☎ 01706 364 594.

YAMAHA SY85 software for sale, groove factory disk £20, RAM card with sounds £35, 100 pure energy library disks £100 ☎ Kriss 01787 278614.

YAMAHA SY99 inc. loads of sounds, two tier stand, pedal and case £950 ono, Alesis Quadrasynth £520 ono and Korg 05RW module plus extra sounds £320 ☎ Mark 01344 53117.

YAMAHA TG55 including drum, ROM and program cards. Home use only, boxed £250 ☎ Alastair 0171 4341182 day 0171 7332656 eves.

YAMAHA TG300 expander like new with manuals £260 ☎ 01684 893698 Mobile 0402 181543 after 7pm.

YAMAHA TG500 64 voice polyphony, immaculate £500 + Alesis SR16 drum machine as new £150; all boxed with manuals ☎ Jean-Louis anytime 01277 232945.

YAMAHA TX816 eight DX7's in a box, nice £1000 ☎ 01202 523721.

YAMAHA TX816 8 DX7's in a 4U rack, 128 note poly 8 part multitimbral, 9 midi ins, 9 thru, want FM this is it ☎ Mike 01942 204800.

YAMAHA TX816 tone module, 8 DX7's in a box, massive and wonderful c/w manuals vgc. £1000 also Moog source, 6 trax Oberheim 6 offers please ☎ 01202 770601.

YAMAHA V50 8 track seq drum machine etc. £250 ☎ 01843 596887.

YAMAHA V50 workstation £350 ono; Fender Rhodes stage 73 £250 ono; Yamaha DX100 £70 ono. All VGC ☎ Mark 01903 716580 eves or 0973 128652 anytime.

YAMAHA W7 workstation synth, home use, boxed with vintage card installed £790, Tascam 424 Portastudio, boxed, mint condition £290 both for £1050 ☎ 01482 844556 (Hull).

RECORDING

AIWA XDS1100 DAT full-size, 3 motors, digital in/out. excellent condition, boxed £495 ono;AKG C451EB +CKI £200 ono AKG C535EB £200 ono all gear vgc hardly used ☎ Steve 01273 709029.

A.C.E.S 24-buss mixer, 48 inputs, 5 band equalisation, 5 auxiliaries, LED baragraph and VU-meters, phase switching, audiofad faders, patchbay, top-class mixer, £1200, consider PX swapping outboard FX, guitars etc. ☎ 01482 448767.

AKAI DR4D hard disk recorder incl iB303 MIDI interface board and Akai 200Mb internal hard drive, boxed with manual, as new hardly used £895 ☎ Paul 01179 238637.

TWO AKG 95S Mics, hardly used £100 for both ☎ 01684 893698/0402 181543 after 7 pm.

AKG C414BULS Mic £680, Akai S01 sampler 1Mb £380, Studiomaster P7 16 channel mixer £1000, Akai XE8 drum expander £90 with 2 cards ☎ Bob 0171 385 3332.

AKG C451 Cardioid condenser microphone including power supply £175, Soundtech ST200CL stereo compressor/limiter £100 ono ☎ Matt 0181 766 7931 or 0976 702 906.

ALESIS 1622 rackmount mixer, 6 FX sends, balanced ins, inserts etc. v quiet £265 ono, Drawmer LX20 dual compressor and gate £130, Alesis Microverb III £90 all excellent comndition ☎ 01482 448674.

ALESIS 1622 MIXER 16 line 8 mic inputs £325, Alesis Quadraverb multi effect processor £250, Roland D110 multitimbral sound module plus cards 8cst editor £240 ☎ Chaz 01892 524948 (Tunbridge Wells).

ALESIS ADAT sync box Steinberg ACI £225, Steinberg Medex 2in/4out MIDI interface £195, Zoom 9120 effects £220, Steinberg SMPTI pro MIDI/SMPTE interface 4 metre klotz 15 way Adat loom £50 ☎ Dave 0181 902 9784.

ALESIS ADAT v4.03, 2 minutes record time only, as new, still under guarantee with LRC and new ampex tape £1425 ☎ Darius 0181 8085103.

4 ALESIS ADAT v4, fully serviced £1250 each, Dynaudio sub-bass ABES2 as new, boxed £1800 ☎ Donald 0141 946 2670 eves.

ALESIS ADATS v4.03, recently serviced £1400 each, Seck 18/8/2 MKII mixing desk £400 ☎ 0141 337 3652.

ALESIS QUADRAVERB TWO latest ROM version with overdrive, sampler, etc. As new a whole effects rack in one would consider part exchange HRMPS etc £450 ☎ Greg 01253 731965.

ALESIS MIDIVERB original £75, Roland TR505 drum machine £60 limited home use, as new ☎ Peter 01484 313875.

ALLEN & HEATH system 8 16:8:2 mixing desk, VU meters, flightcased, only £550 ono ☎ 01273 327889 (Brighton).

ALLEN & HEATH GS1, 16-8-2 two month old bargain £500,Boss RCL10 compressor/gate 1/2 rack £60, 60 way balanced patch bay very solid £60 ☎ Duncan 0181 509 9886.

ALLEN & HEATH GS3 16 track mixing desk with automated midi muting, excellent condition, home use only, boxed with manual, £900 ☎ Mark 01306 731 358.

AMPEX 456 brand master tape, aluminium spools, boxed, three full, one part full, £50 the lot also Betacam, Umatic and Reel video tape ☎ 01226 748179.

APHEX aural exciter type C mono half rack,£70 never used ☎ Dave 01543 454253 Mobile 0973 540571.

ART MULTIVERB LTX 250 programs, stereo in + out, MIDI 3 effects combination, internal power supply iU rack, £125 ☎ James 01978 362910.

ART PROVERB 200 boxed £95 ono; Belden multicore cable 40 & 50 way £1 per foot. Bargain! ☎ 01483 301223 Surrey.

BEHRINGER ULTRAFEX 2 mint condition cost £230 sell for £125, still boxed, virtually unused ☎ Paul 0374 900334 or 01422 204479.

BEHRINGER ULTRAFEX II exciter £170; pair Ramsa A80E speakers £300. All as new, boxed with manuals ☎ Spencer 01803 520317 Devon.

BOSS SE70 £350 ono Apple Mac Quadra 650 16 Mb 14" Trinitron monitor CD300 CD ROM drive Cubase score 2.09 £1300 ono Drawmer DL221 compressor £200 ono☎ 01484 663613 after 7 p.m.

BOSS SX700 effects, 2 months old, £340 ☎ Phil 01865 209085/279564.

DBXII stereo DBX unit, £50 ☎ Dave 01543 454253 Mobile 0973 540571.

DENON DTR2000 DAT, remote, full size, analog , digital, optical in outs good condition. Dats a bargain at £350! Could arrange delivery ☎ DAN-E 01242 527394 daytime.

FOSTEX 812 Mixer 8 groups as new £400 ☎ 0181 778 0008.

FOSTEX 812 12 channel 8-buss mixer. Total 36 inputs available at mixdown. Excellent small recording desk, home use only £550 ☎ Paul 01635 278363.

FOSTEX 81212 channel in line mixer. 8 sub groups, 3 aux busses 3 band sweep eq Phantom powering boxed with all manuals £525 ovno ☎ Nick 01223 894270 (Cambs).

FOSTEX 4050 Autolocater with stand and cables £200, Akai ME35T MIDI trigger with six pads £100 ☎ Dave 01522 778229.

FOSTEX 4050 £200, Akai ME35T MIDI trigger £100, Akai XE8 drum expander £100, Roland D110 £175, Roland JX8P and M64C £250 ☎ Dave 01522 778229.

FOSTEX A8 model350 mixer, cabling and remote control with manuals, light home use only £600 ☎ Chris 0973 363946 or 01273 387889 (Brighton).

FOSTEX B16 excellent condition £1000 ono, Behringer composer £150, portable DAT Casio DA7 £200, Neuman UB7 professional MIC £800 ono ☎ Neil 01964 542338 (Hull).

FOSTEX DMTB 1050, Yamaha SU10 £225, Yamaha MDF2 £225, Yamaha SY35 £325, Atari1040 ST, SM144 monitor £200, Alesis MEQ230 £200. all very good condition ☎ 0114 2819323.

FOSTEX DMTB £1050, Yamaha SU10 sampler £225, MDF2 £225, Atari1040 STE;SM144 £200, Alesis MEQR 30 £200, all top condition ☎ James 0114 2819323.

FOSTEX E16 with rackmount kit, excellent condition, £1550 ono Alesis Microverb III £120, Alesis Midiverb III £210 ☎ 01483 277708.

FOSTEX E16 recently serviced, new capstan motor (£500 PART!) £1700 ☎ Andy 01273 674907.

FOSTEX E16 immaculate condition — only four months light home use. Boxed, loom, manual £2000 ono ☎ 0181 778 7664 anytime.

FOSTEX G245 absolutely immaculate, boxed, manuals with 8330 sync card and remote, very little use, £3500 ☎ 01494 776255.

FOSTEX M80 8-track pro-recorder with two Ampex tapes, demagnetiser, looms £590 or exchange for good keyboard sound module effect unit or similar. Must be in good condition ☎ 0171 7203702.

FOSTEX M80 8-track recorder, immaculate, serviced with new sync head by Fostex, hence, £675 ono ☎ 01425 613429.

FOSTEX M80 8-track, excellent condition, home use only with manual £500 ☎ Chris 0161 624 5802.

FOSTEX M808-track reel-to-reel with rackmount brackets £499 ☎ 01483 419 234.

FOSTEX MODEL 80 with loom to seck 12:8:2 desk private use only, very good condition, various other useful bits and pieces thrown in £975 offers? ☎ 01453 753325 (Glos).

FOSTEX R8 looms,demagnetiser, two new Ampex reels £700, Fostex 812 Mixer £700, both excellent condition with manuals ☎ Irene 0171 252 4326.

FOSTEX R8 8-track recorder, mint condition with manuals, remote extension and 22 reels of tape £625 ☎ Matt 0115 9691845 (Nottingham).

FOSTEX R8 £700; Proline 16:4:8 £500; Atari Mega 2 STE and creator £300; Roland D50 £350; Roland R8 £300; Roland U220 £300; Alesis quadraverb GT £250 ☎ 01253 884993(Blackpool).

FOSTEX R8 with MTC1 SMPTE unit, Fostex 812 mixer with MIDI mute, boxed with manuals, one careful owner £1400 ☎ Dan 0151 652 1873.

FOSTEX R8 complete with Yamaha MB02 mixer, very light home use, as new condition. Instructions and boxes plus ten Ampex tapes, real bargain, £750 ☎ David 01726 842862.

FOSTEX R8 + MTC1 + 5 Reels £800, BBE sonic maximiser 862 version £300 ☎ 0061 45501(Ireland).

FOSTEX R8 VAC, MTC1 sync, Steinburg Cubeat plus manual, Atari STE, mono HI RES monitor £899 ☎ 01452 387228 or 01452 532780 (Glos.).

FOSTEX X26 4 track recorder, immaculate virtually unused £100 ono ☎ 01243 531527.

