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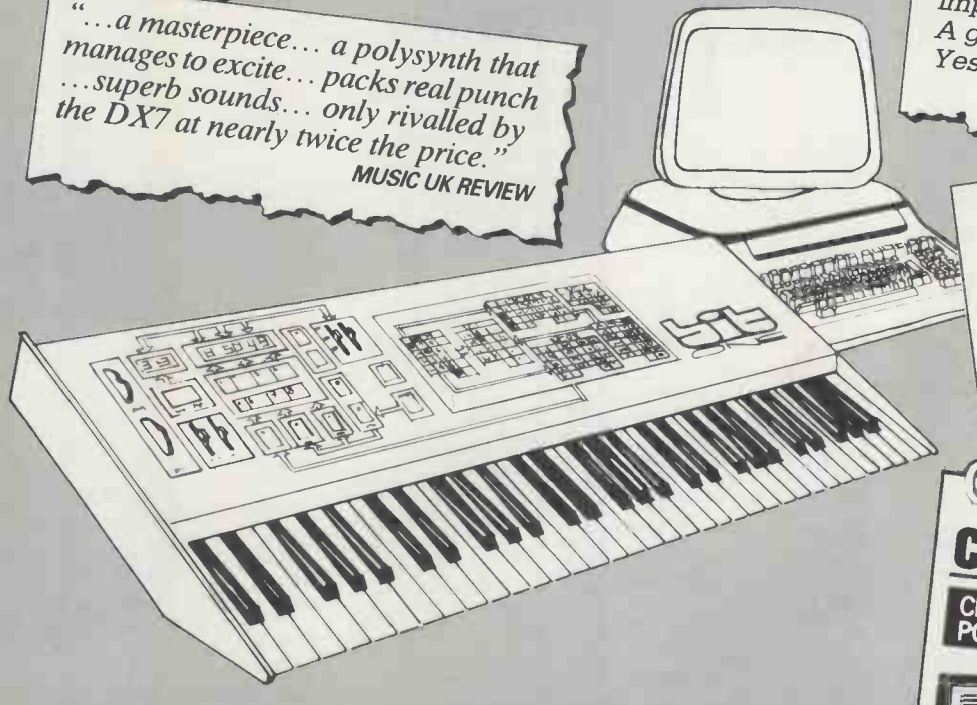

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E&MM February 1985 Volume 4 Number 12

NEWS

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COMMENT

The Don't Knows

How much faith do you have in your local musical instrument dealer? That might sound to many of you like a strange question to ask. After all, you're hardly likely to put your life in his hands, or ask anything of him other than some friendly advice and tips on how to get the best from your gear.

But think about it for a moment. Musical instruments are getting more technologically complex than ever before, and the mere fact that their paper specifications are getting more impressive means that the people who buy them are expecting more and more from them. Often, their expectations are entirely unrealistic, boosted as they are not only by spec sheets and glossy brochures, but also by hi-tech aesthetics and the wild adulation of 'critics' who should know better.

There seems to be a philosophy – growing in stature and popularity – which says that if you pay a lot of money for a musical instrument, it should be able to do all the things you want it to do, bar none. Far too often, we're confronted with queries from readers puzzled that their new hundreds' worth of music computer won't sync to this or interface with that, as if there was some inflexible law that made operational versatility increase exponentially with the amount of hard-earned cash invested.

But there's another source of misinformation, potentially more damaging than any advertising campaign or marketing push. And I'm afraid the hunt for that source takes us back to the local dealer, the man you ask when the manufacturers, the distributors and the magazines draw a blank.

I'm not suggesting for a moment that the average music shop is little more than a den of unscrupulous thieves who'll spin any kind of yarn in order to take advantage of another unsuspecting punter – far from it. For the most part, dealers and their employees are well-intentioned and entirely honest in the way they go about their business. But that doesn't stop them making statements about products they simply don't have sufficient experience of to know any better.

You don't think their role is important? Well, just ask yourself the number of times you've been unsure about a certain aspect of a machine's performance, but gone ahead and bought it anyway, largely on the strength of the dealer's assurances. Ask yourself how much a demonstrator's personal preference for Synth X over Synth Y has led you to view the comparison in a different light, maybe even made your mind up for you? Ask yourself, also, if you believe shop owners and demonstrators to be automatically better-placed than you to make value judgements based on product knowledge and market awareness.

Sure, the fact that your local keyboard demonstrator is surrounded by the latest music technology every day of the week is bound to make him very familiar with the sort of thing that's available, but that doesn't mean he knows every last interfacing or parameter detail: if anything, his own views are more likely to be influenced by personal circumstances and tastes than yours are, simply because he has the time and the facilities to exercise his every whim.

Our own particular sector of the music industry has little in the way of organised and recognised education aimed at making those who earn their living from music better-informed. Perhaps it's time we had.

Don't panic – I'm not advocating compulsory MIDI Evening Classes or Software Schools, merely a more open and more forward-looking attitude to the subject of product evaluation.

The dealers that are winning the sales battle these days aren't necessarily the ones offering the biggest discounts. Increasingly, the winners are those that give their staff plenty of 'hands-on' experience of the machinery they sell before they actually have to go out and sell it, and those who encourage musicians to do the same – examine an instrument in detail, weigh up not only the advantages of its paper specification but also its user-friendliness, its interfaceability, the sturdiness of its construction, and the helpfulness – or otherwise – of its supplied instructions.

Those are the criteria by which musical instruments should be judged, and if everybody adopted the same sort of attitude, there'd doubtless be a lot less confusion among modern musicians than there is at the present time. Because if objectivity is not allowed to flourish, the myths, the misconceptions, and the inaccuracies will grow beyond manageable proportions. And the poor musician will remain forever in the dark, magazines or no magazines. ■

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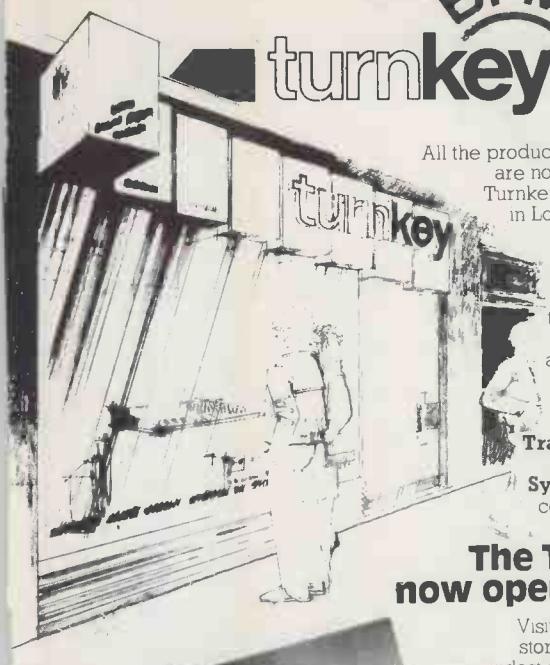

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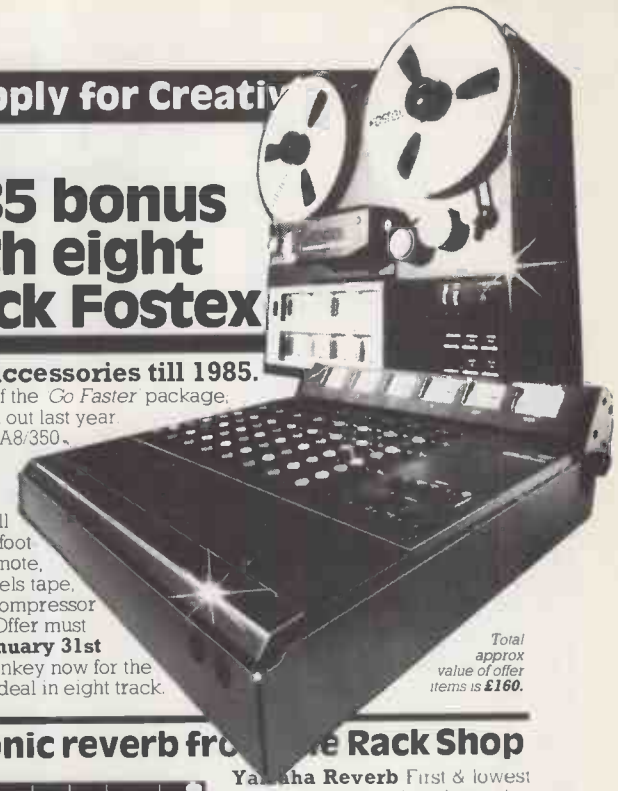

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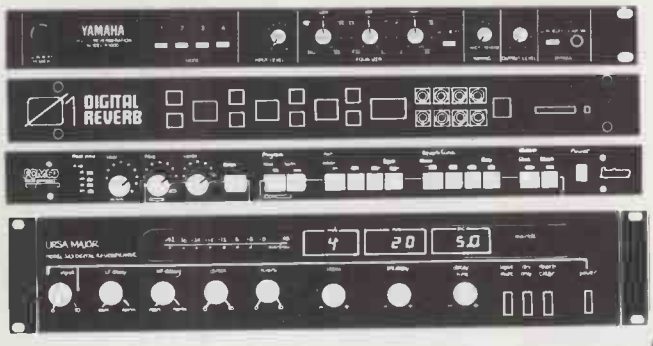

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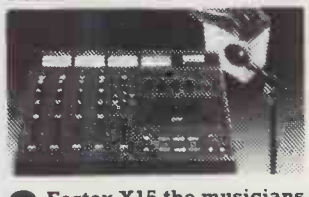

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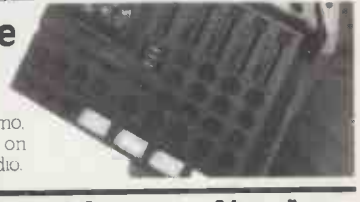

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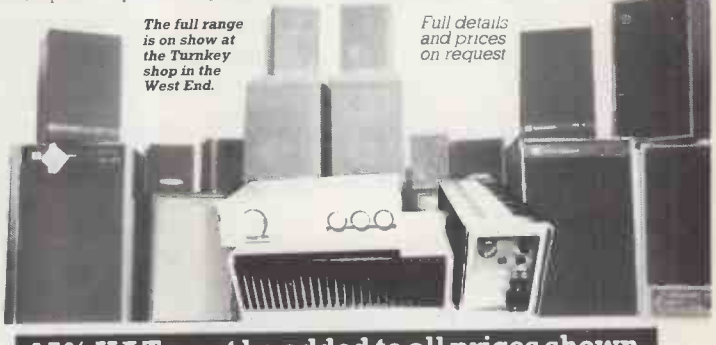

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INTERFACE

Write to: Interface, E&MM, Alexander House, 1 Milton Road, Cambridge CB4 1UY

Simulations

Dear E&MM,

I read with some interest the article *Man and Machine* in your November issue. The article mentions a plan by Patrick Mimram to build a modular digital synthesiser using additive synthesis techniques applied to sinewaves and claims that, when completed, this machine will be the only one of its kind in the world.

I would like to point out that the Bradford Musical Instrument Simulator meets this specification and is on sale now from licensees in Britain and Germany. Although simulated instruments presently on offer are restricted to church and theatre organs, pianos, harpsichords and some orchestral instruments, the Bradford Simulator is a general-purpose machine capable of being programmed to simulate many other instruments or to serve as a digital synthesiser.

The hardware of the Bradford Simulator consists of a range of modules which can be plugged together to make up various sizes and types of system. The heart of the simulator is the Music Module board, which contains 64 independent digital generators that can access sinewaves or complex waveforms held in a common waveform memory, having up to 128 single cycle waveform slots. A high-speed hardware waveform generator generates sinewaves or complex waveforms with up to 255 harmonics into this memory, and any required spectrum or pattern of spectral change can be simulated. Waveform generation, allocation of waveforms to generators, allocation of generators to output channels and pitch and amplitude envelopes are all under the control of two microprocessors located on the board. Up to eight Music Modules can be connected together *via* a ribbon cable 'Musibus' to provide as many as 512 generators.

Other modules deal with player inputs and outputs and there is a floppy disk memory module for storage of instrument specifications and musical performances.

Ten years' work has gone into the Bradford Simulator, all of it carried out in the Computing Department of Bradford University. Finance has come principally from the British Technology Group and further research and development is now under way to produce software to extend the range of usefulness of the Bradford Simulator.

Dr P J Comerford
Project Director
University of Bradford

Further Explanations

Dear E&MM,

I've been following your *Fairlight Explained* series with great interest, and have in the meantime thought of one or two particular points that I'm sure a lot of readers would like to see covered in some way. Among these are the following:

1 Are there any special 'tricks' the Fairlight is capable of performing, such as digital delay/harmoniser effects (*à la* Emulator), or digital vocoder treatments (*à la* Synclavier)?

2 Can the harmonic content of a sound be programmed to vary across the keyboard registers, creating something along the lines of PPG's resonance curve or the Crumar GDS' timbral interpolation system?

3 Judging from what has appeared in the Press, it would seem that the new Kurzweil 250 has a sound-sampling quality at least equal to that of the Fairlight – and at a fraction of the cost! Are there any plans afoot to improve this area of the CMI's performance?

Thanks in advance for your reply, and keep up the good work.

Gary McLeod
Hampshire

Jim Grant replies:

The first question is certainly a difficult one. After all, what does 'trick' actually mean? The old CMI is a powerful beast and, as with any other machine, what you get out of it depends to a large extent on how well you know it.

Anyway, delay and harmonising effects are not specifically catered for by any of the Fairlight's software, but it is possible to create limited delay effects in a couple of ways. One of these is to use the built-in Music Composition Language (MCL) and score the music such that identical voices are played together but with a short delay between the triggering of each sound. The timing resolution of the MCL is 1mS, and voice delays can be programmed to vary as the music progresses.

The short answer to your second query is that it's possible for different sounds to be loaded and spread across the keyboard using the Page 3 keyboard maps.

The more involved answer is a 'trick'. One of the hardware options available to Fairlight users is an analogue interface card. This accepts analogue voltages and gates and derives from them digital information that can be put to use by the CMI. With the aid of software, you can patch input voltages to keyboards and to control values on Page 7. Gates can also be used to open or close Page 7's switches, while in addition, the whole process can be programmed in reverse so that a keyboard voltage is output along with its gate and key velocity.

Not surprisingly, this facility is most commonly used as an interface for analogue sequencers and voltage controlled equipment. But, and this is where the trick comes in, it's possible to take the output keyboard voltage and patch it to a Page 7 control that's selected as an input. If we also attach the Page 7 control to vary, say, the start segment, then ascending the keyboard will cause the sound to begin deeper and deeper into the voice data.

Result? Great new sounds that change in character across the length of the keyboard.

Lastly, we come to the heated question of sampling. It has to be admitted that this is one area of the CMI's performance that does leave more than a little to be desired. But let's be fair about this. Fairlight sampling is eight-bit linear, while the waveform RAM is just 16KBytes which, by today's standards, is poor.

There is method in the system's madness, however, as companding sampling techniques generate non-linear data which, although it improves signal-to-noise ratios, unfortunately precludes the incorporation of some potentially useful features such as the arithmetic addition of voice data to simulate mixing. Remember also that RAM was expensive when the Fairlight was designed in the late seventies: 16-bit processors weren't exactly thick on the ground, either. The CMI is stuffed with 208K of RAM, and in any case, what it lacks in the digital domain, it makes up for in the analogue one. Each channel card incorporates special circuitry to help squeeze every last ounce of fidelity out of the sampling process, and it obviously works well enough, because if it didn't, the CMI wouldn't be the instrument it is today.

The Kurzweil is a different story altogether. The secret behind its outstanding sound quality is memory – and lots of it. The sampled data has 16-bit resolution, giving a theoretical dynamic range of close on 96dB. Add some thoroughly ingenious controlling software, and it's small wonder there's little comparison between the two as far as sound is concerned.