GREAT BRITISH SPRING XLR balanced version£80, Alesis microverb £80;Roland EV5 expression pedal £25; Sure Mic £40, Urei 565 little dipper £offers ☎ 01716399727 eves.

JL COOPER PPS100 SMPTE sync as new with manual £125 ☎ John 0181 944 0391.

JL COOPER CUEPOINT, ADAT card fitted, remote control four ADATS, SMPTE to MIDI convertor as new, £600;JL Cooper CS1 Apple remote control SD11 MOTU, Vision, Sound Tools Editor/Librarian software as new, £160 ☎ 0171 586 5425.

H&H 12-channel mixing desk, digital effects inbuilt (delay or flanger) 4 band EQ echo send and return, fold back, aux in, variable input sensitivity ,£180 ☎ Dan 01273 697572.

HOME STUDIO SALE! Tascam M2516 Pro mixer;Fostex M80 8 track recorder;Zoom 9120;Studio effect; Zoom 9050 guitar/studio multi-effect;Behringer Composer, all gear in immaculate condition with all manuals, Atari STE 4 Mb with cover;SM 14 HighRes monitor with protective screen and wall bracket, Apple CD ROMs audio CDs also speaker wall brackets ☎ 0171 720 3702.

KORG A1 multi effects processor, perfect working condition, boxed with manuals, includes FC6 foot controller, true stereo, superb machine £700 ☎ 0585 682007.

KORG G4 rotary speaker simulator, brilliant ,£150, Band in a Box ST £40, Styletrax for Cubase ,£40 wanted or swap for Tascam 22-2 mastering open reel ☎ 0191 536 5084.

LA AUDIO 4C 4 channel full/half band compressor/de-esser, four individual dynamic units in 1U rack or channels can be linked to provide two stereo compressors, £300 ono ☎ Andy 0151 336 6657.

LEXICON LXP15 superb effect processor with box and manual. 2 years old and seldom used £450 ☎ 0181 7716045.

LEXICON REFLEX, boxed as new, unwanted gift £280 ☎ Steve 01405 762699 (Yorks).

MACKIE LM3204 rackmounting mixer, 16 stereo channels, excellent for home studio, unused, still boxed as new £550 ovno , Quadraverb GT guitar FX, boxed as new £220 ono ☎ 01663 732569.

MACKIE SR24:4 VLZ desk boxed, excellent condition ,£1200 ono ☎ 0181 778 0008.

MACKIE CR1604 DESK mint condition £520, Roland S760 sampler 10Mb mint condition, boxed + Manuals £1050 ☎ Martin 01159529114 or 0976 403119.

MACKIE CR1604 16-channel mixing desk, good condition, it's what everybody is using! £600 ono ☎ Dan 01273 270136 (Brighton).

MIDIMAN 1B/2 mini mixer £150, 2U rack case £50, 2U rack shelf £20, ART FXR FX unit £110 ☎ Ken 01242 230489 (Glos).

MM ELECTRONICS 12:2 mixer, £80 ☎ 01509 507188 (East Midlands).

OTARI MX70 8-track, 1-inch tape machine, stunning quality with full remote, ex-BBC, excellent condition, £2500 ☎ Gary 0181 2960691 (Middlesex).

PEAVEY QFX 4x4, 4 independant FX processors each with stereo ins and outs, MIDI compatible £280 ☎ 0141 638 6687.

PHILIPS DCC 730 digital cassette recorder for mastering, immaculate condition, boxed as new with remote control and tapes £190 ☎ Kester 0181 325 0860 (Beckenham).

REBIS PRO AUDIO EFFECTS 4x gates 2x parametrics 12x oscillator patch bay frame, has space for five more modules, £240 ☎ Paul 0181 850 5537.

ROLAND DM800 8-track HDR recorder/mixer, powerful immaculate, boxed, wonderful to use external SCSIS cost £3000, £1495 as new, drives £150 each Lexicon Alex boxed, all as new, £265 ☎ Norman 0191 384 8890 day 0191 3789703.

ROLAND DM800 8-track HDR, 4 inputs, seagate fireball SCS1 storage units, 2 of each, 540 Mb and 1 gig, total 3 gigabite £1499 (was £3900), Lexicon Alex £240 ☎ Norman 0191 3789703/3848890.

ROLAND VS880 850Mb internal drive plus VASF1 effects board, mint and hardly used, very reluctant sale! £1700 ono ☎ Matt 01253 713379 Blackpool.

SANSUI MR6 recorder £250, Yamaha MR1242 comprehensive EQ inserts, three AUX, XLR, phono and MIC ins and outs, Phantom, both boxed, manuals, superb condition £300 ☎ Matt 01306 881925.

SECK 18:8:2 home use only £600 ono, TX812 £150, Roland P330 £150 ☎ Lenis 01223 258390.

SECK 18:8:2 mixing desk, manual, good condition K550;Tascam 58, professional 1/2-inch 8TK very heavy duty manual, remote, £850Yamaha RX5 Drum Machine 12 outputs, 5 modules immaculate, £300 ☎ 0181 571 5320.

SECK 18:8:2 mixer perfect condition £695, JBL control 5 monitor speakers, hardly used £225 ☎ Ian 01785 212115 Stafford.

SECK 12:2 MIXER good condition £150, Steinburg time lock for Atari STE £25 ☎ 01535 657698.

SECK 12:8:2 desk vgc small light 8 bus 3 band swept EQ 2 Aux ,£495 ☎ 01223 327002.

SENNHEISER MICROPHONES 2 MD441 and 2 MD427 £200 each, immaculate conndition with box and leaflet ☎ 0181 7716045.

SONY MINIDISC UNITS MDS 302 £295, MZ R2 £175, MZ R3 £215 all brand new, never been used C/W box & instructions ☎ 01425 655153.

SONY DB DAT portable recorder, variable sampling rates 48/44.1/32MHz. Gold connectors etc. Replaces the D7 brand new unused. Cost £600 accept £400 ono ☎0881 834313.

SOUNDCRAFT 1600 series desk 16:8:2 Penny & Giles Faders, VU/PDM meters, stand PSU and manuals. classic British console, ex BBC/Dave Stewart £1000 ono ☎ Jason 01932 843072.

SOUNDCRAFT SPIRIT STUDIO 16:8:2, 3 months old, unused with shop receipt £900 no offers ☎ Chris 01708 670017 Essex (Nr. East London).

SOUNDCRAFT SPIRIT FOLIO 10:2 mixing desk, as new, hardly used. Offers wanted ☎ 10924 478155.

SOUNDCRAFT SPIRIT STUDIO 16:8:2 unused, three months old with shop receipt £890 ☎ Chris 01708 670017 Essex.

STUDIOMASTER 16/8/16/2 Proline gold, MIDI 4 AUX's 4 band EQ talkback, mint condition boxed £800 ono ☎ Dave 0163 068 5329.

STUDIOMASTER DIAMOND16:2 mixing desk, excellent condition ,£300 ☎ Paul 01438 812330.

STUDIOMASTER MIXDOWN Gold 16/8/16/2 with MIDI muting, excellent condition, boxed £800 ono;Tascam 32 1/4" mastering machine, mint condition £400 ☎ John 01822 854389.

STUDIOMASTER SESSIONMIX 16:2 boxed;£340 ono Fostex 450 8:4:2/10:2 £285 ono £580 for both! 4x1Mb 30 pin SIMM , £32;Atari 1040 STF 1Mb MED RESC/monitor 2nd disk drive, boxed ,£160 ;Crown MT2400 power amp 600wx2, £500 ☎ 0121 622 2743.

STUDIOMASTER SESSIONMIX gold 16-2-4 Aux sends, sweepable Mid, recently serviced, flight case, £450 ono ☎ Kris 0151 523 8110.

STUDIOMASTER SESSIONMIX Gold 8/2 mixer, full flightcase, manual, excellent condition £225 ☎ Peter 01827 880091 (Leics).

STUDIOMASTER PRO LINE GOLD 8/4/8R superb recording/live desk perfect for 8 track, mint condition, manual £400 ☎ Andy 0117 955 5404.

TANNOY SUPER reds, good condition, home use only £1050 ono ☎ 01604 588618.

TASCAM 38 1/2-inch 8 track + loom £695, Seck 12:8:2 mixer £395, Atari 1040ST, monitor, Cubase and much more, bargain £195 ☎ Dan 01373 812674.

TASCAM 38 1/2-inch 8-track reel to reel tape recorder £700, Tascam M30 8 track mixing desk £250 ☎ 01404 81 2635.

TASCAM 388, used only 3 times, cost £3000 as new bargain, £1000 ☎ 01803 855045.

TASCAM 424 no manual, good condition, new motor £150; Atari 520 upgrade with cubase £150 ☎ Andy 01892 543499 Kent.

TASCAM 464 4-track portastudio, excellent condition (hardly used) boxed with manual ☎ Mike 0161 8191091(Manchester).

TASCAM 488 8 track used one hour £575, including TEAC degausser, Akai ME80P programmable MIDI patchbay £140 all boxed, manuals, also DACS MIDI patchbay £50 ☎ 01727 827464.

TASCAM 488 mint condition with manual, 12 inputs, 2 auxs £650; Roland S550 + monitor 8 outputs, good starter £600, both as kit £1100 ☎ Ian 01494 815593.

TASCAM 488 MKII Portastudio, immaculate with receipt 5.8.96 purchase, boxed with manual, reason for sale - going digital ,£750 ☎ Graham 01423 771440 (N Yorks).

TASCAM 688 programmable 8-track MIDI portastudio, 70 inputs, excellent quality and versatility built-in timecode, mint condition, hardly used, £1100 ono ☎ Steve 0161 865 1577.

TASCAM 688 8-track 20 input mixer with built in MIDI sync, excellent condition ,£895, Tascam ATS 500 syncronizer and interface cable ,£395 ☎ 01733 314502.

TASCAM 688 8-track recorder, 20 input mixer with built in midi sync, excellent condition £895, Tascam ATS 500 synchroniser and interface cable £395 ono ☎ 01733 314502.

TASCAM DA88 private use only, good condition, flight cased £2100 ☎ Mark 0113 2751760 (Leeds).

TASCAM MM1 £435, Quadraverb plus £295, Akai PEQ6 six equalisers £185, Tascam PE40 studio equaliser £285, Yamaha QY20, £195 Roland SRV2000 Reverb £295. IVL Pitch to MIDI £245 ☎ 01257 462609.

TASCAM PORTA 2 high spec 4 track, six inputs, FX loops, inserts, EQ, midi synch, as new £250 ☎ 01928 581456 Cheshire.

TASCAM TSR8 perfect £875, ART Multiverb alpha £170, Steinberg midex + £190, Boss CL50 mono compressor gate £80 ☎ Eugene 0181 694 6876.

TASCAM PORTA ONE 4 track, £150, Art FXR MultiFX ,£120 ☎ Phil 01253 863471 after 6pm.

TASCAM PORTASTUDIO 05HS 4 track recorder /mixer, high speed, DBX, robust and portable, excellent condition, few hours use only, cleaned meticulously, boxed, manual £195 ono ☎ Andrew 01352 740243 (N. Wales).

TEAC 32-2B reel-to-reel mastering machine, cost £500 new. Needs a little attention, hence £200 ono ☎ 01816917060.

TEAC 32-2B 1/2-track 7 1/2, 15ips £300, Maui sample player (PC) 2MB fitted £80, Yamaha Hello Music GM module, software (PC) £80 ☎ 01273 605182 (Brighton).

TEAC A3340 4-track reel-to-reel recorder with DBX type noise reduction, excellent condition, very little used classic workhorse £275 ☎ Chris 0171 254 5638.

TEAC X3 open-reel recorder plus 2A mixer 6.2 both excellent condition and working order, suitable for serious beginner £100 the lot ono ☎ 01788 891533 eves.

VALLEY PR2 with limiter, compressor and de-esser cards, broadcast quality cost over £1200, accept £550 ono ☎ 01565 633790 (Cheshire).

XRi SYSTEMS XR300 mains version (not the cheap one!) in good condition £125 ☎ 01604 588618.

XRi SYSTEMS XR400 MIDI MATE 3 Way merge, 11 Thru ports and Auto routing as new, £95, will deliver ☎ 01246 410799 **YAMAHA DX7S** mint condition £280, Korg M3R also mint, home use only £300 ☎ 01926 817877 Midlands.

YAMAHA DMP7 automated mixer, mint condition, latest software rev £500 ☎ Tony 01784 481577 night or 0171 765 3244 daytime.

YAMAHA FX900 rack digital effects processor, never gigged, absolutely superb, cost £700 accept £250 ono ☎ Gary 01353 723320 (Cambs).

YAMAHA MT120S 4 track, mint, boxed, manuals, hardly used and very well kept, 40Hz-18KHz, DBX, simultaneous recording, graphic EQ, twin speed, £235 ☎ Dave 0191 3722621 (Durham).

YAMAHA MT1X 4 track Betastudio records 4 tracks at once with manual and flight case, £140 ono ☎ 01684 893698 Mobile 0402 181543 after 7pm.

YAMAHA MT2X multitracker, high speed with six channels and AUX returns plus sync to MIDI box. Serviced and in excellent condition, boxed with manual £190 ☎ Thomas 01633 880946.

YAMAHA MT2X 4-track £139,Yamaha DX27 synth £159, Yamaha RX17 drum machine £65, Yamaha REX50 digital effects £99 hardly used ☎ John 0181 977 7495.

YAMAHA MT3X 4 track with Primo UD320 Mic and Mic stand 260 ☎ Gerry 01276 474 2656.

YAMAHA MT8X 8 track cassette multitrack, excellent condition, boxed with manual, £650 ☎ Gary 0171 612 0572/0181 806 2642.

YAMAHA 02R digital automated mixing desk, as new, latest ROM release, boxed, complete with manual £4750 ono , Roland JV1080 £865 ono ☎ 0181 800 9944 days 0181 800 1040 eves.

YAMAHA PROMIX 01 only 6 months old, so as new £1075 ☎ Dave 01626 862506 or 01392 50055.

YAMAHA PROMIX 01 £1300; AKAI S3000 with 10Mb £1300. Roland Juno 106 £425, all mint condition with manuals and boxes ☎ Darren 0161 236 8705.

YAMAHA STEREO COMPRESSOR £160; ADC graphic equalizer £60 the complete Cubase handbook £15, Masos disk for Mirage sampler, offers? ☎ Dave 0197 4 26 1318.

ZIP 100Mb SCSI drive inc cart cable and four clean disks unused, ideal for light sampling. all boxed, mint £100 ☎ 01480 385059.

ZOOM 9120 FX £200, AKG 5255 condenser £75. 16U rack £30, MIC stand £10, vintage Hammond organ, offers ☎ John 0976 278303.

SAMPLERS

AKAI CD3000 sampler 8Mb RAM analog sampling board, 10 outputs, hardly used, £1500, Tascam 688 8-track MIDI recorder 20-channel mixer, immaculate condition ,£1200 ☎ 0181 840 7029.

AKAI S01 2 Mb Roland Juno 1, offers ☎ Kirsty 01483 830 536 ,7-8pm.

AKAI S950 sampler with expanded memory ,£850. Yamaha TX817 sound module, £200, Yamaha RX5 drum machine ,£300, all boxed as new and hardly used ☎ Steve 01243 263311(Bognor).

AKAI S950 £500; Yamaha TG33 sound module £150; Simmons SPM 8/2 MIDI programmable mixer, all boxed with manuals ☎ Nathan 0181 3484915 after 12pm only please.

AKAI S950 fully upgraded £700 ☎ Justin 01203 687429 or leave message.

AKAI S950 1.5Mb £650, Studiomaster 16:2 Diamond Club mixing desk £200. Boss SE50 FX box £225, Casio CZ101 £65, all excellent condition ☎ 01203 394386 6-7pm.

AKAI S950 expanded to 1.5 Mb £650, Emu MPS keyboard with RAM card £480, Casio MG510 midi guitar strat shape £280, all home use only ☎ John 01434 603031.

AKAI S1000 sampler 10Mb memory SCSI board, as new. boxed with manuals £1200 ☎ 0181 778 0008.

AKAI S1000 10Mb digital I/O SCSI £1200, Roland U20 as used by M-People £300, Alesis Quadraverb £195, Roland GP8 guitar processor £200, 16 track direct to disk £1500 ☎ 0171 351 0075.

AKAI S1000 sampler £1000, Yamaha SY85, never used, I can prove it!! £600 ☎ Ian 01926 854105.

AKAI S1000 8Mb of RAM, fitted, boxed, brand-new condition £499 ☎ Neil 01773 540234 after 5.30pm.

AKAI S1000PB 10Mb £499, Roland S760 10Mb £1199, both samplers in mint condition with manuals and boxes ☎ Neil 01773 540234 or Martin 0115 952 9114 after 6 pm.

AKAI S2000 absolutely brand-new, never used, genuine reason, bargain plus mind control CD pack £830; Roland Pc200MkII controller keyboard, used three times £100 ☎ Steve 01782 863463.

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• 'Smart' FSK Tape-to-MIDI synchroniser • Starts anywhere in song • MIDI In to Out merging • Automatic read/write switching • 'Jam Sync' protects against tape dropouts • Records tempo changes • MIDI and FSK status LEDs

POCKET SYNC is the way to expand the capabilities of any multitrack studio. No longer is it necessary to allocate more than one tape track for sequenced parts. Now, shuttling to different points in the song is quick and effortless. POCKET SYNC writes a special FSK sync tone on one track of tape that is converted to MIDI Clock and Song Position Pointer on playback. Merging of data from the MIDI input to the output allows new sequencer tracks to be added while remaining synchronised to tape.

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POCKET MAC

• Economical Macintosh MIDI interface • No external power supply required • 1 MIDI In, 2 MIDI Outs • LEDs indicate MIDI In/Out data • Uses serial or modem port • High speed CMOS design • Improves signal to minimise data errors.

POCKET MAC opens up a whole new world of MIDI programs for the Macintosh computer user. With many Macintosh programs simultaneously supporting both the serial port and the modem port, one POCKET MAC could be connected to each allowing access to twice as many MIDI devices.

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POCKET MAPPER

• Remaps MIDI controllers • Maps Pitch Bend to Aftertouch • 'Set and forget' programming • Supports 15 controllers • Allows unconventional routings • Updates older keyboards.

POCKET MAPPER allows modulation routings to be customised to suit a particular need. Controller data such as Pitch Bend, Aftertouch, Breath Control and others is received and can be retransmitted as a different controller. For instance, DX7 Breath Control modulation can be rerouted to MIDI Volume to modulate synths that do not accept Breath Control. POCKET MAPPER is the most convenient and cost effective way of rerouting MIDI modulation. Now, MIDI wind instruments can remap mouthpiece Breath Control to Aftertouch quickly and easily.

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POCKET MERGE

• Merges 2 MIDI signals into 1 • Handles System Exclusive • Merges on all 16 MIDI channels • Merges Clock and MIDI Time Code • Merges all controllers • Handles large volumes of data • Stackable for 3 or more inputs

POCKET MERGE is an essential tool for sequencing or live use. Operating as a 2-In, 1-Out MIDI Merger, several Pocket Merges can be stacked to merge more than 2 inputs. Now any controller can be a 'master'. In live setups, POCKET MERGE allows any two controllers (keyboard, drum pads, guitar synth, etc) to share a sampler or sound module. Use one keyboard as a master, while using a favourite pitch bender from another, or combine two keyboards for a multi-tiered, organ-style controller. In the studio, POCKET MERGE is a must for sample dump editors, allowing a keyboard and a computer to be connected to the sampler at the same time. POCKET MERGE handles data very quickly, making buffer overflows a thing of the past.

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POCKET FILTER

• Filter on all MIDI channels • Filter controllers, System Exclusive and real-time data • Combine data types/channels • DIP switch selectable filtering • Select channel from any keyboard • Filter all data on selected channels

POCKET FILTER is a vital tool for problematic setups. With MIDI data becoming increasingly complex, POCKET FILTER can unclog the MIDI data stream, sending only the most useful info. Use it to remove unwanted clock messages or System Exclusive data or memory-intensive aftertouch and controller information. POCKET FILTER frees-up unused MIDI Channels from multitimbral synths, making them available for other modules. In addition, it can be used to channelise older synths that only receive in Omni mode.

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POCKET PEDAL

• Sends on multiple MIDI channels • Supports 1 continuous controller • Supports 1 momentary footswitch • Sends pitch-bend, modulation, portamento time, and MIDI Volume • Sends sustain, portamento on/off, sustenuto, and start/stop • Auto pedal/footswitch calibration • Forward/Reverse pedal operation • 3 mode pitch-bend operation • Combine data types

POCKET PEDAL is an indispensible controller for the performing musician. Use it with an ordinary volume pedal and footswitch to send MIDI volume, modulation, and sustain controls on all 16 MIDI channels simultaneously. For owners of multi-effects processors, POCKET PEDAL provides a convenient cost-effective way of providing dynamic control over effects parameters. It is also a handy controller for automated mixdowns, converting any resistive input into MIDI Controller messages for VCAs. Connect a photocell to POCKET PEDAL and control MIDI parameters with a light source!

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POWER PACK

• 'Phantom' powers all Pocket Products • Functions in-line with MIDI signal • Powered by most AC adaptors • Automatic polarity switching • Fully regulated supply • Passes all MIDI data • Alleviates hook-up problems • Boosts MIDI signal

POWER PACK provides power to Pocket Products in instances where upstream devices from other manufacturers have neglected to meet MIDI specifications, or in any instance where power is unavailable. POWER PACK can be placed anywhere in the MIDI chain and accepts power from a standard AC adaptor (not included). It provides additional power when more than 4 Pocket Products are used in a row or allows POCKET PEDAL and POCKET FILTER to retain their channel settings when the master device is turned off. What's more, POWER PACK can be used to boost the MIDI signal and extend the maximum distance between two devices.