But don't despair, Fairlight fans. Imagine an instrument with 14-bit sampling resolution and something like 12MBytes of RAM holding 64 sounds with further storage space available on a 60MByte Winchester disk. It's on its way. ■

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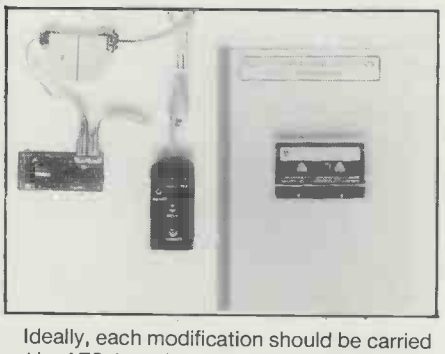
NEWSDESK

HARDWARE

Audio Engineering Services have announced details of an add-on PCB that effectively enables a standard digital delay line to provide a sound sampling facility. The control circuit consists of a peak detector (preset threshold, attack and decay) and a pushbutton input driving TTL logic which controls the DDL output, memory counter position and write enable. The circuit can operate with DDLs using either static or dynamic RAM, and has so far been proven to work with Powertran, Yamaha and Roland delay lines. The PCB is mounted in the delay unit and connected by a ribbon cable through the rear of the machine to a Cannon connector, which in turn connects to the remote control unit.



Ideally, each modification should be carried out by AES, but a kit will be made available at a reduced price to those with electronics experience. The complete kit, including fitting and VAT but excluding collection and delivery, costs £95 and is available direct from *AES*, ☎ (0245) 412641, or by taking your delay line to any branch of Future Music.

MUSIC

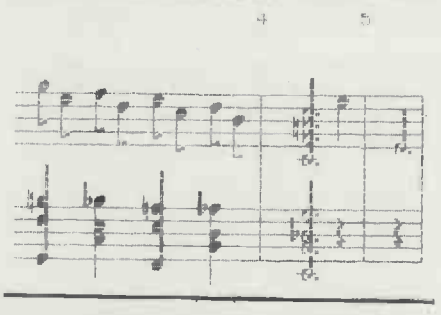
'Inter-face' is the name being given to **Klaus Schulze**'s European tour, cities, venues and dates running as follows: Rotterdam, Arena (February 8); Amsterdam, Pardiso (9); Tilburg, Norderlicht (10); Paris, Salle de la Mutualité (12); Brussels, Auditorium (13); Detmold, Honky Dory (14); Frankfurt, Batschkapp (17); Stuttgart, Maxim (18); Zurich, Volkshaus (19); Munich, Halle 20 (20); Berlin, Trinitatis Church (22); Hamburg, Fabrik (23); Aachen, Audimax (24); and Castrop-Rauxel, Spectrum (25). A new album, also entitled 'Inter-face', will be released by In-team early in March.

TECHNOLOGY

Labtek have released some new **Hotlicks Instruction Tapes** under the titles of Keyboard Chopbuilder, Heavy Metal Guitar, Acoustic Lead Guitar, and Classical Guitar. T Lavitz, who has already been responsible for the Synthesiser Workshop tapes reviewed in E&MM November, has designed Keyboard Chopbuilder to help develop independence of the hands and the cassette contains warm-up exercises (no, not aerobics), rhythmic parts for both hands, as well as several instrumental tracks in the rock, jazz, blues and swing styles over which the student can improvise. Further information from *Labtek International, 257 Middlewich Road, Northwich, Cheshire CW9 7DX.* ☎ *(0606) 48684.*

COMPUTER MUSICIAN

The **Joreth Music Composer System** is a new MIDI sequencing package for the Commodore 64 capable of recording in both real and step time and a mixture of the two. A maximum of eight polyphonic tracks can be recorded, and in step mode, the software produces music score printouts of surprising



quality. The program is available on disk only and the package comes with an interface that links the CBM 64 to a number of MIDI keyboards and also enables the unit to be synchronised with non-MIDI equipment: a tape sync feature is also included. Other features include full disk saving and loading, 5000-note capability, step-time input from either MIDI keyboard or computer, full editing of step-time data, a sectional facility to build songs, variable-speed metronome, and independent transposition of tracks ± 24 semitones. If you're interested, contact *Joreth Music* on ☎ *(0386) 831615.*

It seems everyone's reading the right magazine these days . . . we've just received a software package for the BBC micro from FSoft entitled **Music Maker**. Retailing at just £9.00 inclusive of VAT, Music Maker consists of three parts – a synthesiser, a sequencer, and a pair of data files. Making use of the BBC's internal sound chip, the synthesiser program allows manipulation of a sound's amplitude, envelope and pitch, and groups of 16 sounds may be saved to disk or cassette. The current sound may be played from a two-octave, three-note polyphonic keyboard set into two rows of the BBC's keyboard, and this may be extended to four octaves by use of two octave shift buttons.

Meanwhile, the sequencer allows up to three monophonic lines of music to be recorded in real time, using either one or two sounds, and a rhythm track may also be added. Sequences are displayed on the screen in conventional musical notation (complete with accidentals), and editing of sequences is also possible.

Further information from *FSoft, PO Box 352, Brighton BN1 3AY.* ☎ *(0273) 736042.*

STOP PRESS

Rose-Morris, one of the largest distributors of musical instruments in the UK, have established two separate Sales Divisions, namely **Korg (UK)** and **Rose-Morris (UK)**. The former will have total responsibility for the sale of Korg products, together with EMR computer hardware and software, as well as Clarion home recording systems. Meanwhile, Rose-Morris (UK) will devote its time to furthering the sales not only of the entire Vox range, but also of a wide variety of guitars, brass and woodwind products.

The new year saw a change of address for **EMAS** (The Electro-Acoustic Music Association) to *10 Stratford Place, London W1N 9AE.* ☎ *01-499 2576.*

The **DX Owners' Club** is planning a Hi-Tech Convention to be held on Sunday, March 24, in central London, where all the latest Yamaha Hi-Tech products will be on display. Further details in next month's *Newsdesk.*

Lincolnshire readers will be pleased to learn that **STIX** are opening two new music shops in their area, stocking the usual range of Korg, Roland and Yamaha Hi-Tech gear, TEAC and Fostex home recording products, as well as a wide variety of guitars and guitar synths. Drop in soon to either *407 High Street, Lincoln*, or *Silver Street, Boston, Lincs.* ☎ *(0205) 54882.*

Maybe it's the season, but **Monkey Business** have opened a new store at *166 London Road, Southend.* ☎ *(0702) 332743.* The manager is no less than Robert Pearce, well-known local musician and former manager of Soundwave, and a couple of full-time service engineers will also be on the premises. The shop is promoting a 'hands on' theme, so punters can let their fingers do the walking over products from Korg, Yamaha (including the CX5M), and Akai, as well as the new Casio CZ101. The guitarists among you can fondle Trace Elliott, Wal, Jaydee and Steinberger basses, as well as Fender, Kramer, Washburn, Tokai, Ibanez and Aria guitars. The new Monkey Business will also house a wide selection of drum kits and home recording equipment.

Corrigenda – E&MM January 85 inadvertently stated that the HH K80 Keyboard Combo housed a 15" speaker instead of a 12". We apologise for any inconvenience that may have been caused by this error.

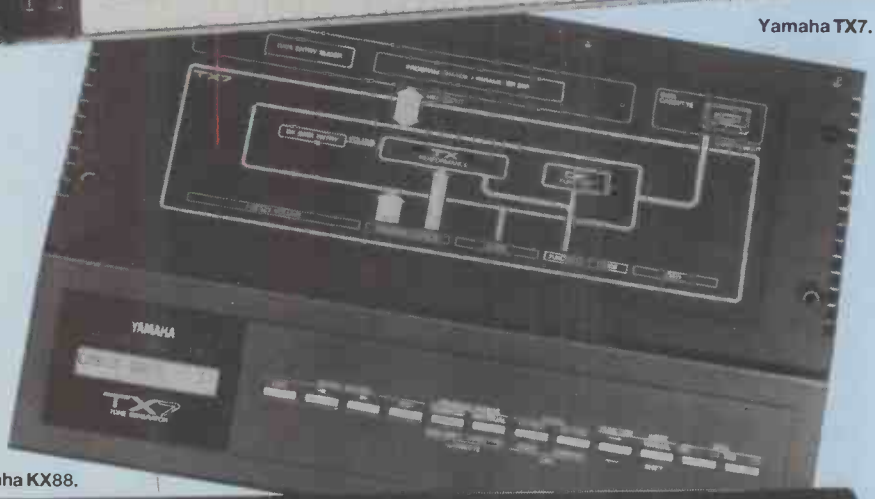
Also, Gremlins had a hand in last month's *Everything but the Kitchen . . .* Firstly, the key code for the table was omitted, and should have read: S – Roland Sync Code, M – MIDI, C – Clock (one pulse per beat), PT – Programmable Trigger, I – Interface needed, and X – Not readily interfaceable. However, we have since discovered that, contrary to popular opinion, the Korg sync code is *not* compatible with Roland's 24 pulses per quarter note format, but does in fact run at 48ppqn. Problems can be overcome by programming the Roland at half speed, or vice versa, or by the use of the Korg KMS30 MIDI Synchroniser (see review elsewhere in this issue). The Korg code does, however, output and require a start/stop signal similar to the Roland standard. ■

Great Expectations

FRANKFURT PREVIEW '85

Yamaha DX5.

Yamaha TX7.



Yamaha KX88.

While a general scarcity of precise technical information, itself a result of many leading manufacturers playing their cards distinctly close to their chest, means we can fit what we know about the expected newcomers at this year's Frankfurt Musik Messe into very little space indeed, none of us at E&MM is in any doubt that, come February 9, there'll be another lorry-load of new hi-tech music gear to drool over and daydream about.

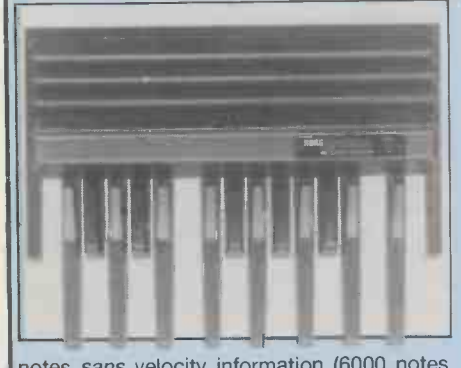
Actually, most of what we already know is more down-to-earth than that last sentence might suggest. For instance, **Casio** will have their CZ1000 polysynth (reported on in last month's *Newsdesk*) on show, and at an expected RRP of £449, that can hardly be classed in the 'daydream' category. The Cosmo computer music system described in this issue's *Outer Limits* report may be some way from becoming a commercial reality, but we fully expect the Japanese industrial giant to be up there with the Big Boys with a complete range of synths, drum machines, sequencers and computers by this time next year. And on the evidence of the CZ101 and 1000, that's a mouth-watering prospect.

Yamaha have already turned the hi-tech music industry on its head, of course. Their master plan for world domination began in the summer of '83 with the release of the DX1, DX7 and DX9 FM synthesisers. At Frankfurt they'll be adding at least one more, the DX5. As its numerical designation suggests, the 5 will slot between the phenomenally successful 7 (£1300) and the rich man's plaything 1 (*circa* £8000), with a 76-note keyboard similar in construction to that of the former and the sound-generating hardware of the latter – at an expected RRP of between £4500 and £5000. That's not the only trick Yamaha will have in store, either, because they'll also be unveiling a MIDI Mother keyboard (88-note, weighted action, pressure and velocity sensing, you know the sort of thing) entitled the KX88. Mind you, it won't be cheap at an anticipated £1500, which we still can't help thinking is a lot of money to pay for an instrument that can't actually make any sound of its own. If you choose to buy a KX88, Yamaha will no doubt attempt to furnish you with a TX816 rack of eight FM sound modules (first exhibited a year ago as the T8PR, incidentally) or failing that, a TX216, which is a quarter of the size, price and sonic capability.

If, on the other hand, you're one of the millions that have already bought DX7s, Yamaha are about to introduce an add-on keyboardless expander by the name of TX7, which should hit the shops at around the £700 mark. And to go with it, there's the new QX7 digital keyboard recorder, effectively a scaled-down version of the company's QX1 multitrack sequencer. Capable of receiving input in both real and step time, and storing up to 8100

ddrum Rack System.

Korg MPK130.



Korg DW6000.

notes *sans* velocity information (6000 notes with), the lesser QX looks like it could be a bit of a snip at just £500. We shall see.

The other Japanese majors – Korg and Roland – aren't being quite so forthcoming about releasing new product information in advance of the show itself. Little is known, for example, of **Korg**'s new DW6000 poly, other than that it exists and that it'll be accompanied by, among other things, a MIDI Pedalboard by the name of MPK130 – certainly a novel idea, that, and it should prove of not inconsiderable value to keyboardists who are forever running out of fingers on stage.

We wouldn't have known much about **Roland's** JX8P poly, either, if it hadn't been for Roland UK getting a single advance model in the country at the very tail-end of 1984, and Paul Wiffen doing his darndest to uncover its every hidden function elsewhere in this issue. It's really anybody's guess what Roland will have on show to back the 8P up, but we do at least know they've got a couple of new home pianos (the HP350 and 450) and yet another addition to the Boss product range, the DB66 Dr Beat metronome. No, we don't think it'll set the world alight, either.

What may be of more earthly significance is the increase in the number of computer-related products this year's Frankfurt extravaganza will almost certainly witness. Goodness knows how many new MIDI software companies will make their presence felt (and heard) in the giant, maze-like exhibition halls, but we can at least tell you what a couple of the established software houses will be shouting about.

Italians **LEMI** will have an update of their much-praised Future Shock Apple-based MIDI Package, featuring intelligent quantisation and an option to defeat incoming velocity data if desired – it increases the note capacity by some 1200. The company should also be displaying some DX7 expansion software that incorporates a voice dump and puts those hidden parameters on screen where they can be seen, a Drumulator expansion board that allows you to put three sets of sound chips inside the machine instead of just the one, and an interface box called the Mastersync – an update of LEMI's year-old Masterclock that'll incorporate both SMPTE and MIDI Interface standards.

Obviously working along similar lines are Germany's **Jellinghaus Music Systems**, who have now finished design of their MIDI Master Synchronizer (you can use it with just about any commonly found clock pulse, or in conjunction with a click track off-tape). Add to that the company's CG-X analogue-to-MIDI interface and a software-based music transcription system called Score Writer, and it shouldn't be hard to see that, as far as this area of music technology is concerned, the Europeans have a clear lead over their Oriental brethren.

Siel, another Italian concern who seem to be taking MIDI very seriously indeed, aim to help keep things that way, too. They're planning to unveil another avalanche of MIDI software for Spectrum, Commodore 64 and BBC micros, the most promising of which looks to be a Database package capable of creating digital delay effects as well as performing more traditional software feats.

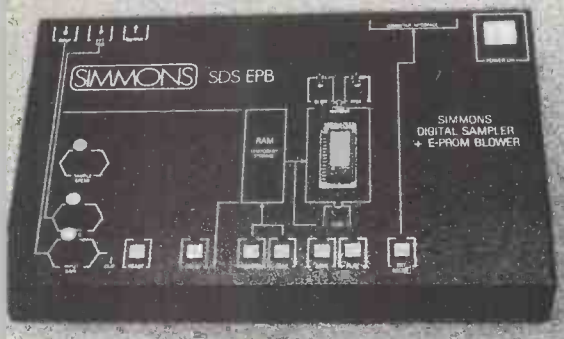
The Siel story doesn't end there, either, because the company will also have a brand new polysynth by the name of DK80 on show. The advance press info suggests this employs a bi-timbral system similar in concept to the multi-timbral principles behind Sequential's SixTrak and MAX polys, except that it works two ways rather than six. Still, those two channels will be fully independent, MIDI channel-assignable and linkable to the DK's built-in polyphonic sequencer. There's going to be an Expander 80, too, plus editing software to go with it that promises to be every bit as good as Siel's last voice editing package, reviewed in E&MM December 84.