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POCKET SPLIT

• 8-Zone Keyboard Splitter • Range from 1 to 127 notes • Fixed boundaries • MIDI Channel/Zone assignment • Footswitch controllable • Floating split point

POCKET SPLIT is an 8-zone keyboard splitter. Each zone has its own MIDI Channel, and has a range of 1 to 127 keys wide. Zone boundaries can be set for hard or soft (overlap or splits). Use POCKET SPLIT to maximise the performance of your master keyboard, or create interesting performance possibilities with your guitar controller. An added feature is an 'intelligent' 2-way floating split that automatically tracks the keyboard player's left and right hands. Now any MIDI device can have the features of a sophisticated MIDI controller at a fraction of the cost!

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POCKET TRANSPOSE

• In-line 16 Channel transposer • +/- 5 Octave transpose range • Switch between normal and transposed modes • Separate intervals for each channel • Transpose key signature and octave simultaneously • All non-transposed MIDI data is passed • Harmonisation mode • Footswitch controllable.

POCKET TRANSPOSE is a performance-orientated transposer that supports separate transpose intervals for each MIDI channel. Although many keyboards have a transpose function, it's usually too cumbersome for live use. POCKET TRANSPOSE makes transposing easy. Intervals can be set while playing, and the user can select the normal or the transposed setting from a footswitch. Guitar synth players can use the POCKET TRANSPOSE to set intervals on 6 separate MIDI channels, or use it to transpose all strings by a certain amount. POCKET TRANSPOSE provides an easy way to try different arrangements without altering sequencer data. You can even set it so that the drum machine channel remains intact.

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POCKET CHANNEL

• Remaps Receive channel • Remaps Transmit channel • Sends multiple MIDI channels • Velocity-switch mode • Footswitch controllable

POCKET CHANNEL takes data from any MIDI channel and remaps it on to one, several, or all 16 MIDI channels. Up to 16 different channel assignments are possible. A unique velocity-switch feature allows automatic switching between two different sound modules depending on the key velocity. Use POCKET CHANNEL to organise channel assignments for a multitimbral sound module, or send a controller's output to two or more MIDI channels. With POCKET CHANNEL, for example, two drum machines or two samplers can share the same note assignments and be set to two separate MIDI channels.

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POCKET THRU

• 1-In, 3-Out MIDI Thru box • High-speed CMOS design • Very low power requirements • Buffered outputs clean up data • Handles all MIDI data • Stackable for more outputs

POCKET THRU is an essential building block for any MIDI setup and an excellent companion product for all Pocket Products. POCKET THRU provides 3 buffered outputs from a single MIDI input. Use POCKET THRU to minimise MIDI delays, or expand the outputs of a POCKET MERGE unit. POCKET THRU also allows POCKET FILTER to be placed anywhere in the MIDI chain, when using it to channelise older synths. Up to 4 POCKET THRUs can be combined to provide a total of 9 outputs.

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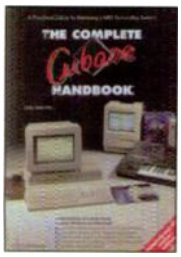

by Udo Wegers

After a short break, the definitive Steinberg Cubase Hanbook is back in print. This *new edition* is once again filled with real world applications and down to earth explanations of how to use all the powerful features offered by Cubase in all its many forms. *The book is now relevant to all three platforms (Atari, Mac and PC)*, and the main attraction of the revised text is its focus on Cubase Score. The Complete Cubase Handbook is a not-to-be-missed purchase for users of Steinberg's highly popular software.

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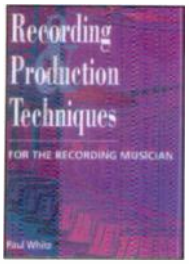

by Paul White.

This highly informative book by SOS's own Editor demystifies the techniques used by professionals in the recording of contemporary music.

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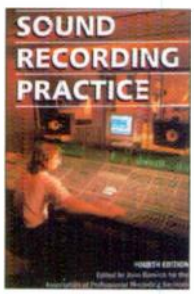

by John Borwick

This now classic text reaches its Fourth Edition, and has been *enlarged and revised* to cover up to date developments in the recording industry. The contents of this 600+ page is too diverse to summarise in such a short space. Suffice to say that every serious recordist, whether amateur, semi-pro or professional should have a copy of this book.

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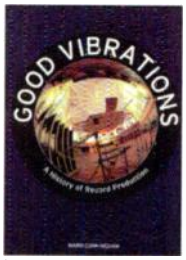

by Mark Cunningham

Good Vibrations — A History of Record Production features a foreward by BRIT award-winning Best Producer of 1996, Brian Eno. The book chronicles the development of recording techniques and music technology, from the invention of sound-on-sound (multitrack) tape recording in 1949, to the current dramatic advances in digital technology. Also highlights the changing role of the producer and engineer, with quotes from George Martin, Brian Wilson, Tony Visconti, Trevor Horn, Hugh Padgham and Pete Waterman. Recordings discussed in detail include The Beach Boys' *Pet Sounds*, The Beatles' *Sgt Pepper's Lonely Hearts Club Band*, Pink Floyd's *Dark Side Of The Moon*, Queen's *Bohemian Rhapsody*, David Bowie's *Heroes*, and U2's *Zooropa*. Includes around 100 photos and illustrations, many previously unseen, plus extensive reference section.

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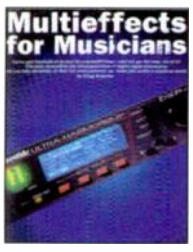

by Craig Anderton

Occasional SOS contributor Craig Anderton adds to his long list of music technology-based books with this comprehensive look at multi-effects units. The book helps you with what to look for when buying a new unit, how to use it when you've got it home, and provides a collection of tips to help you get the most out of your device. 137 Pages.

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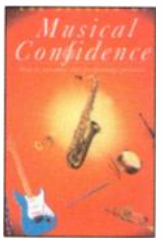

By Andrew Evans

Written by a musician and psychologist, this is claimed to be a first for musicians: a book aimed at maximising performance potential and increasing confidence. A series of questionnaires and exercises allow you to analyse your abilities and needs and allow you to deal with stress, creativity and career management, amongst other topics.

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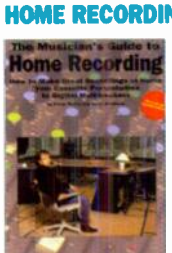

by Peter Mclan & Larry Wichman

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This is the book every serious songwriter, musician, and home recordist needs, with a new chapter on MIDI and the lastest digital recording technologies. A problem-solving guide as well as an instructional text, it is designed to expain in simple terms how professional recording techniques can be applied at home.

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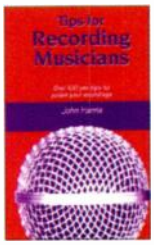

by John Harris

Today's studio equipment is affordable but sophisticated, and it takes a lot of know-how to use all this technology effectively. This book details the equipment you need - mics, effects, tape machines, etc. It has separate sections on recording of vocals, electric guitar, drums and acoustic instruments, as well as the use of MIDI in the recording process. You will learn how to get the best from delay and reverb, as well as effects like compression and gating. There are some useful tips on using the mixing desk and post production work. All in all it's a handy guide that will improve your recording techniques at a stroke.

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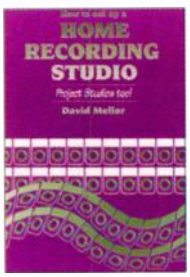

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If you are thinking of setting up a home studio, a project studio or a DJ studio, this book is the place to start. It takes a highly practical 'nuts and bolts' type of aproach to help you produce an efficient and productive studio. It covers soundproofing, keeping the sound in and the noise out, acoustics, studio layout, and studio equipment, and advice on the kit you are likely to need. The book ends with an invaluable questions and answers section, a glossary of terms and a list of contacts.

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WHAT'S A SAMPLER?

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SUCCESSFUL LYRIC WRITING

by Sheila Davis

Superb guide to the art of writing words to music. Learn how to create a memorable song title, choose the best music form for each idea, apply writing principles and avoid common pitfalls, write with both sides of your brain, find your voice. Includes songwriter's bibliography and lists over 60 songwriting organisations to help you connect with your chosen marketplace.

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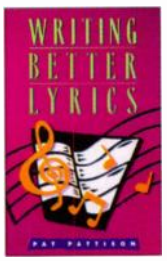

by Pat Pattison

In-depth approach to lyric writing examines 17 songs to discover what makes them so effective. Learn a warm-up exercise that will revolutionise your songwriting imagery, how to use a rhyming dictionary to unlock fresh, unexpected rhymes, avoid cliches and create imaginative metaphors and similes.

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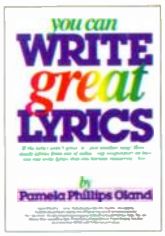

by Pamela Phillips Oland

This book helps you develop your own philosophy and style. Its plentiful techniques, combined with practical advice and exercises, will have you writing great lyrics before you know it!

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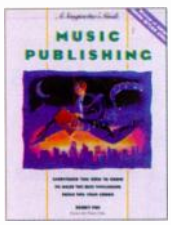
MUSIC PUBLISHING



by Randy Poe

This book demystifies music publishing, explaining what it's all about and what it means to a songwriter. Learn what your publishing options are, from a single song contract to a staff writer to a self-publishing operation. By the time you have finished this book you will never make an uninformed decision about publishing your songs that you will later regret.

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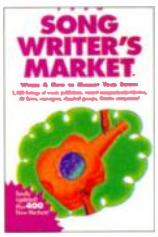
SONGWRITERS MARKET 1997



To get your songs published and produced, you must know who the music industry's players are and how to approach them. This directory identifies those seeking the work of songwriters. Lists 2500 lyric and music markets, clubs, associations, contests, workshops and songwriters publications. Includes 'The A & R Roundtable', where pros discuss their role in a songwriter's career, business side of songwriting, music industry trend report, and interviews with music industry professionals.

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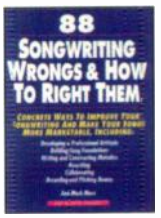

by Pat & Pete Luboff

This is a real workbook for songwriters, dealing with both the craft and art of songwriting. Song structure, rewriting, matching lyrics to music, collaboration, making the right demo, pitching the final result, and business matters.

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CAN YOU SING A HIGH "C" WITHOUT STRAINING

by Thomas Appell

This book features extensive coverage of the vocal cords and explains clearly how to sing high notes without going into falsetto, and without straining. You'll learn how to extend the range of your voice, and why most singers either strain or "break" into falsetto when attempting to sing above their normal range. It comes with 2 CD's jam-packed with over 2 hours of vocal examples and exercises that you can practice with. Many singers have increased their range by several notes after the first week of practice. If you can't sing high notes without straining, but would like to know how, then this book is for you. 122 pages.

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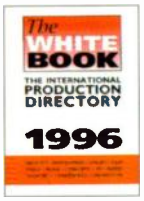

This is the latest edition of the essential source of contacts for artists, performers, venues, services and facilities associated with music, concerts, shows, festivals, film, TV, video, conferences, exhibitions and corporate hospitality - there's even a comprehensive international section. The layout is logical and an index makes fact finding an easy task - altogether an indispensable 864 pages. The new edition once again comes with a complementary copy of The Little White Book, which distils the contents of the larger volume to a pocket-sized list of names and phone numbers.

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SONGWRITER'S WORKSHOP

Edited by Harvey Rachlin

If you want to work systematically at improving your songwriting skills, then try this book: it's divided into four individual 'lessons', each of which is backed up by audio material on cassette. This allows you to listen in the car or walk around with your personal stereo and still absorb useful information. The four sections are: On Songwriting by Janis Ian (yes, *the* Janis Ian); Making Demos by John Barilla; Understanding MIDI by James Becher; and The Art of Pitching Songs by Teri Muench (ex-A&R director with RCA and publisher). Also included is an intro, a quick and breezy glossary and an index. Includes two cassettes.

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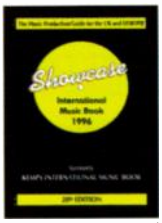

The music industry equivalent of *Yellow Pages*! over 500 pages crammed with all the latest information, including new phone and fax codes for record companies, recording studios, music publishers, equipment manufacturers, artist management, producers, PA and lighting hire, and more. Plus a USA section.

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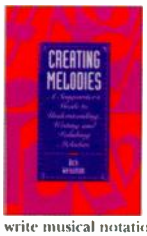

by Dick Weissman

Learn how to create memorable melodies, from love ballads to film scores and jingles. Using lots of examples of popular songs and styles by top-name musicians, Weissman covers the full range of melody writing. Learn how to marry music to lyrics, relate rhythm to the message of your song, read and write musical notation, write instrumentals for films, TV, commercials and theatre, and put together a demo tape.

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THE SONGWRITER'S GUIDE TO COLLABORATION

by Walter Carter

This book describes what to expect when entering into a co-writing situation and how to make the arrangement work. Covers the pros and cons, how to find a partner, publishing your songs, who writes what, money matters, sharing success and rejection, growing together or apart plus co-producing and pitching.

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NETWORKING IN THE MUSIC BUSINESS

by Dan Kimpel

Think of this book as a popular psychology course for musicians. If you feel you could benefit from developing a positive attitude to getting ahead in your area of the music business, then *Networking* is for you. There's nothing like it for good, sensible advice: it's often not enough to have talent. To be successful, you'll need to persevere, have good "people skills", and exercise good networking skills. Success depends on what you know, who you know, and perhaps most importantly, who knows you. An essential book, and a snip at £11.95. Hardback.

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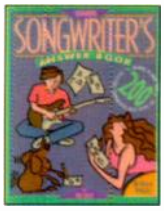
BEGINNING SONGWRITER'S ANSWER BOOK

by Paul Zollo



If you're just starting out as a songwriter or haven't progressed very far, perhaps you have questions about the art and business of songwriting that you can't find answers for. Chances are, they're covered in this book. Over 200 of the questions songwriters most often ask are answered in this book. There are 11 chapters, covering subjects such as lyrics, theory, song structure, collaboration, demos, publishing and the music business. Some answers - such as "What makes a professional-sounding demo?" are actually mini-articles - and an index allows you to target subjects without wading through the text. A friendly, informative read.

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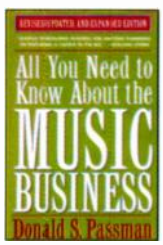
ALL YOU NEED TO KNOW ABOUT THE MUSIC BUSINESS



by Donald S Passman

This book is a must: the author manages a portfolio of high profile clients and teaches music business law at the University of Southern California, and has produced a clear overview of the music business. He starts at the beginning of your career, with advice on choosing a manager, lawyer and agent, and moves through getting a record deal, songwriting and music publishing and finishes with details of copyright, mechanical royalties, songwriter deals, films and more. An exhaustive and entertaining read. 415 Pages.

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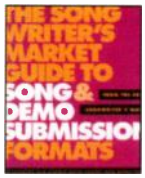
THE SONGWRITER'S MARKET GUIDE TO SONG & DEMO SUBMISSION FORMATS



From the Editors of Songwriter's Market

If you've got the songs and you've got the contacts, this book will help you to choose a format that will get your demo heard as well as overall packaging and presentation and dealing professionally with publishers, A&R reps and other industry people. Plenty of example documents (lyric sheets and letters) are given, and the book is nicely rounded off with a glossary and index. Hardback.

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THE MUSICIAN'S GUIDE TO READING & WRITING MUSIC

It's an entertaining but practical introduction, well, to reading and writing music. This is as friendly as it comes. Learning to read and write music isn't easy, but at least the process is lightened up with considerable doses of wit.

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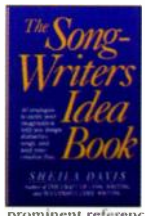
SONGWRITERS IDEA BOOK



by Sheila Davis

If you want a textbook, this is it: 250 pages of serious, intelligent insight into songwriting. Loads of good advice and a friendly tone make this a useful read to anyone, whether beginner or seasoned pro. The focus is firmly on lyrics rather than music, and the prominent references to poetry terminology shouldn't really be a surprise. Use Davis' 40 strategies and you to could soon be "designing distinctive songs". Hardback.

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SINGING FOR A LIVING

by Marta Woodhull

The title says it all. If you're already a singer, this book gives you everything you need to know in order to exploit your talent further: looking after your voice and voice exercises, business advice and marketing and audience interaction are all covered in this straightforward book.

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MIDI INFORMATION

MUSIC TECHNOLOGY REFERENCE BOOK

by Peter Buick & Vic Lennard

Written by Peter Buick and Vic Lennard (author of SOS's Atari Notes column), this book offers information at your fingertips and is an indispensable reference source for the musician or sound professional in the recording, broadcast, live, video, computer, multimedia, post production and theatre industries. It includes comprehensive MIDI spec, General MIDI, MTC, MSC, and SysEx information. It also includes charts, check lists, useful hints, tips, and ideas, plus a glossary, list of contacts and a comprehensive indexed, it is also organised into convenient sections. 150 Pages.

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PRACTICAL MIDI HANDBOOK (3rd Edition)

by R A Penfold

This book is completely updated, and features a section on General MIDI. It provides a "straightforward, non-mathematical introduction to MIDI", and features a full glossary of MIDI terms.

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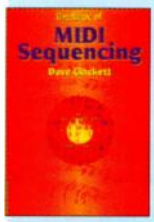

by Dave Clackett

Hands On MIDI Software's Dave Clackett has boiled his knowledge into a collection of tips for getting the best out of hardware or software sequencers. Dave covers the hardware and software you need to get sequencing, and introduces the basics of sequencing and notation, with particular emphasis placed on using General MIDI/GX/XG sound sources. Recommended.

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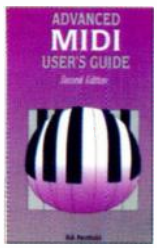

by R A Penfold

Most MIDI users do no more than scratch the surface of MIDI's potentialities. But dare to dig a bit deeper and you'll find a whole new world of creative possibilities.

With the Advanced MIDI User's Guide, you'll learn how to optimise your MIDI system to get the best results from your particular setup, and you'll find out how to use gadgets like switchers and mergers to enhance your system. If you want to incorporate a multitrack tape recorder into your MIDI system there's a section on synchronisers, SMPTE and MIDI time code, and retro freaks will learn how to hook up that dusty old analogue synth to their MIDI systems.

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MAKING THE MOST OF MIDI

By Paul Overaa

This is a MIDI book unlike any other. It explains the fundamentals of MIDI and MIDI sequencing for the beginner, and it goes much further, dealing with issues that will be of help to more established users. Advice on MIDI fault finding, help for musicians using sequencers with live bands, MIDI messages and MIDI files, plus programming material. So if you are a keen first time user or a MIDI veteran, there will be something in this book to interest you.

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MIDI FOR THE PROFESSIONAL

by Paul D Lehrman and Tim Tully

Co-written by SOS contributor Paul D Lehrman, this substantial, exhaustive work covers pretty well any aspect of MIDI that you could think of. As an overview of what MIDI is and does in 1994, this 239 page book couldn't be better.

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MIDI SURVIVAL GUIDE

by Vic Lennard

Whether you're a beginner or a seasoned pro, the 'MIDI Survival Guide' shows you the way. No maths, no MIDI theory - just practical advice on starting up, setting up and ending up with a working MIDI system. Contains over 40 cabling diagrams, and how to: connect synths, sound modules, sequencers, drum machines and multitracks; how to budget and buy secondhand; using switch, thru and merger boxes; transfer songs between different sequencers, get the best out of general MIDI , and understand MIDI implementation charts.

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A BEGINNERS GUIDE TO MIDI

by RA Penfold

The title says it all: all aspects of MIDI are explained, and many common beginner's problems are discussed.

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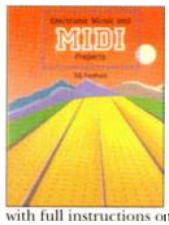

by RA Penfold

Want a MIDI THRU box, patchbay or switcher? Well they're all here. And you don't need a degree in electronics either. All the projects are explained in detail, with full instructions on assembly. So if you into MIDI and you want to expand your system without taking out a second mortgage, fear not. Here's the book to help you build up your MIDI system without laying out thousands on hardware.

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THE ARC MUSICIANS' DIRECTORY

The new Musicians' Directory from Arc Publishing aims to provide all things to all musicians: whatever your style of music, the comprehensive listings offer you the contacts you need, whether it's labels, studios, venues, music shops or management - and that just scratches the surface of the dozens of topics covered by the book. Apart from being a directory proper, the Handbook also includes a selection of useful articles, including subjects such as how to be a session player (by SOS's very own Paul White), music publishing, releasing your own record, copyright protection, accounting, legal advice and more. The Musicians' Directory offers over 380 information-packed pages for little more the price of a new CD.

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SYNTHESIZERS

KEYFAX 5

by Julian Colbeck

The latest instalment in the intrepid Keyfax series offers potted specifications and concise mini-overviews of digital pianos, home keyboards, General MIDI modules, stage organs and computer sound cards. Look out for company backgrounders, contact details and cross-references to earlier Keyfaxes.

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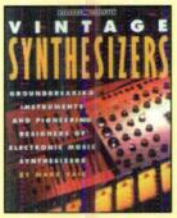

By Mark Vail

This well-illustrated, 300 page book covers synth history, interviews with designers and overviews of important instruments. Mark Vail's book could be the most entertaining and useful synth book yet – check out the definitive history of the Minimoog, complete with pre-production designers' sketches. While not strictly a buyers' guide, there is a comprehensive section to sourcing, valuing, upgrading and servicing classic instruments.

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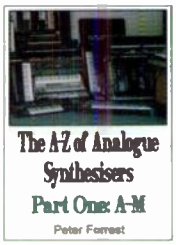
THE A-Z OF ANALOGUE SYNTHS PART ONE: A-M



by Peter Forrest

The author has aimed to make his book a complete rundown of all the major analogue synths and keyboards ever made, and on the evidence of this first volume, he seems to have succeeded. The book is useful and detailed, and shows evidence of the massive amount of research and effort put in by Peter. He gives pocket company histories and detailed data on the instruments produced - but note that a few entries for a few particularly obscure instruments and companies are limited due to lack of data. The book also provides a comprehensive overview of the qualities of various instruments; charts and tables assess second hand values and maintenance levels necessary to keep a given instrument playable as well as such intangibles as sound quality, collectability and user interface. The A-Z of Analogue Part One, which is limited to 8000 copies worldwide, also features 96 colour pictures of classic instruments.