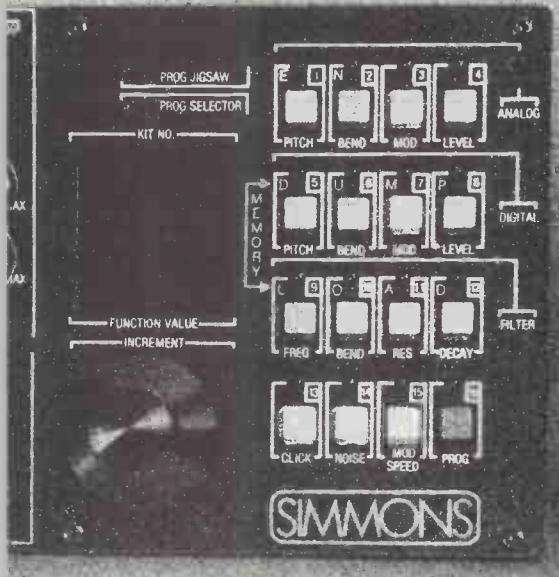
And finally, **Music Sales** are all set to expand the range of Commodore 64-based packages they launched with the wonderfully-named Music Maker towards the end of last year. Most of the new programs remain dependent on the Commodore's scarcely scintillating SID chip for their sound sources, but Frankfurt will see the public debut of a Sampler program capable of sampling sounds and replaying them over a ten-octave range. MIDI compatibility and built-in Fourier analysis are said to be among the Sampler's other assets, but the biggest one will probably be its price – just £50 (you heard) inclusive of, well, everything.

Lingering on the subject of British innovation, we find the **Oxford Synthesiser Company**, whose sole product since inception has been the OSCar monosynth. Until now, that is, because Frankfurt will be the setting against which the company launches an eight-voice polyphonic Advanced Sound Generator. Housed in a 19" rack-mounting module, the ASG will be MIDI-controlled, responding to velocity and pressure information and incorporating elements of both analogue and digital synthesis. Centrepiece of the module is said to be a large, high-resolution graphic display that makes parameter editing a doddle, and the system is of course fully programmable, with a total of 256 memory locations onboard. It's multi-timbral, too, and because many of the controlling routines are software-based, the system will be readily expandable to accommodate future updates that'll include sound-sampling, sequencing and music printing. Looks like OSC are going to be sharing a stand with LEMI, so if you're going to Frankfurt and want to get a look in on all the goodies, you'd better book your appointment early.

Finally, the world of electronic percussion is unlikely to remain unchanged by events at the Frankfurt show. **Dynacord** should have their complete system up, running and in production, **Simmons** are *bound* to have something up their corporate sleeve, and those cunning Swedes over at **ddrums** will be exhibiting a complete kit and rack for the first time – the perfect complement to what are still some of the best digital drum sounds around.

Well, that's just about the limit of what a few weeks' detective work has uncovered about Frankfurt in 1985. It should be better than ever, but sad to say, we still aren't any the wiser as regards the new Fairlight, which should be there in all its glory. Guess you'll just have to read next month's full report . . . ■





SAMPLE

REVIEW

BLOW

REPLACE

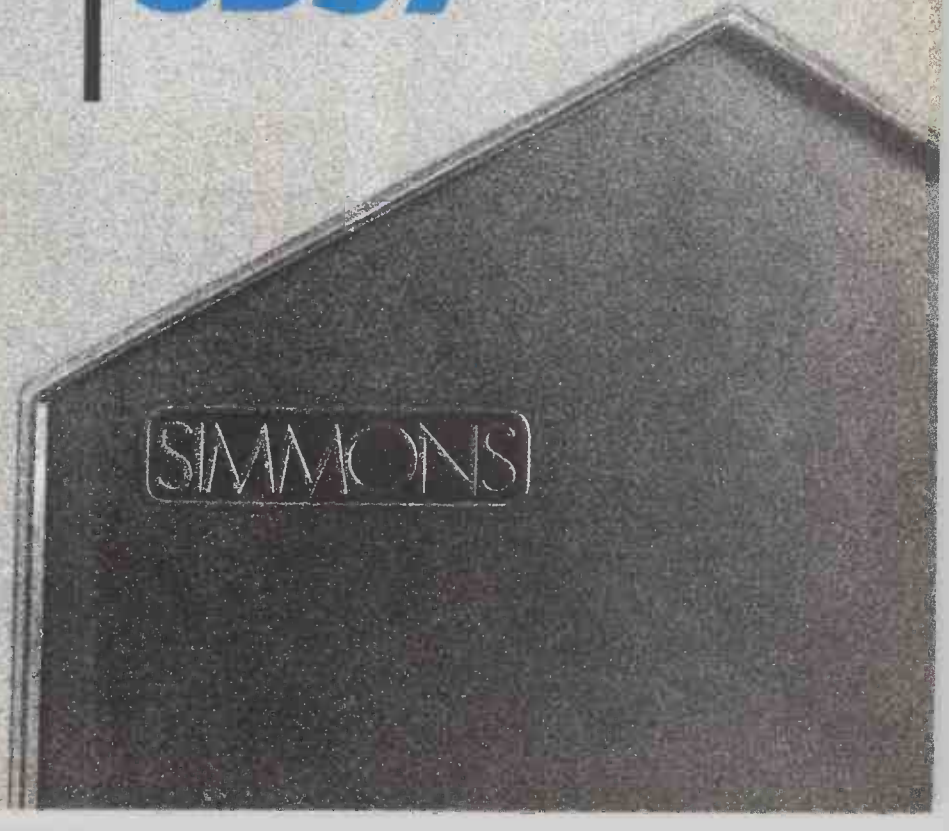
MANIPULATE

SELECT

TRIGGER

AMAZE

SDS7



SIMMONS

Electronics Limited
Alban Park, Hatfield Road,
St. Albans, Herts. AL4 0JH
lephone: (0727) 36191 (5 lines)
Telex: 291326 HEXDRM G.

HARDWARE

Roland JX8P and PG800

Touch-Sensitive Polysynth and Programmer

Roland's newest polysynth is by no means a revolutionary design, but there's plenty of evidence that a good deal of thought has gone into determining its range of facilities. *Paul Wiffen*

Before we go any further, perhaps we'd better clear up any confusion that may be caused by Roland's current model numbers. The JX8P is, of course, a six-voice polysynth and not an eight-voice one as its name might suggest; the PG800 is not an update of the MPG80 (which is used to program the Mother Keyboard system's Super Jupiter module) but a programmer designed exclusively for this six-voice instrument; and the special cartridge, the M16C holds 32 sounds. Clear?

Keyboard

Now that we've dealt with that possible source of confusion, we can take a look at the products themselves. The JX8P is an update of the JX3P poly, which first appeared nearly two years ago now. We were then reliably informed that the '3P' stood for Programmable Preset Polysynth, but unfortunately nobody at E&MM can think of eight words beginning with P that apply to the JX8P. Ah well. Anyway, the principle advantage the 8P has over its predecessor is that it's keyboard is touch-sensitive, responding both to initial key strikes (velocity-sensing) and after-touch (pressure-sensing). Both velocity- and pressure-sensing are offered only by the Yamaha DX7 in this price range, so the 8P has little competition in that respect. However, pressure response is not independent to each key: you still have to pay Prophet T8 or DX1 money for that facility.

The keyboard itself spans five octaves C-to-C, and is of the fairly standard Japanese plastic variety. It seems to cope fairly well with the extra duties the touch-sensitivity calls upon it to perform, but a little more travel in the actual keys might not have gone amiss. In the JX's monophonic modes, the keyboard *always* responds to any new note played, which is useful for solo work because it means the instrument reproduces arpeggios and trills as fast as you can play them.

'Applying Key Follow to each ADSR shortens the length of the envelope as the pitch rises, itself a property of many acoustically-generated sounds.'

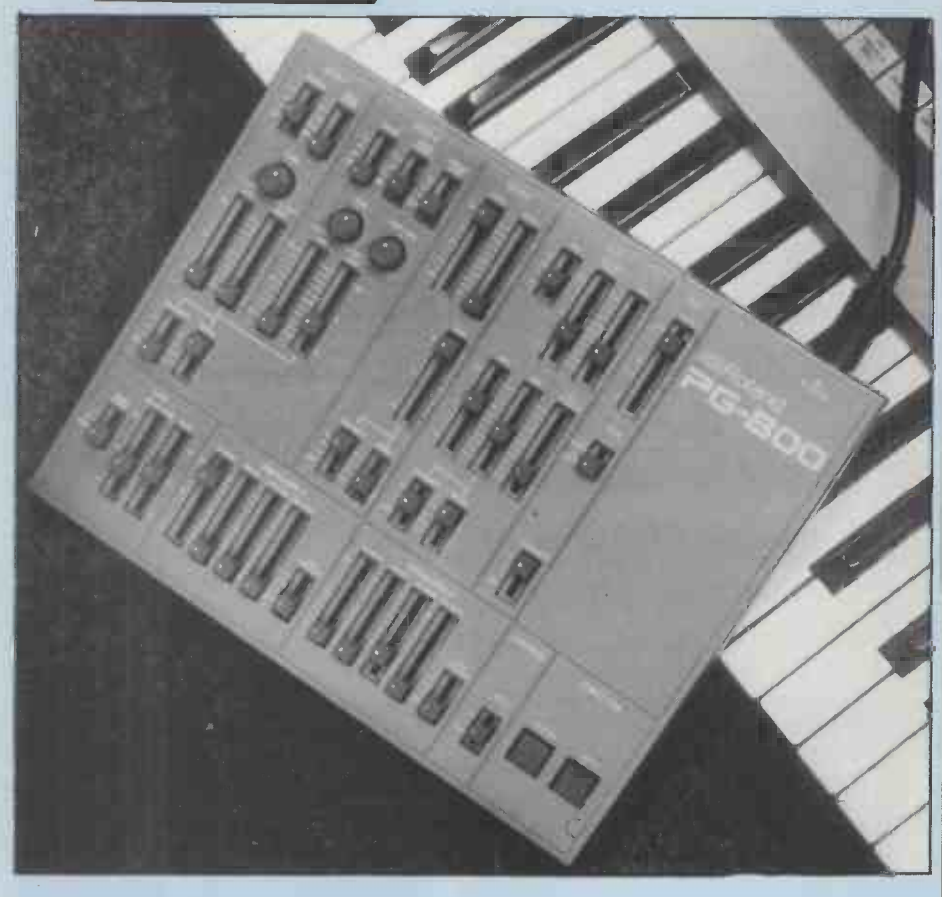
Preset Sounds

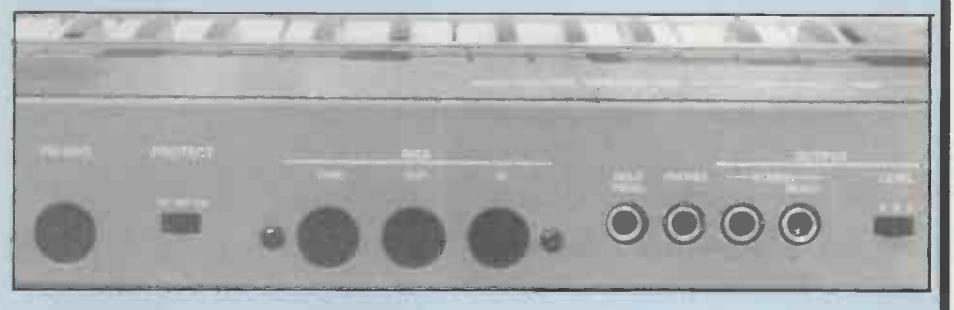
Like the original JX3P (reviewed in E&MM August 83), the 8P has a selection of factory preset sounds in addition to programmable memories: in this case 64 of them arranged in two banks of 32. The first 32 are listed on the touch pads used to select both sounds and parameters. They include a selection of Piano, Organ, String and Brass sounds, most of which are reminiscent of previous Roland endeavours but come to life with the added bonus of velocity-sensing, this being stored as part of the sound. Of particular note are the vocal sounds Choir and Voices, which in certain areas of the keyboard are very realistic indeed and a *vast* improvement over the 3P's efforts in this area, while the sounds based on the Sync feature are excellent for those screaming Jan Hammer solos.

The second page of presets is accessed by pressing the Preset button again. A small marker comes up on Roland's built-in LCD to show that the second set of presets has been accessed, and these are then selected *via* the 32 touch pads as before. This second page includes several unexpected sounds such as Log Drum and Marimba (convincing proof of the 8P's ability to handle percussive

sounds), and an excellent Flute that makes good use of the built-in Voltage Controlled Mixer (more on this later) to add overtones to voices manipulated by rapid key-strikes. Apart from a few excusable sillinesses (Bubbles, Psycho Mellow, and JX Jet – a hangover from the JX3P, unfortunately), the majority of the preset sounds are very usable, and as always, a little editing goes a long way towards making them more impressive.

One great dilemma that manufacturers face when designing a synth these days is whether to give the user the option of overwriting the preset voices and risk the instrument losing good sounds due to a mains 'spike' or a passing *Guitarist* reader, or to make sure the presets are irrevocably stored inside the machine in non-volatile ROM. As they did with the JX3P, Roland have opted for the latter solution on their new poly, which means you're stuck with their 64 presets. And although these can of course be edited, they must then be restored in one of the 32 user-programmable memory locations. This arrangement is made less restricting in the case of the JX8P than it was on the 3P by the addition of a RAM cartridge facility that allows an infinite library of sounds to be easily and quickly stored and accessed (so much better than all that tedious mucking about with cassettes).





Voice Structure

So assuming you're interested in creating some sounds from scratch, what facilities does the JX8P put at your disposal?

Well, a list of the available parameters is given in the Edit Map at the right hand end of the JX's front panel, but the situation is clarified considerably by a glance at the layout of controls on the PG800 programmer. In brief, the JX8P has two DCOs per voice, a similar number of ADSRs, and a VCF, LFO, chorus facility and the Voltage Controlled Mixer just alluded to.

Each oscillator has four available outputs – sawtooth, square and pulse waveforms and noise. The pulse wave seems to be set at about 20%, and there's no means by which the width can be altered, either manually or automatically. In 1985, this is a fairly serious omission as most of today's analogue synths have this feature incorporated as standard. However, the 8P's chorus device (which Roland seem to be very keen on – almost every keyboard they produce has one) can be used to add the sort of movement characteristic of Pulse Width Modulation, albeit with less user control.

As well as the (not exactly uncommon) provision for modulating the oscillator's pitch from the LFO for vibrato and trill effects, the JX also allows pitch to be controlled by either of the ADSRs, positively or negatively. This would ordinarily allow you to create pitch-change effects such as those provided by syndrums and the like, but is even more useful in the case of the 8P because of the Sync facility incorporated into the design of DCO2: some truly wonderful sync sweeps are possible by altering that oscillator's pitch.

A four-stage Key Follow feature is also available, not only on the filter (where it is commonly referred to as Keyboard Tracking), but on each ADSR as well. This latter facility has the effect of shortening the length of the envelope as the pitch rises, itself a natural property of many acoustically-generated sounds. Unfortunately, the effect is not continuously variable: only three positions are selectable *via* the appropriate control. Still, the feature is there, and it's a useful one.

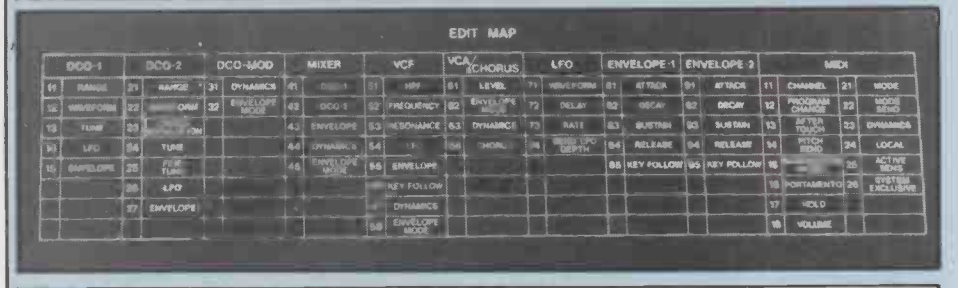
> 'I don't know of any other synth that possesses a Voltage Controlled Mixer that allows the level of an oscillator to be controlled either by an ADSR or by the velocity of keystrokes.'

Mixer

The best is yet to come, however.

While several competing synths already offer the Sync/Pitch-to-Env combination and Key Follow was present on the old MemoryMoog, I don't know of any other synth that possesses a Voltage Controlled Mixer. This allows the level of DCO2 to be controlled either by an ADSR or by the velocity of keystrokes. The former routing is particularly effective when used with percussive envelopes, while the latter is a great help if you're seeking to imitate certain acoustic characteristics, as evidenced by the Flute preset that adds the harmonics caused by over-blowing when a key is struck hard. Other effects can be created by adding DCO2 at a different pitch or best of all by using it in conjunction with the Sync and Dynamics features for some really impressive solo sounds.

Thus far I've made no mention of the 8P's much-vaunted after-touch facility. This is because it's one parameter that can't be programmed within individual memories: instead, the feature has a section of its own at the extreme left-hand side of the synth. The parameter's assignment procedures are also a bit rudimentary, with only level, vibrato, and ▷



brilliance (ie. the filter) being controllable *via* additional playing pressure. Then again, they *are* the most logical parameters to control. Mind you, I would have appreciated the addition of a further facility for the control of oscillator pitch (preferably for each oscillator individually), as bends and sync sweeps would then be accessible direct from the keyboard. On the plus side, though, the amount of after-touch can be programmed with some degree of subtlety through the appropriate slider.

Performance Controls

Also at the extreme left-hand side of the keyboard lie the JX's real-time performance controls. Bend and Portamento amounts can be programmed and then introduced *via* their respective switches. Personally, I rather wish Roland would call their performance device by a name other than Bender (*'performance device' doesn't sound any better to me – Ed*), as more far-reaching – and decidedly last-minute – design changes are by no means out of the question if this area of the JX's layout is anything to go by. To explain, the Bender has a joystick ball-type housing that looks at first as if it should be used to introduce the LFO in a fairly radical fashion. In fact, that housing is only present for aesthetic purposes (or so it would appear), though it's still possible to accomplish a reasonable range of variations in vibrato level.

We haven't finished with the 'not storable in memory' side of the JX8P's layout, either, as it's this section that allows the synth's six channels to be triggered in different ways. First mode we come to is Poly which, not surprisingly, allows normal six-voice polyphonic playing, while Unison puts all the voices on one note for lovers of full-frontal solos. Like Unison, Solo is also a monophonic mode, the difference being that it uses only one voice channel.

The best thing about the 8P's key mode choices is that when Unison is selected, the instrument's Master Tune parameter can be used to detune the voices away from each other, in addition to detuning oscillators apart: the LCD helps out here (something it does very often, in fact) by showing how many cents the various pitches differ by.

By now, you're probably thinking what a shame it is that the Roland's after-touch, performance control amounts and key modes can't be stored as part of a sound. Well, you're right – it is a shame. But there is a compromise solution in that any voice – complete with settings for any or all of the parameters mentioned above – can be stored away as a Patch. Unfortunately, there are only eight spaces available for these Patches, and they have to be accessed in sequence (hence 'Chain', I guess). Still, you shouldn't have much difficulty programming your particular octet of voices in a sequence that matches a concert running order, for instance.

MIDI

The JX8P has been blessed with Roland's most comprehensive implementation of MIDI so far. Besides the now standard features such as Program Change, Bend Enable/Disable, and Mode changes, the 8P can also accomplish some more *recherché* things along the MIDI bus, *viz* Mode Send, Volume Change, adjustment of Dynamics, and two forms of message completely new to this reviewer – one called Local that allows the 8P's voices to be turned off so that only the sounds from a connected MIDI slave unit (eg. an expander) are played from the keyboard, and another called Active Sense that helps eliminate the problems that can occur if MIDI connections are severed, for whatever reason.

And the JX8P can transmit/receive on any of 16 MIDI channels, while the customary In, Out and Thru sockets are on the back panel. Pretty impressive stuff, all in all.

There's some more goodies at the new Roland's rear, besides, like an output level selector that enables easy matching between the JX and a wide variety of performance environments such as stage, studio, rehearsal and so on; stereo outputs (the right-hand one provides a mono signal if that's what you require); sockets for stereo headphones and a Hold pedal; and a Memory Protect switch and five-pin DIN connector (for the PG800) to complete the rear panel arrangement. Incidentally, the programmer is held in place on top of the right-hand end of the 8P's front panel by magnets, which seems a sensible solution.

Conclusions

A synth that's of a sufficiently flexible nature to appeal to several different sorts of keyboard player, I'd have said. For the pianist in search of a collection of usable synth sounds that can be played with velocity sensing, it should prove a strong competitor, even in DX7 territory – even more so if a fat, analogue-type sound is what's wanted most of all.

In the world of conventional analogue polysynths, there's little or nothing to rival the 8P (with the possible exception of the limited-availability Bit One) on a value for money basis. It *is* a little tedious to program in the absence of a PG800 module, but at least the separation of synth from programmer means that the purchase of the latter can be delayed until finances allow: not everybody can be Geoff Downes, you know.

The news on the voice storage front is somewhat mixed, of course, because although storing sounds on cartridge is a lot easier than dumping them to tape, it's still a great pity that Roland's designers couldn't endow the instrument with more than eight memory locations capable of storing after-touch and performance control data.

You'd be right in thinking that the JX8P incorporates little in the way of revolutionary design principles, but in a lot of cases, evolution is preferable to revolution, and there's no doubt that the new Roland's implementation of MIDI, for instance, has been well worth waiting for. ■

RRP of the JX8P is £1250, while the PG800 programmer is a further £180. Further information can be had from Roland UK, Great West Trading Estate, 983 Great West Road, Brentford, Middx TW8 9DN. ☎ 01-568 4578.

MIDI KEYBOARDS

SEQUENTIAL CIRCUITS ● OBERHEIM
KORG ● YAMAHA ● ROLAND

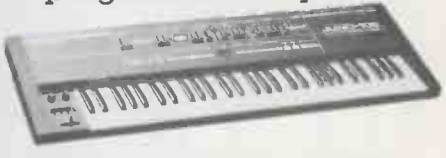
SEQUENTIAL CIRCUITS
YAMAHA ● ROLAND

MIDI COMPUTERS / SOFTWARE

Oberheim OB-8▼
An 8 voice programmable Poly Synth with 120 programmes and the Oberheim sound.

Sequential Circuits Drum Tracks ▶
A fully programmable Drum Machine with 13 digitally recorded drums. Each sound has individual tuning and volume.

ROLAND ▼JUNO 106
A 64 timbre Poly Synth. An affordable MIDI programmable Synth.



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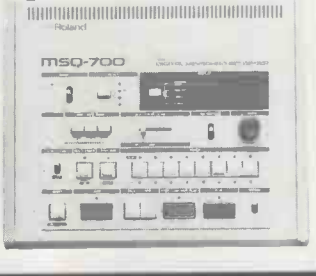

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MPC Programmer 8

Computer-controlled Rhythm Sequencer

Once again, those cunning MPC people have come up with something so devillishly useful, you wonder why nobody started making it months ago.

Paul White

These days, it seems the part of the drummer is forever being taken by electronics. And if you don't happen to like the lack of tonal variation inherent in the way most drum machines go about their business, you've no alternative but to go for electronic drums or individual modules like E&MM's Syndrom. As yet, most electronic drum systems have been designed to be triggered from pads, but while this has undoubtedly been of great benefit to drummers fearful of being left behind by the onslaught of technology, it has the unwanted side-effect of making drum sequencing a real headache. It's in response to this dilemma that MPC have come up with an eight-channel rhythm sequencer that doesn't cost the Earth, and is readily interfaceable with three popular home computers.

The model sent for review talks amicably with the Commodore 64, and its ROM-based software means that the system is ready to go the instant it's powered-up. MPC also make versions for the Sinclair ZX81 and Spectrum micros, though in those instances the software has to be loaded from cassette and you have to forego the sync facility – more on this later.

Once you've parted with the requisite quantity of greenbacks, and assuming you've gone for the Commodore variant, you get an interface unit that plugs straight into the cartridge slot at the back of the 64, and this is linked *via* ribbon cable to a custom-designed trigger pulse box. In addition to the eight jack sockets that provide the trigger outputs, the top of the box contains eight pushbuttons and an equal number of rotary controls. An eight-pin DIN outlet is also provided to allow for direct connection to a Simmons SDS8 electronic drum kit. A bit cheeky, but useful nonetheless.

In the normal course of events, the trigger box's first seven outputs are used to trigger some arrangement of sound modules, while the eighth carries only accent pulses. However, if you feel you've got enough of an accent already, you can connect the appropriate socket to a further sound generator of some description. Meanwhile, the rotary controls above each channel pushbutton are used to set the output pulse height, though just in case you're unsure as to what this might mean, in most cases it corresponds to volume: the pot fitted to the accent channel sets the amount by which all the other outputs increase in level when an accent is programmed. The buttons themselves are used for real time programming, and work in a manner similar to that of the Tap button on dedicated drum machines such as the Roland Drumatix.

System

On powering-up, the system's menu is immediately displayed on your monitor screen, and presents the following set of alternatives:

1 Compose Bars
2 Make Sequences
3 Compose Songs
4 Save Songs
5 Load Songs
6 Download to MPC
7 Configuration

In all, up to 52 different bars can be composed in step or real time, and to help you on your way if you select the latter mode of entry, channel six can act as a metronome output on every third or fourth beat as and when required.

The screen display itself is not unlike that of the Boss Dr Rhythm Graphic or Roland TR707, in that a grid is provided on which you insert and delete beats. The matrix is normally 16 beats wide by seven voices (plus accent) deep, but bar length can in fact be expanded or contracted by up to a maximum of 24 beats. Standard Commodore cursor controls are used to position beats within a bar, and these are easily deleted if you make a programming cock-up.

Each bar programmed can be named either by a letter of the alphabet or a shifted character, giving a possible total of 52 different bars. There's also a facility for linking adjacent pairs of bars together, should this be your desire, and to this end, the bar display is capable of showing two bars simultaneously at any time. You can even copy complete bars into other locations for further editing, which should be a boon for the positionally indecisive. Once you've programmed all the bars you deem necessary, the next job is to assemble complete sequences.

A sequence may consist of up to 64 bars. That might not sound like all that much at first, but if you make sensible use of repeat commands, you shouldn't have much trouble making up entire songs from stored sequences. You've got a maximum of nine repeats per repeat sign at your disposal, and provided that each of these ends with an end-of-repeat sign, you can even put repeats within repeats. A bit like BBC Television, in other words. Mind you, failure to comply with these regulations will almost certainly leave you with a mutinous computer on your hands, so watch it.

Songs

You can build these up from bars, sequences, or a combination of both, up to a total of 64 sections. Note though that once this point has been reached, not even repeat passages are possible, so you've got to make sure you implement these at the Compose Sequence stage.

One good thing about the way this part of the system functions is that once you've played your song through to its logical conclusion, it stops. Certainly a relief after those software packages that insist on returning to the beginning and playing the whole thing through again *ad nauseum*.

An entire set of 25 songs can be saved on cassette for future use (the whole process takes less than two minutes), or alternatively, they can be downloaded onto an MPC Drum Computer, should you happen to have one lying around. Another nice touch is the Configuration page ('7' on the main menu), which you can use to change the names of percussion voices if your module line-up changes at any time. And perhaps more importantly, this page also allows you access to this version's built-in Sync function.

Let's get one thing clear first of all. This system has only a sync output, so there's no way of inputting some external sync source such as a tape signal generated by the MPC Sync Track, for example. Unfortunate, but there you go.

There are two modes of sync operation. The first outputs 24 pulses per quarter note and is available from the DIN socket on the interface box. This conforms to the Roland DIN sync system and therefore allows the Programmer 8 to be used in synchronisation with such drum machines as the Roland TR606 and 808. The second mode provides one pulse per beat, and among other things can be used to step sequencers at semi-quaver intervals or trigger percussive patches set up on a conventional analogue synth.

Conclusions

The Programmer 8 system is incredibly easy to use, making the programming of entire drum parts a lot less onerous than it is on a lot of dedicated units. I've owned a TR606 for years, but I still find composing and editing songs a real struggle: this MPC innovation should change all that. A brief look at the handbook is all you need to start composing, and the bottom of the display incorporates a prompt sheet to remind you of any commands you might have forgotten.

Admittedly, Spectrum users are a little less fortunate in that they'll have to load the software from tape as well as foregoing the sync facility, and I do feel that a sync input that enabled the system to be run from a sync track on tape wouldn't go amiss. Still, it may be that pressure from the professional recording lobby will eventually persuade MPC to include such a provision on future models. I hope it does.

Even as it stands, the Programmer 8 is a joy to use and versatile enough to satisfy most realistic demands. After all, it's possible to store an entire live set's worth of rhythm tracks with this machine. Can't be bad. ■

This Commodore 64 version of the Programmer 8 as tested carries an RRP of £220 including VAT, while the Spectrum and ZX81 variants are both £199. Further information from MPC Electronics, The Gables, Station Road, Willingham, Cambs CB4 5HG. ☎ (0954) 60264.

Technical Specification

Channels 1–7 provide positive-going pulses whose voltage can be varied between 0.5V and 4.5V. Use of the accent control enables this to be increased to a maximum of 8V. The accent output on Channel 8 is a fixed-height (4.5V), positive-going pulse, 10mS in width. Use with the E&MM Syndrom may necessitate programming accents on every beat, as the 4.5V pulse height may not be sufficient for reliable triggering. Power is provided by the host computer, so no batteries or power pack are required.

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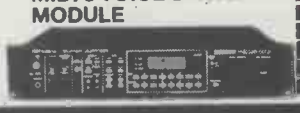

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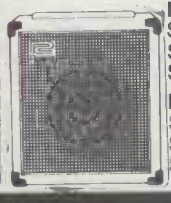

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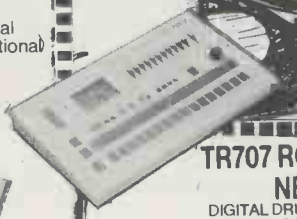

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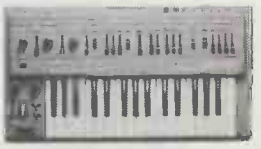

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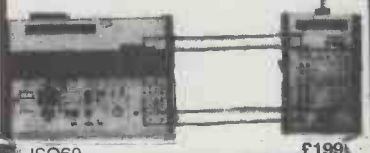

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TX8 16FM VOICE GENERATOR SYSTEM

Independent MIDI-driven FM voice generator modules (TF1) have been developed by Yamaha so it is not necessary to acquire 8 complete MIDI synthesizers to make the most of the QX1. An 8-module system, the TX816, contains 8 TF1 voice generators in a convenient rack-mountable package. Each TF1 module permits 16-note polyphonic output, and can hold up to 32 different voices in memory. 32 function memories are also provided.

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CX5M Music Computer

The CX5M is an extremely versatile computer specifically designed for a wide range of music generation, programming and editing tasks, and for interfacing with other Yamaha digital instruments and components. The CX5M is a MIDI compatible computer, allowing it to serve as a control centre for playback and automatic sequencing of the Yamaha DX series synthesizers, RX drum machines and other MIDI compatible equipment.

The CX5M also has a Yamaha digital FM voice generator built-in — the same type of voice generator that has put our DX series Digital Programmable Algorithm Synthesizers at the forefront of the digital keyboard field. That means it is capable of producing rich, realistic sounds that are almost indistinguishable from acoustic instruments. In fact, 46 fine voices are provided pre-programmed. But you can also program your own to create virtually any voice you like. And you can save your original voices on a standard cassette tape.

A wide range of applications programs, interface units and accessories expand its music making potential enormously.

Sophisticated Music Software YRM101 FM Music Composer

This optional program cartridge is a must for all composers and arrangers. It is simply the most sophisticated, versatile, easy-to-use music composition and arrangement package in its class. You get an on-screen music staff onto which you "write" notes by inputting them either from the computer keyboard or directly from the music keyboard. The ability to input notes from a piano-type keyboard is a real bonus for musicians. Up to eight parts can be entered, and each part can be assigned a different "instrument". You can use the superb pre-programmed FM voices in the CX5M, or voices you have programmed yourself. You also have full control over time signature, key signature, tempo, dynamics and phrasing. What's more, any parameter can be changed at any time during the piece. Of course, your compositions can be saved on a standard cassette recorder and reloaded whenever needed.

Furthermore, compositions written on the FM Music Composer can be used to "sequence" MIDI synthesizers, drum machines, etc via the CX5M's MIDI interface. The possibilities of this software package are virtually endless.