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KEYFAX 2

by Julian Colbeck

1989 version of Keyfax provides individual summaries and specifications of the last of the great mono synths, digital pianos, and classic polysynths like the Roland JX10 and Prophet VS -forerunner of the SY22 and Wave Station. Early Keyboard and rack-mount samplers are covered in this indispensable guide. Still a great buy.

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THE MUSEUM OF SYNTHESIZER TECHNOLOGY

by Martin J Newcomb

If you liked our feature on the opening of the Museum of Synthesizer Technology in October, but haven't got the time or the cash to visit in person, then the next best thing has to be the museum's guide book. This 118 book is printed on glossy paper and contains full-colour pictures of a large selection of exhibits from the museum, together with some descriptive text and company backgrounders. The text reads a little like a fanzine, but the hardcore synth fanatic will want this book for the pictures. In these pages you will glimpse instruments that you are unlikely ever to experience in the flesh: an exceedingly large Roland System 100 modular set-up, an EMS Synthi 100, an ARP 2500, a large Emu modular and what must be the comprehensive collection of Moog equipment anywhere.

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DRUM MACHINES

DRUM PROGRAMMING — A Complete Guide to Program and Think Like a Drummer

By Ray F Badness

Coming from a publisher that has a good range of real drum texts, we'd expect this book to be a little different. And it is: it gives plenty of insights into how real drummers approach their job, and there are plenty of example patterns to help translate these ideas to a drum machine.

CODE B235 **£6.95**

Postage: UK £1.50, Europe £4.95, R.O.W. £7.50

DRUM MACHINE RHYTHM DICTIONARY

By Sandy Feldstein

For use with Roland drum machines or any grid-based pattern system. First 75 pages on programming huge range of rhythms in rock, latin, jazz and funk styles. Remainder analyses styles and patterns of world's top drummers - Phil Collins, Billy Cobham, Steve Gadd, Stewart Copeland, etc. Highly recommended.

CODE B110 **£16.95**

Postage: UK £1.95, Europe £5.50, R.O.W. £8.50

RHYTHMICAL GROOVES & PATTERNS

By Siegfried Hoffman

Looks at how drummers compose rhythm patterns to add emotion, swing or groove. Contains examples for you to programme into your drum machine or sequencer.

CODE B115 **£11.50**

Postage: UK £1.95, Europe £5.50, R.O.W. £8.50

260 DRUM MACHINE PATTERNS

By Rene-Pierre Bardet

Even more drum pattern styles (paso doble, charleston, etc)

CODE B019 **£7.95**

Postage: UK £1.95, Europe £4.95, R.O.W. £7.50

DRUM MACHINE PATTERNS

By Rene-Pierre Bardet

200 drum patterns and breaks presented in one-measure grid notation. Funk, R'n'B, ballad, pop, reggae, afro-cuban and many other styles.

CODE B018 **£7.95**

Postage: UK £1.95, Europe £4.95, R.O.W. £7.50

PLAYING TECHNIQUES

SOLID GROOVES

By Dieter Peterrit & Herb Quick

128 pages dealing with both bass and drums, the 'heart' of the pop group, together. Although written primarily for drummers and bass players, anyone interested in understanding rhythmical music in popular styles will find this book invaluable.

CODE B172 **£11.50**

Postage: UK £1.95, Europe £4.95, R.O.W. £7.50

1000 KEYBOARD TIPS

by J Dreksler & Q Harle

The hi-tech musician's guide to the basics of music, scales, chords and harmonies. 256 pages covering chord relationships, improvisation, suggested drum machine patterns, plus comprehensive chord table. Too good to miss!

CODE B113 **£13.95**

Postage: UK £2.50, Europe £6.95, R.O.W. £9.50

CLASSICS IN SEQUENCE

by William Lloyd & Paul Terry

Takes concepts behind Music In Sequence and applies them to all-time favourite classical music scores. Authors show how to make fresh, exciting interpretations of classic scores. Info on reverb and effects, interpreting scores, editing synth voices. Highly creative—an ideal workbook for the music classroom. Covers Medieval, Renaissance dance music, Bach's Toccata in D minor; Vivaldi, Purcell, Handel; opera excerpts from Rossini, Verdi, Borodin; Mozart, Schubert, Tchaikovsky, music from Carmina Burana; Debussy, Satie, Steve Reich's Piano Phase and more. Highly recommended.

CODE B193 **£12.95**

Postage: UK £2.50, Europe £5.50, R.O.W. £8.50

ROCK IN SEQUENCE

by William Lloyd & Paul Terry

The latest book from the authors of Music In Sequence and Classics In Sequence is now available: Rock In Sequence offers detailed scores of 17 rock and pop hits from the '50s to the present day, alongside a collection of helpful sequencing tips. Songs are included from the likes of Eurythmics, Blur, The Beatles, Led Zeppelin, Abba and others. 112 pages.

CODE B320 **£14.95**

Postage: UK £2.50, Europe £5.50, R.O.W. £8.50

MUSIC IN SEQUENCE

by William Lloyd & Paul Terry

Still one of our best-selling books. Easy to follow, practical guide to making real use of your sequencer, written by people who really understand music and how to create it using today's technology. This brilliant, unique book carries the SOS seal of approval.

CODE B155 **£12.95**

Postage: UK £2.50, Europe £5.50, R.O.W. £8.50

COMPUTERS & MUSIC

MUSICAL APPLICATIONS OF THE ATARI ST's

By R A Penfold

Includes a general introduction to MIDI, a handful of MIDI add-on circuits (Thru box, MIDI switcher and so on), plus a collection of programs, in Fast BASIC, that allows you to use the ST's internal sound generator and create little MIDI applications.

CODE B280 **£5.95**

Postage: UK £1.50, Europe £4.95, R.O.W. £7.50

MULTIMEDIA ON THE PC

By Ian R Sinclair

If you want to know what multimedia is and what it can offer you, then this is the book for you. Much of the information is general enough for everybody, but as the title suggests, the book is aimed at PC users. The book explains the installation and use of a CD ROM drive and a sound card and covers all key concepts behind multimedia. As an added incentive, if you buy this book, you can send away for a free copy of *Picturebook*, a multimedia authoring package.

CODE B272 **£11.95**

Postage: UK £1.95, Europe £4.95, R.O.W. £7.50

THE COMPLETE SOUND BLASTER

by Howard Massey

Explains in simple, non-technical terms: how to install the Sound Blaster hardware and software for use in both the DOS and Windows environments, the two sound processes used by the card, MIDI, the Sound Blaster's MIDI capabilites, and the many different applications for the Sound Blaster, including the various software utilities provided with the card, and many of the third party support products that enhance its operation.

CODE B313 **£10.95**

Postage: UK £1.95, Europe £5.50, R.O.W. £8.50

SEQUENCER SECRETS

by Ian Waugh

Ian's book aims to "go beyond the manual" in telling you how to get the best from your sequencer. The book features 29 hands-on sequencing projects and is suitable for use with all software sequencers. The book hopes to help you optimise your MIDI system and use your sequencer to create all sorts of useful effects. A troubleshooting section helps you track down stuck notes, double notes and so on.

CODE B299 **£6.95**

Postage: UK £1.50, Europe £4.50, R.O.W. £6.50

PC MUSIC HANDBOOK 2nd Edition

by Brian Heywood & Roger Evan

This book will show you how to turn your PC into a creative music making machine. It explains how you can create very sophisticated music on your PC by running sequencing software, how to create your own sounds with a soundcard, how to use your PC as a sound librarian, or a sample editor, or even use it as a hard disk recorder or a sound sampler. All these things are possible with today's sophisticated PC.

The use of sound in multimedia applications is also covered, and there is a chapter on PC hardware with advice on which type of PC is best for your particular needs.

There's advice too on getting connected to the Internet, where you can contact other PC music aficionados world wide!

CODE B332 **£10.95**

Postage: UK £1.95, Europe £5.50, R.O.W. £8.50

COMPUTERS AND MUSIC

By R A Penfold

2nd edition. Covers hardware and software applications. Excellent glossary of jargon, and now bang up to date.

CODE B098 **£8.95**

Postage: UK £1.50, Europe £4.95, R.O.W. £7.50

LIVE SOUND

PUBLIC ADDRESS LOUDSPEAKER SYSTEMS

by V Capel

All aspects of PA speaker systems are covered in this book, including low-impedence matching, 100V systems, transmission lines and how to install inductive hearing aid loops. At the heart of the book is the Line-Source Ceiling Array, a system that is claimed to improve clarity, even coverage and reduce feedback. Full step-by-step construction and installation details are given.

CODE B283 **£3.95**

Postage: UK £1.50, Europe £5.50, R.O.W. £8.50

SOUND REINFORCEMENT HANDBOOK

by Gary Davis and Ralph Jones

From recording to broadcast, fixed installations to touring, this 400 page reference covers live sound setups, equipment, techniques and jargon.

CODE B105 **£27.95**

Postage: UK £3.95, Europe £7.50, R.O.W. £14.50

LOUDSPEAKERS FOR MUSICIANS

CODE B284 **£3.95**

Postage: UK £1.50, Europe £3.95, R.O.W. £4.50

INTRO TO LOUDSPEAKER& ENCLOSURE DESIGN

by V Capel

The book provides both useful background to speakers and enclosures in general, plus practical information on crossovers and full details on constructing the so-called 'Kapellmeister' design of speakers.

CODE B281 **£2.95**

Postage: UK £1.50, Europe £6.95, R.O.W. £9.50

LIVE SOUND MIXING

by Duncan R Fry

This is a hands on, friendly introduction to all aspects of mixing live. It hails from Australia, and is an SOS Bookshop exclusive. The author is an experienced live sound engineer and has packed his book with loads of information, diagrams and hints to take you from basic principles through to trouble shooting when things go wrong.

CODE B256 **£19.95**

Postage: UK £1.95, Europe £5.50, R.O.W. £8.50

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SOS Videos

EMAGIC NOTATOR VIDEO TRAINING MANUAL

This video manual is detailed and helpful, and is presented in a most friendly and approachable manner by session musician Tim Walter, whose tone throughout the video encourages and inspires confidence. If you are new to Notator and are still in awe of its power, this is the video to bring you down to earth. An introduction and 28 tutorials take the user from the absolute basics - including plugging in the dongle - to working with Unitor and SMPTE, and synchronising to video. As well as actual recording of MIDI data and sequencing, comprehensive coverage is given to using the score layout and printing facilities that are so much a part of Notator. Topics covered include; sequencing page, score editing, lyrics and text, graphic arranger mode, hyper edit, the printer page, using the part box.

CODE V012 **ONLY £19.99**

Running time: 2 hours 20 minutes Format:VHS(PAL)
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

WINDOWS 95: WHAT WILL YOU LEARN TODAY?

CODE V065 **£19.99**

Running time: 74 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

MACKIE ULTRA MIX VIDEO GUIDE

CODE V066 **£9.99**

Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

ROLAND GR09

Presented by Roland UK product demonstrator Nick Cooper, this application-based tutorial video for the Roland GR09, produced in association with Roland USA, covers every function completely. Covered topics include; the GK2A Synthesiser Driver, pickup sensitivity, use of the tuner, what a patch consists of, use of the pedals, patch edit 1 & 2 (including layering and detune, chromatic function, reverb & chorus, edit target, pitch shift), the use of external midi devices, saving to an external sequencer & more.