YRM102 FM Voicing Program

This program gives you precise control over the CX5M digital FM voice generator to edit and alter the pre-programmed voices or create totally new voices of your own. The FM voice generator employs 4 operators, each with a sophisticated envelope generator, and a choice of 8 algorithms (different configurations of operators with different modulator-to-carrier relationships). The YRM102 FM Voice Program lets you precisely set all parameters relating to the operators and algorithms, as well as extras like amplitude and pitch modulation, LFO waveform, keyboard scaling, transpose, etc. With a little practice you should be easily able to program just about any voice you can imagine. Save your original voices on any standard cassette recorder, and build up an original voice library. Voices you create can be used in arrangements created with the FM Music Composer program.

YRM103 DX7 Voicing Program

DX7 owner's, here is the key to easy DX7 voice programming. This program displays all DX7 voice parameters right on the video monitor, and lets you program from the CX5M computer keyboard. The data is transferred to the DX7 via the built-in MIDI interface. Voice parameters are displayed in easy-to-understand graph form. For example, when programming envelope generator parameters you can actually see what the programmed envelope curve looks like, rather than having to think entirely in terms of numbers. The DX7 voicing program makes programming the DX7 so easy, that even if you're not interested in the CX5M's other capabilities, it's worth having one just to program your DX.

YRM104 Music Macro

The Music Macro is for people who want to incorporate top-quality musical voices into their BASIC computer programs. The Music Macro adds a special set of commands to the CX5M MSX BASIC language, permitting control of the digital FM voice generator from within BASIC programs. This makes it possible to program games or audio/visual type programs incorporating music or sound effects using FM voices for real quality and impact.

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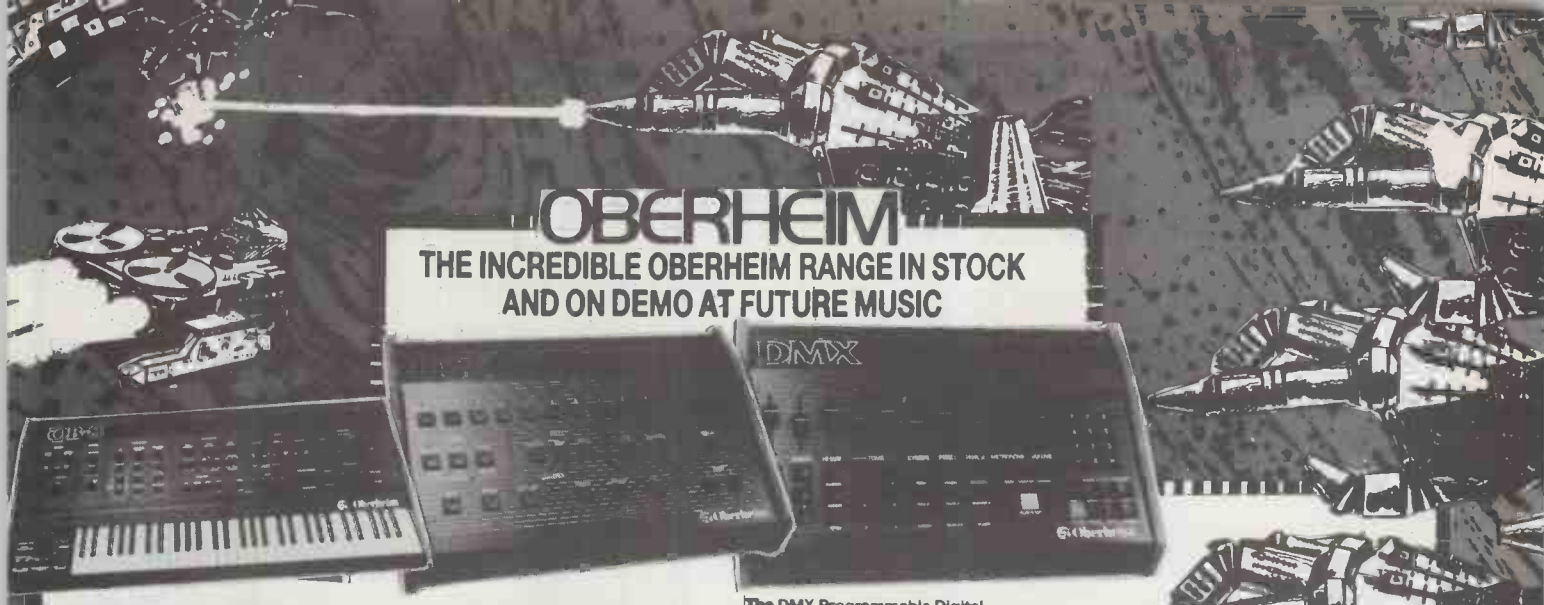

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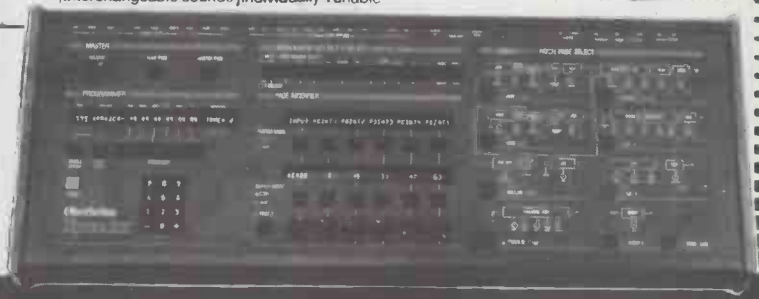

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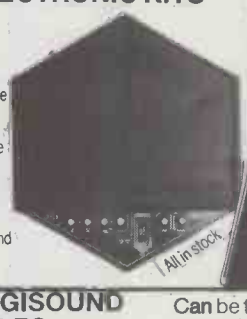

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Roland SBX80 Sync Box

It may have an inauspicious title, but don't be fooled, the Sync Box is a versatile and thoroughly professional tool. *Paul White*

Put as simply as possible, the Sync Box is a programmable tempo controller that can be used to control the tempo of sequencers or drum machines *via* MIDI or the now familiar DIN sync facility first introduced by Roland. A variable timebase pulse output means that many other machines will also sync to the SBX80.

There are three possible methods of programming the tempo generated by the Sync Box: one is by the obvious expedient of the tempo control knob, whilst the remainder entail using the Tap button or feeding an external click or beat into the Audio In jack on the rear panel of the machine. The Tap facility is actually one of the system's most powerful functions, as it enables live sessions or recorded tracks with no time code of their own to control the tempo of the Sync Box, and hence all manner of drum machines and sequencers.

To perform this task, you do require an interface of sorts to perform the ongoing real time tempo extraction algorithm, but fortunately, most readers will already have one of those. Yes – the human brain (plus index finger driver interface) is what's used to tap out the tempo of the music on the Tap button (what else?), and the Sync Box then converts this tempo into both MIDI and DIN sync formats so that your drum machines and sequencers follow you rather than vice-versa.

Alternatively, a tempo (or sequence of tempi) may be recorded into the Sync Box using either the Tap/External Click or the internal numerical entry system and associated keypad. This enables multi-tempo compositions to be stored, and all entries can be modified using the machine's built-in editing system, which allows the tempo to be changed and bars to be added or deleted.

SMPTE

Introduced by the Society of Motion Picture and Television Engineers (yes, that's where the acronym comes from), the SMPTE time code was originally designed to synchronise video tape to a soundtrack which, in most cases, is recorded and played on a machine quite separate from the video equipment.

Unlike click-tracks or simple sync clocks, the SMPTE code carries information that accurately defines any given position on the recording tape, in units of both elapsed time and video frames. This added sophistication means you don't have to run the track from the start in order to pick up synchronisation: the machine just has to wait until it sees the appropriate piece of code on tape, and then it locks on automatically. This may not seem important if you're just writing 10-second jingles, but if you're mixing the soundtrack for *Star Wars* and someone fluffs a drop-in two minutes before the closing credits, the last thing you want to do is have to take it from the top.

In the context of systems that use the Sync Box, the SMPTE code is first recorded on one track of a multitrack recorder (or video recorder), after which the tempo information can be entered in one of two ways. If the composition has not yet been started, the Sync Box can be programmed either numerically or with the Tap button: you'll then have set the master tempo for the piece. On the other hand, if a part of the music already exists, or if the overall tempo must be set to match the timing of a sequence of images on film, then the Tap facility may be used all the way through the piece. Then, providing that the operator can keep time, the stored tempo will run perfectly in sync with the existing material, by following a SMPTE code that can be generated by the Sync Box or by some external means.

Well, that's a general overview of what the Sync Box can do, so a brief look at its physical attributes is probably now in order.

Construction

On unpacking this device, I was genuinely surprised to find that it was *not* contained in a 19" rack-mounting module. Measuring a smaller than expected 325×303×107mm, the unit weighs in at 3.5kg and, for those of you who suffer attacks of inexplicable paranoia whenever an electricity bill pops through the letterbox, it consumes only 11 watts.

The free-standing case is fabricated from sheet steel with plastic side panels, and the two-tone grey paintwork is tastefully set off with a touch of Roland's distinctive orange legending. The photograph should give you a general idea of the layout (and its inherent complexity) but what it probably doesn't show is that all those dinky little perspex pushbuttons light up when active. A green fluorescent type of readout is used for the main display, and this is a multi-function device capable of showing either SMPTE location data or tempo and time signature information.

Turning to the Sync Box's rear panel, you'll see that this is also fairly busy, including as it does the connections to and from the tape machine as well as the MIDI and DIN sync sockets. Additionally, an external pair of footswitches may be plugged in for remote start/stop-continue operation, and an audio input is provided

so that the Tap button entry system may be implemented by applying an externally generated pulse or suitably amplified microphone.

Outputs are also fitted for the Roland's internal metronome and the timebase, the latter being a clock pulse output that can be set to give between one and 120 pulses per quarter bar by means of a front panel switch. This means that a wide range of drum machines and sequencers can be persuaded to accept orders from the Sync Box, in addition to those conforming to Roland's DIN sync specification.

Facilities

On power-up, the Sync Box enters manual mode, and the tempo may be set using the Tempo control, the Tap button or the keypad: in the last-mentioned case, the tempo is entered in beats per minute. Associated with the Tap button is a three-position ('quick', 'medium', and 'slow') slider switch: in the 'quick' position, you only have to hit the Tap button twice and the tempo is computed from the time elapsed between the first and second push. The 'medium' setting, on the other hand, takes a mean value from three taps, while 'slow' uses four taps to generate the mean tempo.

If the Sync Box is used in conjunction with MIDI equipment, Song Select messages may be transmitted, though I believe that some MIDI drum machines have no provision for interpreting this data, which is a shame.

And still on the subject of manual mode, two measures of count-in are generated by the built-in metronome. If, however, you decide to use real time record mode, a count-in will have to be programmed if you need one.

As intimated in the introduction, the facility exists for Sync Box users to 'play' the Tap button throughout an existing piece of music in order to produce a synchronised result. In effect, what you're doing is resetting the tempo every bar, so there's no chance of the system wandering out of sync. Actually, it is possible to fool the Sync Box in this mode, as I found out when trying to tap in a very fast tempo, because the system then locks onto every other beat, silly thing.

Using the main display, it's also possible to set a time signature, in order to create bar lines, and this may be changed again during the course of a composition. This is essential if some sort of editing facility is required, as the microprocessor would otherwise be unaware of where one bar stops and the next starts. Another example of technology not being as bright as it might be.

Modes and Codes

By putting a SMPTE track down on tape before you start (or even afterwards if you use real-time Tap entry), the tempo program can be made to lock accurately to tape. The SMPTE code should be recorded on an outside track at a level of between −3 and 0dB, and the adjacent track should be left free to avoid crosstalk problems. Commonsense, really. Once the SMPTE code has been recorded, it can be verified to ensure there are no dropout errors and, once that's been accomplished, you're ready to go.

The external audio click input means that a click signal recorded onto a spare track of the multitrack tape machine can be used to program the tempo if this is convenient. And if it isn't, you just use the Tap button or keypad numerical entry.

Apart from enabling you to insert bars, delete bars and alter time signatures, Edit mode also makes it possible to offset the timing of your entire composition forward or backward in time against the code track. The handbook acts as a comprehensive source of information regarding all the edit functions, but personally, I would have liked to see a more readable, less ambiguous manual than this one. It really is heavy going in places, though if you have the necessary time, patience, and enthusiasm, it'll get you there in the end.

In Use

This machine is so flexible that it would take a lot of time (and expensive equipment) to check out all its possible applications. However, I can say with confidence that all the basic functions work as described in the aforementioned manual, though not surprisingly, that isn't always the reliable reference source it should be. For example, in the section about recording the SMPTE code, the book states: 'By pressing the Tape switch, light up the SMPTE REC indicator'. This *sounds* fine, but the fact of the matter is that you have to press the switch *four times* in order to step through to the correct function. Perhaps Roland's authors could do with brushing up on their English numbers.

Real-time tap programming turned out to be fun (for 'fun', read 'not too difficult'), though I did experience a few difficulties getting my aged TR606 to sync properly. A couple more scans through the instructions soon sorted things out, however. Operator error this time, obviously.

All in all, I tried out enough of the machine's functions to be convinced that the Sync Box does what it purports to do, and for the (relatively speaking) modest asking price, that's really quite a lot.

Conclusions

A SMPTE-based system at this price is unheard of, or at least, it was until Roland came along. Everything the unit is supposed to do, it does without fuss, though I was disappointed to find out that there was no way of using the Sync Box as an autolocator for storing tape positions. Also absent is the facility to synchronise two tape machines *via* the SBX80's SMPTE connections and although I know that isn't what Roland's new baby was designed to do, the omission seems a strange one in view of the fact that, once you've developed a SMPTE system, it takes only a little extra hardware to implement these additional features.

Nevertheless, what you get for your money is a powerful tool capable of performing musical tasks many of you might have thought impossible, such as synchronising drum machines and sequencers to existing pieces of music.

The Sync Box has a memory capacity of 3967 beats, which works out at just under 1000 bars in 4/4 or 3/4. And with a typical tempo of 120 beats per minute, the maximum playing time will be in the order of half an hour or so, which should be enough for almost everybody.

It may not make any sound of its own or look like the sexiest bit of hi-tech gear yet created, but the Sync Box is potentially useful enough to be sorely missed once you've had the use of it for any length of time. Which, in retrospect, is probably why Roland only let me keep mine for a couple of days . . . ■

RRP of the Sync Box is £900 including VAT. Further information from Roland UK, Great West Trading Estate, 983 Great West Road, Brentford, Middx. ☎ 01-568 4578.

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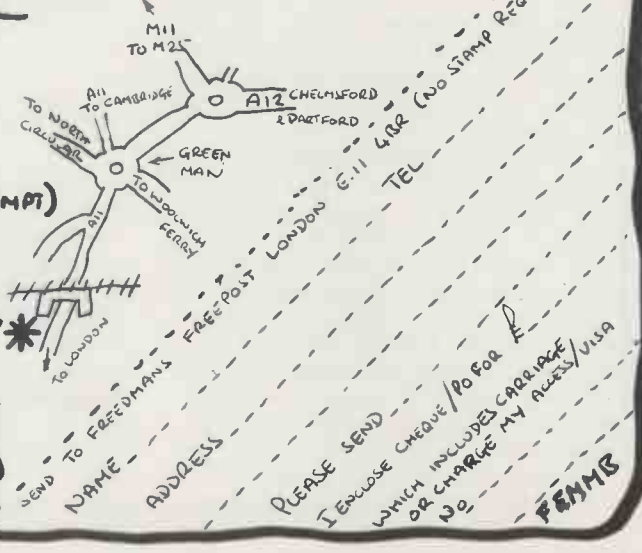

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Korg KMS30

MIDI Synchroniser

Finally, a company has summoned up sufficient nerve to design, build and market an interface box that's affordable as well as extremely useful.

Trish McGrath

Ever since the new generation of MIDI synths and sequencers hit the scene, musicians have been desperately trying to update their equipment to the new format as quickly and as painlessly as possible. Unfortunately, in the majority of cases this necessitates using erstwhile equipment alongside newer MIDI instruments, and coming face to face with that horror of horrors – interfacing.

Basically, what most of us need from a synchronisation point of view is a simple to use unit that will convert clock signals from MIDI to the most popular analogue sync codes, and vice versa. And if It'll also enable you to run your MIDI drum machine from a click track on tape, so much the better. Cue the Korg KMS30.

There's no doubt that the KMS has been launched to further the cause of Korg's own product range as well as to solve some previously insurmountable interfacing problems. After all, if it hadn't been for the new Synchroniser, there'd have been no way anybody could've linked the Poly 800's MIDI sequencer with any Korg drum machine. And besides, the DDM drum machines are incompatible not only with the Poly 800 but also some (let's face it) very popular non-Korg drum machines and sequencers, so the KMS allows the excellent Super Percussion unit to complement a drum machine other than the Super Drums, for example.

Measuring a compact 232 × 35 × 131mm and weighing in at a reasonable 850g, the KMS comes complete with its own 9V AC adaptor and is constructed from a grey metal casing with blue livery. The all-important five-pin DIN sockets comprise one MIDI In, two MIDI Outs, one Sync In and two Sync Outs, with a couple of phono sockets (Tape In and Out) provided for syncing everything to tape. Each of the three Sync sockets enjoys an accompanying toggle switch that's used to select either a 24 or 48 pulses per quarter note sync code, which won't be particularly heartening news to Oberheim owners but should satisfy most other mortals.

Since the KMS doesn't actually generate a clock signal of its own, a Master Clock Select switch provides a means of selecting which of the three kinds of possible clock input signals (MIDI, Sync or Tape) will be used as the master clock for the outputs. A Tempo LED flashes in time with the beat and, as well as a Power On/Off selector, a Synchronisation On/Off switch enables and disables the unit without the user having to unplug cables. Handy.

Operation Options

So that's about it. Those of you expecting a series on *Understanding the KMS30* will be a little disappointed since, as far as the actual hardware goes, most of it is pretty self-explanatory. Operating the unit consists of switching it on (it does help sometimes, you know), deciding on which generation of hardware will provide the master clock (let's say it's MIDI), and connecting the MIDI Out from the chosen unit to the MIDI In on the KMS. If you set the Master Clock Select to MIDI, MIDI Outs 1 and 2 will effectively operate as MIDI Thrus, so they could be sending unprocessed data to an expander or MIDI drum machine (normally, both MIDI Out jacks send only clock and start/stop data, note information being disregarded by the unit). Meanwhile, if your KMS is on the ball, Sync Outs 1 and 2 will output whichever sync code is indicated by the 24/48 ppqn selector.

The procedure is pretty similar if you decide to use a sync code as the master synchroniser. Connecting, say, a TR606 to the Sync In socket (set to accept a 24 pulses per quarter note code in this case), with the Master Clock Select switch set to Sync, and the MIDI clock signal is output from the MIDI Out sockets, with the Sync Out sockets emitting either a 24 or 48 ppqn code.

Perhaps a rundown of popular bits of gear whose owners may find a KMS30 useful wouldn't go amiss, so here they are (listed in brain cell data retrieval order):

Sync (24 ppqn) – Roland TR606, TR303, and TR808 drum machines, MC202, MSQ700 and MSQ100 sequencers, E-mu Drumulator*, MXR 185 Drum Computer*, Hammond DPM48 drum machine, and the SCI Drumtraks*.

Sync (48 ppqn) – Korg KPR77, DDM110 & 220 drum machines, the Linn Drum*, and the SCI Drumtraks (input only).

MIDI – Clef Band Box, Korg Poly 800, SCI SixTrak and Max synths, SCI Drumtraks, Roland TR909, TR707 and PB300 drum machines, MSQ700, MSQ100 and PR800 sequencers. (PS. I lied about the Clef Band Box.)

(Both the Yamaha RX15* and RX11* drum machines can synchronise to all the above formats.)

* Machines marked thus may also need to generate a 5V trigger pulse on Pin 1 to start and stop the Roland clock.

Taping in Sync

Perhaps the KMS30's most desirable feature is its ability to generate a click track, derived from a drum machine or sequencer input (sync or MIDI), which can then be recorded on one track of a multitrack tape machine. Any overdubbed parts will then be in perfect sync with each other, provided the click track has been recorded properly. The procedure for this is straightforward and clearly explained in the KMS30's refreshingly concise user manual. The click-track could also be used for triggering the playback of a computer sequencing package if a Sync In socket is provided on the MIDI interface. The synth's audio outputs are routed to a new track and, like before, a multitracker's capability is extended without actually overdubbing and gaining a generation of tape hiss.

And, if you do use a click track as the Master Clock, it does mean you have the option of recording a guide drum pattern and replacing it later (provided you haven't bounced the drums down or recorded over the click track), as well as actually recording the drum machine audio output directly to the stereo master.

Conclusions

At £155 including VAT, the KMS30 is the solution to many previously unsolvable incompatibility problems, and as such should find favour with the entire hi-tech music fraternity. Korg have obviously given its list of facilities some thought, because its usefulness won't be at an end even when the analogue versus MIDI dilemma has reached its logical conclusion: the tape sync feature will still be as worthwhile as it ever was.

An effective and highly laudable piece of contemporary interfacing, then, that does what it sets out to do with complete transparency and reliability.

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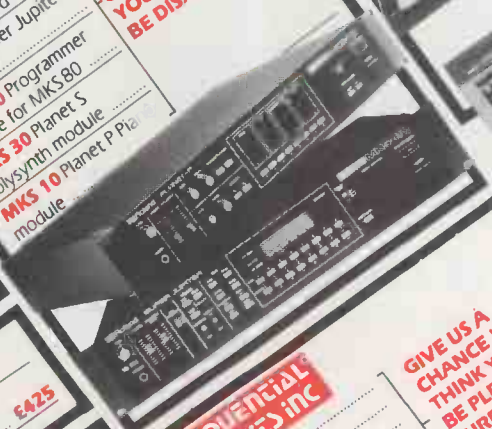

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Hot on the heels of last month's five-unit round-up of the latest in keyboard combo design comes a duo of reviews on the combos that didn't make it here in time. *Paul White*

Vox Venue Keyboard 100

Although Vox have changed hands on numerous occasions throughout their long and chequered history, they are probably still best remembered for their legendary AC30 amplifier.

The Venue is nothing like an AC30. Built to satisfy the demands of today's multi-keyboardist, the Vox Venue seems to offer a reasonable degree of sophistication whilst remaining quite affordable. Basically, it's a 100W solid-state combo with three separate input channels, each with its own bass, treble and volume controls. The auxiliary circuits are organised in a manner very similar to that employed by Carlsbro, in that a push-button for both 'effect' and 'reverb' is fitted to each channel. To the right of the front panel is the Master section, and this includes the master volume, reverb and presence controls in addition to the effects loop sockets and the reverb footswitch socket. Each channel has two inputs of different sensitivities, which should help to minimise instrument matching problems.

Fabricated from chipboard and plywood, the cabinet measures 24" × 21" × 9½", and is neatly covered in grained black vinyl. Standard plastic stackable corner protectors give the whole thing a finished-off look, and the solid-state amplifier section itself is located in its own compartment at the top of the cabinet.

In the speaker department, output power is handled by a generously-rated 15" driver and a sizeable high-frequency horn, both of which are mounted in a sealed section of the cabinet.

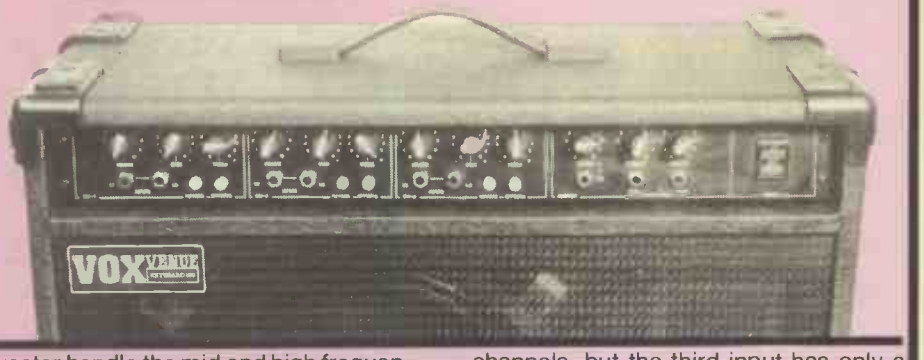
The Venue's back panel is well recessed, containing as it does output jacks (for extension speakers), the DI and slave out-puts, and a headphone jack for players too embarrassed to expose their practising to the outside world. The mains connector is of the now standard IEC type and as an added bonus, a large Union Jack is printed on the back of the heatsink cover to remind you and your Japanese support band of the amp's origins.

In spite of its solid construction, the front panel design of this combo lends it a somewhat cheap and cheerful air. On checking out the combo using the trusty DX7, however, I was impressed by the clarity and power it provided and, although the tone controls are fairly standard, they're still more than adequate for any normal require-ments.

The reverb is the usual spring type, which sounds effective on keyboards but a little twangy on drum machines. Mind you, there's no denying it would cost a lot to improve this performance significantly. If anything, background noise levels are

better than average, but these do of course increase a little if a lot of top boost or reverb is added.

So, with the possible exception of its rather unflattering front panel design (red buttons and purple stripes – the Production Editor would never approve), the Venue looks good, and it works very well indeed, giving a strong, clean sound up to quite high levels with plenty of bottom-end punch available at the tweak of a knob, if you'll excuse the expression.



McGregor Keyboard Combo

McGregor is already a household name in the UK and most parts of the planet, but probably not in the field of musical instru-ment amplification. This combo could be set to change all that, however. Designed and built in sunny Warrington, home of the most famous vodka distillery this side of Leningrad, this combo represents a conscious, no-holds-barred effort to satisfy the discerning professional musician, something that's reflected in both the physical size and the asking price of the amplifier.

The fact that the McGregor is a three-channel keyboard combo with reverb will raise few eyebrows: it's when you realise that it's powered by a 200W MOSFET amplifier and incorporates no less than four loudspeakers in a three-way ported enclo-sure that it starts to take on the appearance of something a little bit special. These features, coupled with a seven-band graphic equaliser and two auxiliary effects loops, make the McGregor a very flexible amplifier indeed.

The McGregor's cabinet is quite conven-tional, being built from ¾" chipboard and plywood and finished in a standard black vinyl with black stackable corner pieces. But even though the handles and speaker grille are also off-the-shelf items, the design still exudes quality, this being due partly to a tidy front panel design and partly to the grey-painted baffle which shows off the speakers to excellent effect.

The main speaker is a McKenzie 15" drive unit, whilst two 5" units and a horn tweeter handle the mid and high frequencies, a combination that gives a clear, natural sound with plenty of kick. I'm glad that the makers have resisted the temptation to fit a strap handle on the top of the unit for carrying purposes, as this combo is certainly no lightweight. Still, if you're concerned about space, the overall size is only about 32" × 20½" × 14", so

the McGregor will fit easily into the back of most cars without any problem.

Each of the three input channels is identical with the notable exception that the third channel incorporates a DIN socket for connection to a tape recorder. Rotary controls are fitted for volume, treble, bass and reverb functions, whilst pushbuttons select the two auxiliary effects loops. Both high and normal impedances are fitted to the first two channels, but the third input has only a high impedance: in practice, though, this should match virtually any input source.

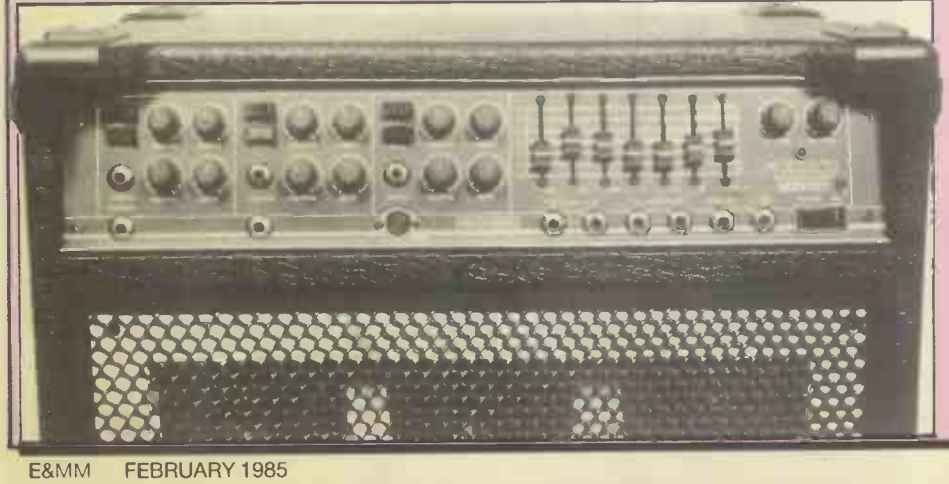
Moving right brings us to the graphic EQ, and this is a fairly standard but nonetheless effective seven-band design that will normally be used to compensate for anomalous room acoustics among other things. Directly below this are the effects loop sockets, the line output jack and the footswitch socket, whilst to the right are the reverb and master volume controls. In the extreme lower right-hand corner is the power switch, the operation of which will no doubt be familiar, though apparently, some *Guitarist* readers still believe that the small red indicator LED is some sort of light bulb. It is not.

The McGregor's multiway speaker system certainly adds a touch of class to the overall sound. During the test period the breath of flutes, the gentle bowing of violins, and the tinkle of bells all sounded clear and natural, which is really rather surprising as all the sounds came from a DX7. The reverb behaved itself extremely well and there was always plenty of power in hand, though if you wish to unleash the full 200W output on your audience, you'll need an eight-ohm extension speaker cab to handle the extra power.

The basic tone of the amp is so good that virtually no variation in EQ is needed to obtain a decent sound, but if you're really intent on using some, there's plenty of control available, even before you start to use the graphic EQ. And background noise remains commendably low at all settings.

At around £450, the McGregor *is* a little bit more expensive than most of the competition, but it really does perform well. Just about all the facilities you could wish for are included except for a headphone outlet, and that really is the McGregor's only minor problem (or should that be miner problem?).

The combo's high power, clean sound, and low background noise levels make it an attractive proposition for both professional and semi-pro players, and if you're looking for that extra bit of quality and versatility, you've simply *got* to give McGregor a fair audition. ■



Prices and Addresses

Vox Venue Keyboard 100 (£299) *– Vox Limited, 32–34 Gordon House Road, London NW5. ☎ 01-267 5151.*

McGregor Combo (£450) *– MTR, Ford House, 58 Cross Road, Bushey, Herts. ☎ (0923) 34050.*

Roland MSQ100

MIDI Digital Keyboard Recorder

Roland's budget MIDI sequencer has been available for little while, but has managed to evade the eagle eye of E&MM – until now. *Trish McGrath*

While sequencer software packages for home computers have been flooding the marketplace in recent months, dedicated MIDI sequencers are still quite scarce. E&MM reported on the Roland MSQ700 in April 84, and that machine has since proved extremely popular, so what has the MSQ100, in effect a scaled-down version of the earlier model, got to offer? Well, polyphonic recording is possible in both step and real time, there are overdubbing and editing facilities, and tape dumping and synchronisation to drum machines are also possible.

The front panel is economically laid out (ie. lots of shifts and multifunction switches) and sturdily constructed (it forms part of a dark grey metal casing), and separates into Mode, Tempo, Display, and Record function switches. Mode consists simply of Play Only (otherwise known as memory protect on), Load/Play and Data Transfer (where recorded data can be saved to cassette tape or to another MSQ100 *via* MIDI).

Connections

It makes sense, to me at any rate, to check out the back panel options first in order to clarify what you can and can't use to record from and sync to. Apart from the necessary power supply socket (9V DC), the MSQ100 provides MIDI In, Out and Out/Thru sockets and connections for Tape Load and Save, as well as Sync In and Out for synchronisation to drum machines and sequencers operating on the 24 pulses per quarter note standard (TR606, TB303, and so on). However, Korg DDM owners will need something like that company's KMS30 (see review elsewhere this issue) to convert the Korg 48 pulses per quarter note code. The DCB connections fitted to the MSQ700 are conspicuous by their absence – hard luck Juno 6 and 60 owners – so this is very much a MIDI only unit, at least when it comes to linkable synths.