CODE V061 **£19.99**

Running Time 57 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

ROLAND JV-1080 VIDEO MANUAL

Roland's amazing JV-1080 synthesizer module is covered in detail in this informative video. Presented by Tim Walter the video the video guides you through the basics, and leads you painlessly onto the advanced features. The video even shows you how to fit the expansion boards & gives demonstrations of some of the wonderful sounds they contain. Once again this video has been produced in association with Roland UK & USA to ensure that everything it contains is accurate, and relevant to the new and more experienced users alike.

CODE V046 **£19.99**

Running time: 80 minutes Format: VHS (PAL)
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

HOW TO GET A RECORD DEAL

The facts you need from the people who know. How To Get A Record Deal contains vital information and insight that you will not find anywhere else, from artists and executives who have made it and know what it takes.

On this video music industry pros give you the straight facts on how to break into this extremely competitive business. Because sometimes the difference between success and failure is information.

Presented by the National Academy Of Songwriters

CODE V003 **£14.95**

Running time: 1 hour 7 minutes
Format: VHS (PAL)
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

ROLAND TDE-7K DRUM SYSTEM

CODE V045 **£19.99**

Running time 65 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

STEINBERG CUBASE

This manual is presented by Chris West, Steinberg expert. It's very much a practical, 'get up and running' video, showing the novice user exactly how to install and begin using Cubase, whether they're running the program on an ST, Mac or PC computer — there's even a basic background on using the computers themselves! All of Cubase's controls are shown, explained and demonstrated in depth. Once you're familiar with the basic controls, Chris takes you slowly through recording your first session, followed by overviews of the various edit screens. It's rather like having an expert tutorial that you can run again and again in the comfort of your home, until you can use Cubase like a true pro. Topics covered include; the main screen, customising names and outputs, copying and pasting between arrangements, MIDI filter, cycle mode recording, the tool box, all edit screens.

CODE V011 **£29.99**

Run time: 1hour 30 minutes Format: VHS (PAL)
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

ROLAND MS-1 VIDEO MANUAL

CODE V047 **£24.99**

Running time: 50 minutes (approx)
Format: VHS (PAL)
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

BOSS DR-5 DRUM MACHINE

Presented by Nick Cooper (Roland UK Product Specialist) this video covers all the functions of the DR-5 in a clear and concise manner. Produced in association with Roland UK & USA. By using the information gathered from Roland 'helplines', particular attention has been paid to the areas that many users find most difficulty in. This makes it of interest to beginners and experienced users alike. Nick imparts the information with ease and a professional manner, making it enjoyable and entertaining.

CODE V043 **£19.99**

Running time 57 minutes
Postage: UK £1.75 Europe £4.95, R.O.W. £6.95

ROLAND XP-50

This XP-50 video owners manual is produced by Roland Corporation US and covers all the major features of the instrument in detail. This is an application based video that provides many examples of how your new found knowledge can be applied. Just a few of the 30 separate topic areas covered are: Effects, Choosing Sounds, Loading a Song, Loop Recording, Copying a Track to Pattern, Making an RPS Set, Track Editing, Multitrack Recording, Patch Editing, Creating Splits & Layers in a Patch.

CODE V063 **£24.99**

Running time: 63 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

ROLAND G800

Presented by Roland UK's product demonstrator Sara Reybould, this video covers every essential feature and function of the Roland G800. Sara provides the user with a wealth of knowledge on this sophisticated instrument, with recourse to many practical examples and close-up shots of the LCD screen. The video was produced in association with Roland USA and Roland UK to ensure that the content is accurate and informative.

CODE V060 **£19.99**

Running Time 92 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

YAMAHA PSR6000 KEYBOARD VIDEO MANUAL

Yamaha's PSR6000 is a home keyboard with a difference, and offers many professional features plus excellent sound quality. Tim Walter starts at the beginning and makes the instrument look easy and fun. His enthusiasm is catching, and, yes, the PSR6000 is a very capable instrument. The tape runs to 75 minutes, which makes for excellent value.

CODE V029 **£19.99**

Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

ROLAND GR-1 GUITAR SYNTH

CODE V014 **ONLY £29.99**
FOR 2 VIDEOS

Total Running time: 4 hours. Format: VHS (PAL)
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

BOSS ME-8

Nick Cooper (Roland UK product demonstrator) explains every single feature and function of the ME-8 in detail. The unit is clearly explained in a logical sequence with examples given of how the functions effect the available sounds, a perfect aid to new users of the ME-8 and those who would like to get that little bit more from it. Just some of the main points covered are: What is a Patch?, Selecting a Patch, Copying a Patch, Edit Mode, Using The Effects, Control Effects, The Tempo Function, Manual Mode, and lots more.

CODE V064 **£19.99**

Running time: 72minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

JUST ARRIVED!

MACKIE 8•BUS VIDEO MANUAL

NEW

Almost 60 minutes of fun-packed, detailed explanation of the various features of Mackie's popular range of 8 buss mixing consoles (16•8, 24•8, 32•8, 24•E) and how best to utilise them. Onscreen numbers allow quick searching to desired topics.

CODE V068 **£9.95**

Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

KORG AX30G TONEWORKS VIDEO MANUAL

ORDER CODE V028 **£19.99**

Postage: U K £1.75, Europe £4.95, R.O.W.£6.95

ROLAND GP100

CODE V062 **£19.99**

Running Time 45 Minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

EVERYTHING YOU WANTED TO KNOW ABOUT PCs BUT WERE AFRAID TO ASK!

CODE V048 **£19.99**

Running time 91 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

KORG PROPHECY VIDEO MANUAL

Written by Phil MacDonald

Korg's new Prophecy Synthesizer now has its own video manual!

The video covers all the major features over 6 sections, with lots of examples of the amazing effects that are available using the 'log' and 'mod' wheels. The video's visual interest is maintained by the extensive use of Chroma Key and multi camera effects. This is a video that is ideal for new owners, and those who want to know more about the Prophecy before they make a purchase.

CODE V049 **£14.99**

Running time: 36 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

HOW TO GET THE MOST OUT OF HOME RECORDING

3 TOP CLASS VIDEOS

A superbly presented set of videos which no home recordist should be without. Have you got your set yet?!

LEVEL ONE

This well presented video explains how to set up and operate a simple cassette-based multitrack home studio. It clarifies all the basic terminology and demonstrates the recording of a song from beginning to end, covering how to record guitars, keyboards, vocals and drum machines; which microphones to choose; how to patch in effects units and use them well; what makes a good arrangement; what makes a good mix; plus what to master on to and why.

Full of professional tips and clear examples, this superb video offers the musician with no recording experience a fast route to successful operation of a simple home studio.

CODE V005 **£24.95**

Running time: 1 hour 10 minutes
Format: VHS(PAL) HiFi Stereo
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

LEVEL TWO

This is, in our opinion, the *best ever* guide to the equipment and skills needed to produce high quality results from a home studio.

Full of clear examples and graphic information, the video majors on effects and how to use them well. It also covers the do's and don'ts of track bouncing; microphones and mic techniques for different applications; getting the most out of multi effects units; plus an analysis of guitar effects with top session guitarist Milton MacDonald and an enlightening interview with ace producer Alan Parsons.

Writer/ presenter Julian Colbeck packs the programme with professional tips, allowing musicians of all kinds to get the most out of their home studio.

CODE V006 **£24.95**

Running time: 1 hour 45 minutes
Format: VHS(PAL) HiFi Stereo
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

LEVEL THREE

This video is packed with information and professional tips on advanced MIDI applications in the home studio, including interfacing with sequencers, which sync code is best for which application and why. Hit producer Martyn Phillips (Erasure, London Beat) discusses modern recording techniques, and top programmer Paul Wiffen examines the opportunities and benefits offered by hard disk recording. It offers practical advice on sampling - how to save time and tracks; plus professional tips on advanced arranging and mixing techniques, including spectrum mixing.

CODE V007 **£24.95**

Running time: 1 hour 30 minutes
Format: VHS(PAL) HiFi Stereo
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

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OVERNIGHT DELIVERY OPTION: ONLY £5.00! See Order Form for details

KORG X5 SYNTH

Korg's new X5 synthesizer, reviewed in SOS' January 1995 issue, now has its own video manual. Presented by Tim Walter in an entertaining and lighthearted manner, and explains all basic aspects of Korg's highly affordable instrument in very clear terms. If you're in any way daunted by your new purchase, or want to get a feel for the instument before laying out your cash, this is the video for you.

CODE V027 **£19.99**

Running time 55 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

PLAY BLUES NOW!

A complete guide to blues guitar playing that shows a variety of blues rhythm and soloing styles — for both beginners and advanced players alike.

Learn the blues style of Eric Clapton, Stevie Ray Vaughan, Peter Green, etc. The programme not only covers the usual blues shuffles and scales but using 4 complete songs, gives you the resourses and techniques to create professional blues parts and solos in a wide variety of blues styles.

CODE V051 **£12.99**

Running time approx 50 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

ROLAND JV-90 SYNTH

Roland's JV-90 synthesizer gets the treatment in this informative Labyrinth production. Virtually every facet of the JV-90 is covered, from the basic functions to more advanced programming. Chris Allen guides you through the powerful features this instrument has to offer. Produced in association with Roland UK & USA to ensure that everything it contains is accurate, and relevant to new and more experienced users alike.

CODE V044 **£19.99**

Running time 70 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

THE EMAGIC LOGIC TUTORIAL VIDEO VOLUME 1

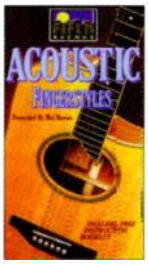
Produced by Emagic themselves, this video once again sees Tim Walter (featured on the excellent Notator video) in the tutor's chair. There are plans for a series of videos which become ever more detailed and informative, but for now Volume 1 takes you through the first steps of getting the software up and running, and covers virtually all the controls you'll need. *This video is valid for all versions of Logic, whether being run on an ST, Mac or PC.* Presentation is rather intriguing, with a mobile camera that helps to hold the interest more than the average training video and some interesting graphics that aid comprehension and help to quickly find specific tutorials and bits inside tutorials. Contents as follows:

- Tutorial 1: The Arrange window and basic seqnencing
- Tutorial 2: Playback parameters & Toolbox
- Tutorial 3: Controlling MIDI data flow
- Tutorial 4: Manipulating sequence data
- Tutorial 5: Moving around in Logic
- Tutorial 6: Windows and key commands
- Tutorial 7: More sequencing
- Tutorial 8: Score
- Tutorial 9: Looking at the Event List
- Tutorial 10: Editing the Event List
- Tutorial 11: Using the Environment
- Tutorial 12: The best of the rest (HyperEdit, Matrix Editor, Cycle Mode and more).

CODE V023 **£29.99**

Total running time 70 minutes Format: VHS (PAL)
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

ACOUSTIC FINGERSTYLES



Presented by Mel Reeves

In this video there are 5 major instrumental studies to work through including country, classical and blues. Each style is broken down into small sections allowing you to learn more quickly and efficiently. Each piece is demanding, but great fun to play. The final section looks at styles and techniques used by players such as R.E.M, The Eagles, Sheryl Crow and Paul Simon, and provides an insight into creating new and interesting fingerstyles of your own.

CODE V059 **12.99**

Running time approx 90 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

KORG X3

This video offers an easy way in to this powerful workstation. It starts from absolute basics, including audio connections and volume levels, and the clear and helpful script covers all basic facilities of the X3. The video features a sophisticated use of picture in picture, with the X3's display cut into the main image to show you clearly what Phil is actually doing, and main points are reinforced with on screen text and graphics. The main section headings are:

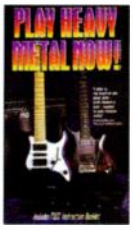
- *X3 Audio Connections*
- *Getting Around the X3*
- *Factory Disk*
- *Disk Drive Modes*
- *Selecting Sounds*
- *Global Modes*
- *Sequencer Mode*
- *Quick Sound Editing*
- *Playing MIDI Files on the X3*
- *Using the X3 with an external sequencer*

Note that these are loose headings, with each section also containing information on connected subjects in varying amounts of detail. A lot of ground is covered, and we can recommend the tape to any X3 owner.

CODE V018 **£19.99**

Running time: 55 minutes Format: VHS (PAL)
Postage: UK £1.75 Europe £4.95, R.O.W. £6.95

PLAY HEAVY METAL NOW!



A concise, easy to follow video guide to real heavy metal playing for guitarists of all levels.

A guide to hard rock/heavy metal techniques for guitarists of all levels. The programme covers RHYTHM, SOLOING, and TECHNIQUE. All of the techniques, solos, etc are clearly demonstrated

No need to read music. Free booklet contains tab, chord and scale diagrams.

CODE V052 **£12.99**

Running time approx 65 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

PLAY GUITAR NOW!

ACOUSTIC & ELECTRIC

An easy-to-follow video to take you from the basics to a full rock solo.

The programme covers TUNING, CHORDS, FINGERSTYLE, 12 BAR BLUES, BARRE CHORDS and ROCK SOLOING for both electric and acoustic guitars. Includes free chord/tab booklet.

It is not necessary to be able to read music to learn from this video.

CODE V053 **£12.99**

Running time approx 51 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

ACOUSTIC BLUES GUITAR

Presented by Mel Reeves

Whether you can already play fingerstyle guitar, or are simply familiar with basic chords, this programme will show you all of the necessary techniques to play great blues guitar. All of the technical aspects are explained in the clearest possible way before getting down to the real business of learning 5 real blues that are great to listen to and terrific to play.

CODE V058 **12.99**

Running time approx 63 minutes
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

ANALOGUE HEAVEN

Remember our feature on the opening day of the Museum of Synthesizer Technology which we ran back in October 1994? Wish you'd actually been able to attend?

Well, now you can have the next best thing: the museum has released a fascinating 50 minute promo video that features footage shot on the day as well as a lightning tour of the facility. The programme is hosted by SOS contributor Julian Colbeck. The tape opens with synth pioneer Bob Moog making the inaugural speech: and officially opening the museum, followed by a nostalgic run through one of his old modular systems. Analogue Heaven makes diverting viewing for anyone interested in vintage synths, represents good value, and offers the perfect companion to the Museum's guide book, also available from the SOS Bookshop.

CODE V026 **£12.95**

Running time: 50 minutes Format: VHS (PAL)
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

GETTING THE MOST OUT OF THE KORG M1

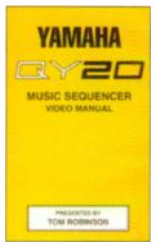
Written and presented by Julian Colbeck

The Korg M1 is a classic instrument. The range and quality of its sounds has made it one of the most successful synthesizers of all time. But because the M1 is so immediate, it's too easy just to scratch the surface, leaving many of its exciting capabilities undiscovered. This highly informative video enables M1 owners to unleash the full creative potential of this enormously powerful workstation. With plenty of musical examples, tips and inside information, the video offers clear, concise explanations of the instruments features and operating procedures, helping you to greatly expand your dexterity and creativity across he whole range of this world-beating instrument.

CODE V002 **£24.95**

Running time 1 hour 10 minutes Format: VHS (PAL)
Postage: UK £1.75, Europe £4.95, R.O.W. £6.95

YAMAHA QY20 MUSIC SEQUENCER VIDEO MANUAL



by Tom Robinson

Yamaha's popular QY20 portable sequencer/ sound source is a deceptively simple device to use; if you think you might like some insight into getting that little bit extra out of the device, then look no further. Produced in co-operation with Yamaha, the video features mobile musician Tom Robinson showing you how to get the best from this portable marvel. Tom, who has used the QY20 extensively as a writing tool on the road, says: "I never leave home without it".

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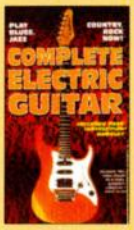

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Complete overview of Yamaha's new QY300 sequencer/sound source. Presented by Joe Ortiz of Heavenly Music, the video offers a hands-on tutorial on what is potentially a very powerful piece of hardware. Starts off with a runthrough of QY300 features, followed by a clear, step-by-step tutorial that introduces you to creating your own sequences and styles. As a bonus, the video comes with a free disk loaded with 6 new QY300 styles and 6 demo sequences.

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by Sam West

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VIDEO CODE V067 £22.95

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by Sam West

Although geared towards singers of varying abilities, voices and styles, the contents of this recording are often challenging even to the professional singer! The video (code V067) goes into more technical detail, whereas the CD or Cassette concentrate on more intensive practising. First of all the exercises are sung, in various keys and then with musical accompaniment and melody line, so you can concentrate more on your voice while practising (karaoke style).

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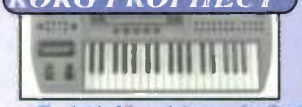

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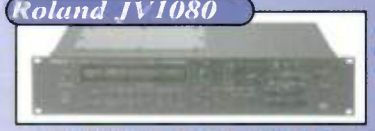

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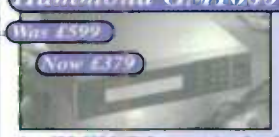

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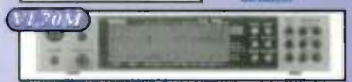

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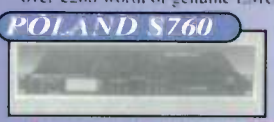

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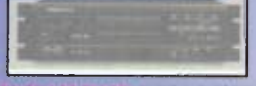

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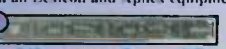

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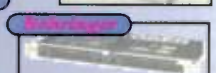

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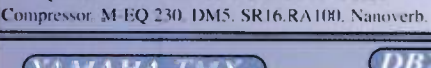

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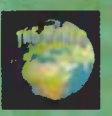

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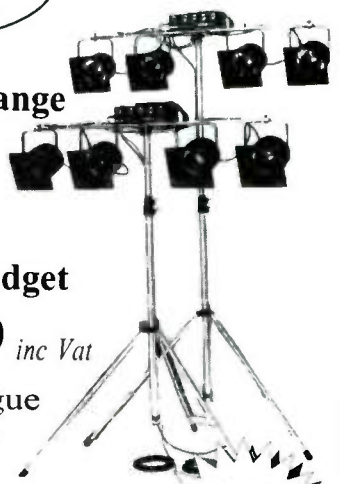

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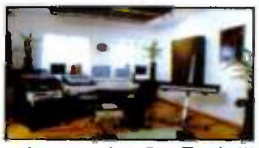

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sounding Off

Singer/songwriter PATCEE FRANCIS argues that music should transcend technology, not be circumscribed by it.

I recently had the pleasure of attending the Nottingham Music Seminar (24th and 25th September) which offered the chance for those involved in the music industry, both locally and nationally, to exchange opinion and information concerning its state and direction.

Amongst the ingeniously-titled, exciting seminars was 'Has Every Note Been Played?', a look at retro, the position it occupies within contemporary music and whether it's simply the consequence of musicians and the music industry as a whole running out of new and challenging ideas.

The discussion motored along, raising issues concerning the acceptability of the whole '70s disco revival. The debate looked at the popularity of revival club nights such as the popular Midlands bash 'Car Wash', and other similar nights, and asked whether this genre could be regarded as playing an active role in the progression of music as an art form. Can, for example, Donna Summer's 'Love to Love you Baby' (1976) or Aretha Franklin's 'Respect' (1967) really have the same social impact today that they created when they were originally released? More to the point, does their '90s audience truly value and appreciate the greatness of these pieces of original art?

And speeding swiftly on, are the purveyors of this enjoyment — the promoters and DJs — champions of a cause, educating those too young to have been involved the first time around? (A tough job but someone's got to do it!) Or, playing the cynical card, has the industry found yet another way of recycling the old, to lucrative ends? Will the exploitation ever cease? I think not.

But back to the original question. Has every note been played? Is this a solemn rave to the tune of the death march? Could it really be that in the 1990s the creative human mind has fallen foul of the machine (they've taken over our worktops, our jobs, and now our minds!)? What's more, the invasion seems to be welcomed. Mine was the lone voice at the seminar bemoaning the idea that technology is now seen as a major part of the recording process. Prevalent belief was that every note will never be played while technology continues to improve. But what about musical inventiveness? What about having an idea and then transforming it? What about those old-fashioned days when musicians used instruments? I shiver on behalf of musicians down the ages, both male and female, as bands of computers are marched heartlessly across their graves!

Would creative juices really cease to flow with the demise of the omnipotent sampler? And what of the live band? Are the likes of Oasis, Living Colour and others simply a '90s remake of a '60s phenomenon?

I'm not suggesting that technology has no place in the positive progression of music. Indeed, as a singer/songwriter, my voice has often fallen under the sampling knife. It goes without saying that these machines are impressive, but let us not forget that that is all they are. Technology should exist to enhance the creative process, not replace it.

It struck me as I walked out of the seminar that there is now a new age of musicians. Musicians who wouldn't refer to themselves as such. And as I pondered on that, I wondered if musicians today shouldn't be called something else — Music Technicians, perhaps? This in itself raises yet another question: what truly defines a musician? Is it someone who can boast that they have attended the best school of music, who can score a 20-piece string arrangement without turning a hair? Or is it someone who can turn out a Kylie Minogue-esque pop hit every day before breakfast? Or are musicians quite simply those who have the ability to create brilliant pieces of music that capture a moment and move the listener? Maybe it's all of these?

I'm not being precious or high-brow in any way. It's just that I have so much more faith in human ability and imagination. I would argue that those who claim that technology is their driving force will, if they're not careful, find themselves spinning out of control and crashing into a wall of broken dreams. Every note has not been played and never will be. Technology, however, may become old hat, just like the abacus did. SOS

If you'd like to air your views in this column, please send your ideas to: Sounding Off, Sound On Sound, Media House, Trafalgar Way, Bar Hill, Cambridge CB3 8SQ. Any comments on the contents of previous columns are also welcome, and should be sent to the Editor at the same address.

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