Tucked away on the rear panel are eight Function switches that determine what MIDI information is to be recorded, among other things. These tiny buttons (have a matchstick at the ready for toggling) give you the option of recording key velocity, bender/control change and after-touch data, though using these will of course have its effect on the memory's note storage capacity (quoted at 6100 single notes without velocity, 4900 single notes with it). A further switch selects the type of information being sent from the MIDI Out jack – this can be either the recorded data or, with the switch set to Mix, data being received from a master keyboard, which is sent to a sound module or expander unit in addition to being processed by the MSQ.

Yet another function switch (!) determines whether the MIDI Out/Thru jack is, er, Out or Thru. Although its purpose may not be instantly obvious, this switch does let you play a slave module during recording (MIDI Thru), thereby 'getting into the groove of things' (whoever invented that phrase must be even older than our Publisher) in addition to functioning normally as MIDI Out during playback.

Finally, the Metronome can be set to sound on either a crotchet or quaver – so I guess that if you set it to a crotchet you could fool yourself into thinking it was a quaver and play along with your Korg drum machine. (I never said it was easy . . .)

Recording

Before you can begin to digitise your masterpiece, the clock source you want to use must be specified from a choice of Internal, MIDI or Sync. Basically, MIDI allows the MSQ to be started and stopped by a MIDI drum machine or sequencer, but seeing as this entails occupying the MIDI In socket, it's a facility that can really only be used in playback mode. If you need your MIDI drum machine to play along during recording, you'll have to connect to one of the MSQ's MIDI Outs and set it to receive start/stop and clock data only. Similarly, Sync is chosen when a drum machine operating at 24ppqn is to serve as the master synchroniser.

When the tempo is dictated by the MSQ's internal clock, a large rotary control is used to vary it from Slow to Fast. If this sounds vague and imprecise – don't despair. Pressing Tempo Check puts a reading of the current metronome speed up on the LCD, and the parameter itself is variable from 33 to 254 beats per minute, which is a big enough range for anybody, really.

And so to the real business of recording. In real-time mode, measures are counted automatically so either 3/4 or 4/4 time is best selected beforehand (later editing will be a shambles otherwise). Pressing the Load button commences the two-bar lead-in, whereupon recording commences regardless of whether or not you're actually playing anything, so you're free to leave blank beats (or even whole ▷

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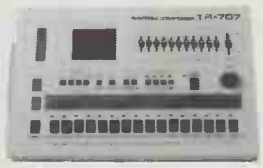

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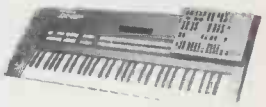

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bars) to suit your own arrangement. When you've played the sequence, Stop completes the bar and playback is initiated by pressing Reset and then Play or alternatively, playback can commence from any chosen measure. If you want your sequence to loop endlessly, look no further than the Repeat Play button, and if your sequence length proves to short, simply move to the last measure and press Load once more.

Recording in step time follows the now almost standard method of selecting the shortest timing value and using multiples of this base value interspersed with rests, tied notes, and measure ends to complete your piece. Worth noting is the fact that the base value on the MSQ can be changed freely during the input stage (which is good news) the options available being quavers, triplet quavers, semi-quavers, 1/16th quints (five steps to a crotchet), 1/16th sixths (six steps to a crotchet), and 1/32 notes. This should be sufficient for most applications, and the Roland's resolution in real time was good enough for the machine to record any fraction of a bar I cared to chuck at it. And since measure ends are inserted manually, the MSQ can accommodate time signature changes at any point during recording in step time, should you feel so inclined.

Editing

The MSQ100 provides a fair quota of editing facilities, such as Copy, Erase, Insert and Delete, all of which are simple to operate and eminently useful. However, since editing is carried out to particular *measures*, it's important to insert measure ends correctly if you've recorded your sequence in step time, for obvious reasons. Using the Back and Forward Measure buttons lets you home in on the bar in question, and Copy allows you to copy a measure to the end of the existing data (but not to any other point in the sequence). Erase deletes the sequence from a chosen point to the end of the data (this can also be used to start from scratch again), while Insert, not surprisingly, provides a means of inserting additional music at any point during the sequence, and Delete will remove a bar as and when required.

The display flashes an assortment of useful messages during the editing stage, and these include current measure number, how much more data can be recorded (available note storage), current tempo, and the MIDI channel being recorded.

This last function is actually called MIDI Channel Shift and contrary to what I implied in the last sentence, doesn't in fact tell you which channel is being recorded. Confused? Well, stay tuned DX7 and Korg Poly 800 owners. In their infinite wisdom, Roland have endowed the MSQ100 with the ability to *receive* information on a particular MIDI channel, but *record* it as if it had been data received on a different one (this is where the 'shift' element comes into it). So, owners of a polysynth capable of transmitting only on MIDI Channel 1 and an expander module with assignable channels can record their first part on Channel 1, alter the MIDI Channel Shift value to +1 (ie. Channel 2), and then record the overdub. Provided both modules operate in Omni Off, Poly mode, both sequences will be played simultaneously but on separate MIDI channels – 1 and 2. You didn't know the MSQ could do that, did you? Frankly, neither did I till I got to page 26 of the manual.

> 'Since measure ends are inserted manually, the MSQ can accommodate time signature changes at any point during step-time recording.'

Overdubbing

Further parts can be added by moving to Overdub mode, resetting to the required measure and pressing Load as normal. If you're only using one keyboard, you can overdub as many times as you see fit, up to the maximum number of voices your synth can handle. It also goes without saying that if pitch-bend, vibrato or after-touch are used on one channel, any overdubs on that same channel will also be affected. Incidentally, the MSQ *is* capable of remembering program change data, but to make sure you're going to start in the right voice, you've got to enter the bank and patch number for the first sound during the lead-in.

Of course, if you're lucky enough to possess more than one MIDI synth, you can overdub using all sorts of different channel numbers, and the MSQ100 will then do a reasonable imitation of a multitrack tape machine. If two MIDI Outs are not enough, you can use the MIDI Thru sockets on your modules (if they have any) or pick up one of Roland's handy little MIDI Thru Boxes. Do bear in mind though that once sequences are overdubbed, all the data is automatically merged and editing must be carried out to complete measures.

Alternatively, a particular channel number (assigned by the MIDI Channel Shift button) can be erased using the Channel Erase function. I'd still recommend saving patterns to cassette quite frequently though, so as not to risk losing valuable data.

The MSQ100 can also give the gift of dynamics to any MIDI drum machine that accepts Key Velocity information, simply by recording a sequence on a touch-sensitive MIDI keyboard, using the appropriate notes (ie. 'C' for bass drum, 'D' for snare and so on). This refreshes the drum machine software most hardware cannot reach. Or something.

Conclusions

I must admit to being pleasantly surprised by the MSQ100. I *did* find the multifunction switches a little bewildering: the Back Measure button, for instance, performs no less than six functions, depending on what mode you're in. Still, like anything else, you get used to it.

Data remains in the unit's memory as long as the AC adaptor is connected, but is completely erased a day or so after disconnection. Since the contents of the memory can be saved to cassette, this in itself shouldn't present a problem, though you'll need to bring a cassette player with you to a gig for good measure, I imagine.

So if you're on the lookout for a compact and versatile dedicated MIDI sequencer, and suffer from techno-fear where computers are concerned, why not have a bash at the MSQ100? It has a trick or two up its sleeve. . . ■

RRP of the MSQ100 is £525 including VAT. Further information: Roland UK, Great West Trading Estate, 983 Great West Road, Brentford, Middx. ☎ 01-568 4578.

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Higher Education

Newcastle CAT School of Music

A personal overview of one of Britain's more unusual and forward-looking music schools, from the pen of one of its students. *Paul Evans*

The School of Music and Performing Arts which forms part of the Newcastle College of Arts and Technology is the only specialised music school of its type in the North East of England, and indeed, it's one of only a very few in the country. It offers some unique courses and opportunities for young musicians, and aims specifically to prepare its students for careers in all branches of the music and entertainment industries.

Established in 1964 with a mere 24 students, the School quickly made its reputation, and as a result of its rapid growth in popularity, moved into its current purpose-built premises in 1974. The three-storey buildings house lecturing and teaching rooms and instrumental teaching rooms for individual and group tuition, including two piano keyboard laboratories, a drum studio and a tuned percussion garage. There are rehearsal rooms for the many groups, bands and orchestral ensembles based in the College as well as a suite of 19 student practice rooms, an electronic music studio and a fully-equipped concert hall.

The School is well supplied with musical instruments. Almost anything is available, from early medieval instruments, orchestral brass, strings, woodwind and tuned percussion to modern jazz and rock instruments and state-of-the-art computer music systems, synthesisers and drum computers. The College also has its own video studio (which is utilised within the music and performing arts courses) and the facilities of the New Tyne Theatre are available for stage musical productions.

The department continues to grow in popularity, attracting students of all ages from all over the country and presently operating near its full capacity of over 250 full- and part-time students. Further expansion is now in progress, and the School has recently acquired the floor of another building to accommodate further growth.

Courses

Electronic music comprises only one part of the wide range of studies taught at the School of Music, but because of the flexibility of the course structure, any student may take an active interest in electronic music if he or she wishes. You might be interested to learn of the range of courses on offer: some are geared specifically to the needs of the rock, pop and jazz musicians and composers who make up a large portion of E&MM's readership, while others adopt a more traditional outlook.

In addition to the usual GCEs and the popular Performing Arts Foundation course in drama, singing and dance, courses are offered in three general areas of musical study: traditional 'Classical' music courses; early and medieval music; and light and popular music. And these can be studied at two levels – the initial two-year Foundation Courses and the advanced three-year Professional Diploma Courses. I'll concentrate on the light music courses, since I can't imagine too many of you are actively engaged in the study of medieval composers.

Only a handful of colleges in Britain offer the Light Music Foundation Course. It's specifically designed to meet the needs of young musicians in the rock, pop and jazz fields. To stand a chance of joining the course, you should be technically capable on your chosen instrument, which may be keyboards, guitar, bass, drums, voice or anything else, but you need not necessarily have had any previous formal training. The main requirement is that you should be talented and prepared to work hard to develop that talent. On the Foundation Course, gaps in your musical education are filled by practical and theory classes, and instrumental proficiency is further developed. The aim is that by the end of the course, you'll have a good general musical education and be adept at playing (and reading for) your chosen instrument.

On completion of the Foundation Course, you can either leave to pursue your ambitions as bait for the sharks of showbiz, or progress to the Professional Diploma Course, where nobody is likely to bite your head off unless you're dumb enough not to work hard.

The Diploma Course is an intensive one, however, on which you should become proficient on two or more instruments and study music theory, history, analysis, harmony, arrangement and orchestration to fairly advanced levels. In addition to all this, you can study a choice of many specialised options, the list of which is (almost) endless and includes popular music techniques, improvisation and electronic music. You'll also find yourself playing in the College's Big Band, not to mention smaller bands, medium-sized bands, choirs, theatre orchestras, Newcastle Jazz Festivals, Edinburgh Fringe festivals, lunchtime concerts, concerts on Metro Radio, concerts not on Metro Radio, soundtracking sessions for communications students in the video studio, and generally gaining experience of performing in every conceivable situation you're likely to find yourself once you've left the confines of the School.

Students who make the most of the opportunities presented by the Diploma Course can become versatile, experienced, professionally-minded musicians, with an advanced general music education as well as a great proficiency in their chosen specialisations by the time they complete the course. So these are the aims of the Music School and, by and large, they are admirably met.

As a student there, I'd say the best thing about the School is that *all* the necessary facilities and tuition are already provided: it's up to the students to make the most of them. You're encouraged and assisted to develop freely and choose your own directions and specialities and the courses are comprehensive and flex-

ible enough to accommodate the diversity of interests that results from this freedom.

Speaking of specialisations, it's time to return to E&MM's own.

Electronic Music

The College's electronic music facility began in a small way nine years ago, with the ubiquitous EMS Synthi 100, a Revox A77 tape recorder and a pair of Altec monitor speakers. Despite the apparent simplicity of this set-up, it was used enthusiastically by all those involved, and live performances were given of students' material and of compositions by Kevin Stephens, the senior lecturer in charge of the electronics facility.

As synthesiser technology advanced, better instruments became available, and the School of Music augmented its instrumentation by buying one of the first programmable polyphonic synthesisers – a Roland Jupiter 4 – in 1978. The emphasis has, until very recently, been laid firmly on live performance and this led to the purchase of a high-quality Carlsbro PA system with which the JP4 was frequently used in concerts given by diploma students.

Kevin Stephens and the School's Director, James Joseph, have pursued a policy of obtaining the best instruments available, assuming that this is financially possible. When it became clear that computers were going to play an increasingly important role in modern music (around 1981), they ordered an Apple IIe computer music system, which has been used as a compositional, arranging and transcribing tool for works as complex as the *1812* Overture. The recording facilities were simultaneously expanded by the arrival of a second Revox, a Soundcraft 16:4:2 mixing desk, a Sharp amplification/monitoring system, numerous pairs of headphones, a Roland RE501 chorus-echo-reverb unit and a cassette duplicator.

Paradoxically though, electronic music was of secondary interest to most CAT School students until the dramatic emergence of electronics as a major force in modern music resulted in the department begin-ning to attract a new breed of student wishing to specialise in this field. In order to meet the growing demand, Joseph obtained the department's proudest possessions: in 1984 a Rhodes Chroma computer-synth and the latest updated version of the E-mu Drumulator digital percussion computer. A Rhodes Triad interfacing unit, together with concurrent hardware and software expansions to the Apple, have completed a state-of-the-art computer music system of which students are currently taking full advantage. Other new arrivals are a range of signal proces-sors and effects that include a compres-sor, flanger, gate, chorus, octaver, EQ distortion and overdrive pedals, and a selection of dynamic mics and C-ducer contact mics for acoustic instruments.

The department has a strong community spirit, and co-operation between the students has resulted in the semi-permanent residence of a Korg modular synth system, a Roland CR78 Compu-Rhythm, Yamaha DX7, Moog Source, various delays and effects and several multitrack cassette machines in the Electronic Music Studio. And cassette mastering machines, in addition to the Revoxes, are provided by the College's Educational Technology Resources Centre. The facility also enjoys a good relationship with local dealers Rock City Music, who supply and service all the equipment. In return, students have occasionally provided studio demonstrations of the Chroma and Drumulator for the store's customers.

New Multitrack

As part of the School of Music's continuing growth, and as a reflection of its serious commitment to electronic music, James Joseph recently allocated the funds to provide the Electronic Music Studio with a fully-equipped multitrack recording facility. After consultation with Kevin Stephens and, ahem, the author, it was decided to install a comprehensive, high-quality, eight-track with an open-ended, expandable system design. The system (which will have been installed by the time you read this) consists of a Tascam 38 with full transport remote control, punch in/punch out footswitches and two Tascam DX4D noise reduction units, while a new AHB System 8 model 168 mixing console will be used in conjunction with the Soundcraft (plugged into the 168's expander inputs) to give a 32:8:4:2 mixer. The AHB's ability to use the group outputs in mixing will allow a maximum of 40 line inputs, and this should make the most of the individual voice outputs on the Chroma, Drumulator, JP4 and other instruments.

From now on, monitoring will be *via* a pair of Tannoy Little Red Monitors powered by Quad 405-2 amplifiers, with the Sharp system acting as a domestic reference. The high quality delays available from the RE501 obviate any need for a DDL as yet, but future outboard additions will probably include a compressor/limiter (to control high-transient signals such as vocals and bass guitar), and a couple of high-quality AKG condenser mics and Sennheiser headphones. Finally, the department hasn't forgoten those little essentials that make all the difference to a studio – mains hum suppressors, VDRs to protect the electronics from voltage surges, *miles* of spaghetti to connect everything together, and (surprise, surprise!) plenty of tape for the multitrack and for mastering onto the Revoxes.

Plans for the future include adaptation of all equipment to the MIDI standard and software for the Apple (and a new BBC micro) to control everything *via* that standard, so long as nobody's watching *Star Trek* on the colour monitor, of course.

Security is tight at the College, so the studio facilities are only available when the department's technician, Raymond Hislop, is there, unless you make special arrangements with the powers-that-be. However, the studio is in use nearly all day, every day, for a variety of different purposes. A great deal of time is spent generally investigating and practising with the Chroma/Apple/Drumulator system in conjunction with the Korgs and JP4.

Spot the guitar. Choma, Apple IIe, Korg MS series and Jupiter 4 are the stars of the show.

Other, more concrete uses of the studio include the following.

Diploma students Gordon Hall, Bill Robinson and John Simpson are currently in the studio arranging and recording various pieces for their course projects. Other students create 'vocal' sounds on the Chroma and use them to perfect their choral and harmony arrangements, while various jazz groups rehearse with it.

As the first students to specialise in electronics and studio techniques at the School, the main users of the facility are the author, Peter Riani and Stephen Scorer. We're currently writing and demoing an album of pastoral English pop music for a five-piece studio band, Absent Friends, for release after this year. And we're also rehearsing a small electronic-acoustic orchestra for a performance of 'Tubular Bells', specially arranged by Steve Scorer, to be staged in the College's concert hall at a future date. ■

Further information about the School of Music can be obtained from: the Departmental Clerk, Room 141, School of Music, College of Arts and Technology, Maple Terrace, Newcastle upon Tyne NE4 7SA.

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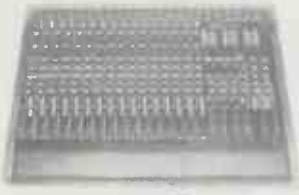

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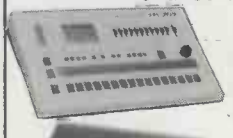

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MUSIC ON CASSETTE

It seems there are more E&MM readers making demo tapes than ever before. We take a critical look at some of them. *Neville Unwin*

Kris McKuen *Derby*

Containing as it does nearly an album's worth of minimalism, McKuen's cassette *Linear Functions* is music you either love or hate. A repetitious montage of changing textures forms the basis of each track and develops slowly to achieve a hypnotic effect. I found myself listening for and trying to anticipate the slightest change in the music before it actually took place, but the most interesting aspect of Kris' work is undoubtedly the varied synth textures he's created. Melody plays an important role, too, but at the cost of the harmonic progressions, which are for the most part rather conventional. Nevertheless, it's the music's originality that makes this one of the most inspiring cassettes of the month.

Holiday Patrons *Cleveland*

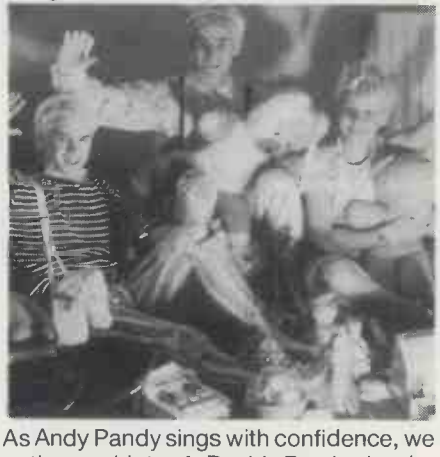
Three very different tracks from the Holiday Patrons. 'Destroy Me' sets a deep, unemotional vocal against a powerful, driving beat, while 'Muscle Sport' is an entertaining (read 'humourous') look at bodybuilding: the third track, 'I'm in Love with Love', is almost a blues. The band's unco-ordinated backing vocals work particularly well, proving that, just because you can't sing, doesn't mean you can't shout effectively. Holiday Patrons are not primarily a synth band, and there are no drum machines or sequencers within earshot. Instead, their music is less complex than many more technologically-oriented groups, but it's also played with a better technique than most, even if that simplicity is carried to extremes at times.

There's Nothing New Under the Sun *Luton*

At first sight, a tape that seemed to represent the height of pretention. No fewer than 26 tracks (most of them, thankfully, short) based on 'ancient writings and the Bible' follow each other without pause. Nevertheless, each track has something of interest to offer. There's a wealth of technical effects and diverse instrumental arrangements that ensures that the music never becomes dull. Overdubbed tapes, solo speech, choral singing and a variety of synth sounds all contribute towards this end. However, pretentious aspects aside, the continually unexpected song endings result in the music becoming disjointed, particularly when there's no 'breathing space' between songs. The actual material used is interesting, but is just not given enough time to reach a satisfactory conclusion.

Andy Pandy and the Mad Teddies *Harrogate*

At the opposite end of the musical spectrum come this (intriguingly-named) Yorkshire band. Not only does their image embrace the world of children's television, so do their songs. 'Tick Tock', for instance, is the tale of Looby Loo's kidnap by the Action Men, while 'Party Time' contains a mixture of kiddy talk and nonsense words – a clear winner for the Silliest Song of the Month award. The object of all this seems to be to present the most ridiculous subjects in a perfectly straightforward – even dramatic – manner.



As Andy Pandy sings with confidence, we notice a hint of David Bowie in the delivery. And although there's a dance flavour in many of the songs, they're on the whole, thoughtfully arranged and accommodate a variety of atmospheres. Those rock musicians who like to take their image seriously might find this band frivolous, but there can be no doubt they've taken as much time and care as any over the finished product.

Woodside *Cambridge*

Unusual among E&MM demo hopefuls, Woodside are a guitar-based band. Mysteriously entitled *Jade* their cassette features a variety of styles, from the obviously commercial 'New Day' to 'Commuter Belt', a slow track that, again, comes close to blues territory. Technically, every track is well played. Tim Maitland's various bass styles and brother Chris' excellent drumming being particularly impressive, and these are complemented by the quality of the recording. The vocals aren't always intelligible, which is a shame, and Woodside would almost certainly benefit from the inclusion of a keyboard player in their line-up, as that might result in a bigger variation in sound texture. Something which, despite effects pedals, is somewhat lacking on the evidence of this cassette.

The Best of the Rest

Julius, alias Paul Spicer from West Sussex, offers just one track, made worthwhile by the strange intervals in the distinctive vocal line. The lyrics are conventional, the accompaniment simple yet

effective. In contrast to this demo, which was recorded in just four hours of studio time, The **Producers'** demo is (perhaps appropriately) rather over-engineered. It's technically well performed, though, if rather unadventurous in style. Still, they do at least use a Frankie bass sound (played on an OSCar though I'm not sure it's the same sound as the one we published in *Patchwork*) with more imagination than that band managed on 'Relax'. Meanwhile, Oxford's **Paul Hopgood** features on two tapes this month. His solo offering, 'The Mystery of the Sheep in the Suitcase', is almost minimalist in character, and concentrates on unusual, shifting harmonies. However, it's rhythmically too conventional and sonically too predictable to keep it from becoming monotonous. Produced by Paul Hopgood, **The Turquoise Mole Eaters** are a different kettle of fish, and definitely an oddity. To put it politely, the spontaneous nature of their songs increases towards the end of the tape, and although a neil 'heavy concept' version of 'Freebird' is at times quite amusing the playing on all the tracks is ragged, the remainder of the songs being too overdone to be funny. More effective are Wakefield's **Citron Girls**. Their satire 'How I Made a Million Dollars by Leading Two and a Half Lives for the FBI' shows that a song needn't be musically complicated to succeed, while 'The New Trash from America' uses skilfully-mixed excerpts from radio broadcasts to bring home its message. ■

If you've made a demo tape you'd like reviewed in E&MM, send it well-protected (accidents do happen) to On Cassette at the editorial address. Don't forget to include plenty of recording/equipment details, as well as a recent photo if possible.

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CASIO MT35, Auto Chord/Bass/Rhythm
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CASIO PT-1, New Model with Memory
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ROLAND JSQ 60,2,500 notes
ROLAND MC-202, 2,600 notes
ROLAND CSQ,600, 600 notes
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ON RECORD

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Morgan Fisher
Look at Life
Cherry Red BRED 64

Well, a real turn-up for the book in February's electronic music Record of the Month stakes. Some of you may remember Fisher as a member of late-sixties overnight success combo The Love Affair. Me, I remember that his was the tortured but inspired imagination that resulted in *Miniatures*, an album consisting of 51 minute-long recordings by artists famous and infamous that surfaced about ten years later.

But here he is, beating all-comers to make the brightest, most original long-playing contribution to 1985 so far. Recorded in Japan, where Fisher has been living for the past year as a convert of the Rajneesh religion, *Look at Life* is a celebration in every sense of the word. Morgan makes plentiful use of the best modern technology can offer him (a couple of Casios, Yamaha GS1, DX7 synths and REV1 pro reverb system), but still succeeds in making music that lifts like no margarine I know of.

There's a variety of styles on show here, from the systems patterns of 'Lord of the Full Moon' through the lilting Latin of 'Samba de Carnival' to the undisturbed calm of 'Erik', as good a tribute to Monsieur Satie as you're likely to find this side of Japan's 'Nightporter'.

Above all, *Look at Life* tugs the listener away from the grey indifference of everyday life and into a world where deceit and pretence are as far away as they'll ever be, though in the case of the next record to come under the microscope, that obviously isn't far enough . . .

Wendy Carlos
Digital Moonscapes
CBS IM39340

Absurdly sub-titled 'An Evolutionary Synthesiser Tour de Force', Carlos' latest offering promises the world (nay, the galaxy) and delivers, well, nothing really. I suppose it's stating the obvious to say that Carlos' inventiveness has completely deserted her since she made *Switched-on Bach* (as a man) back in 1969 or whenever it was, but even that knowledge didn't prepare me sufficiently for the mediocrity of *Digital Moonscapes*.

In the (diabolical) sleeve notes, Carlos claims to 'love the orchestra' and then proceeds to rob that august musical tradition of almost all its natural glory and sparkle by using a number of dreary, lacklustre synth sounds lovingly programmed on a brand new Synergy/Crumar General Development System. And while an unhealthy preoccupation with the synthesis of acoustic timbres means that there's scarcely an original synth sound anywhere on the entire LP, there's also no escaping the fact that there's hardly a musical progression here that's worthy of the name.

If there is a lesson to be learned from *Digital Moonscapes*, it's that you can't rely on technology to do all the work for you if you haven't an original musical idea in your head – so don't get carried away with that costly computer music system you always promised yourself.

How the mighty have fallen.

Jean-Luc Ponty
Open Mind
Polydor 823 581-Y

Another synth player who's been around a bit, though Ponty can at least claim some instrumental versatility in view of his well-documented exploits with myriad forms of electric violin. What he can't claim with any conviction is that Open Mind breaks much in the way of genuinely new ground, either musically or technologically.

Still, where Ponty scores over Carlos is in being able to instill some sort of passion into his playing after all this time. Even when a star of similar stature such as Chick Corea (the title-track) or George Benson ('Modern Times Blues') drops by to make a guest appearance, Ponty keeps his cool and continues playing with confidence and self-respect.

Not an earth-shatterer then, but *Open Mind* should keep Ponty's fans happy, and enhance his reputation as one of the most emotional synth performers of the present era. If there's anybody capable of proving that solo synth performance needn't be an egoistic indulgence, it's him.

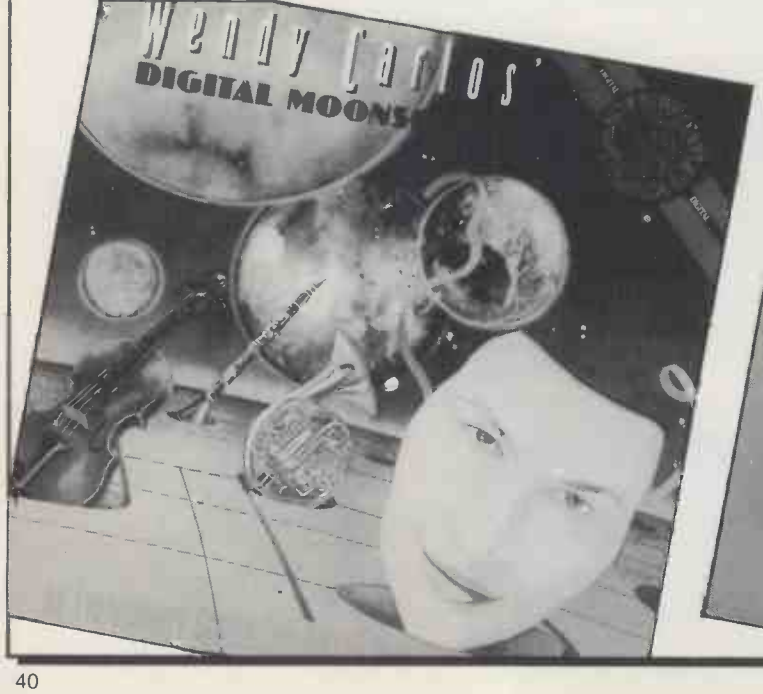
Steve Roach
Structures from Silence
Fortuna FOR-LP024

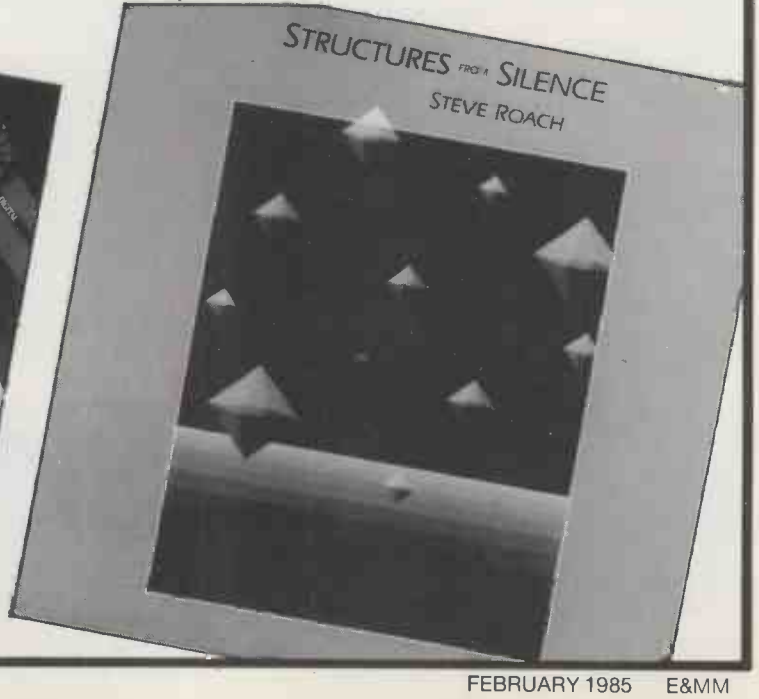
And by way of complete contrast, an album of floating, reflective computer music from Roach, a young Californian composer who'd already made his mark as a writer of more 'dynamic' electronic music before turning his hand to the crystalline ambience of *Structures*.

According to the composer, 'the essence of this music is what you feel when it ends, a returning to the silence', but personally I got more involved in it while it was still playing – it makes a colourful but inoffensive backdrop to more or less anything. Which, if you think about it logically, is exactly what good muzak is all about.

Technical details are scarce, but we are at least furnished with the information that the composer listened to no outside music whilst in the final stages of committing side two to tape, so the recording should theoretically be free of conscious plagiarism. Actually, there's more than a hint of the Eno School of Ambience in the way *Structures* is put together melodically, which will no doubt please those already converted to the attractions of this sort of music, but leave the rest of the record-buying public out in the cold.

The album is much the better for its lack of compromise, however, so if you're interested (and the record is only a tiny part of what's now an excellent Fortuna catalogue), contact Lotus Records at 23 High Street, Newcastle under Lyme, Staffs ST5 1QZ. ☎ (0782) 628916. ■





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ZOO 2000

AN INTERVIEW WITH JEAN-MICHEL JARRE

France's most successful composer of electronic music had a new album, *Zoolook*, released at the end of last year. Here he explains the motivation behind the recording and describes the technology that made it possible.

Paul Wiffen & Dan Goldstein

Whenever one of electronic music's most influential figures foists a new long-playing record on the unsuspecting public, that public tends to sit up and take notice. Even more so if it's been the best part of four years since he released a collection of all-new work, and if he's recruited a number of other well-known musical experimenters to assist him in the new album's production.

The figure in question here is Jean-Michel Jarre, the album is *Zoolook*, released in the UK by Polydor at the end of '84, and among the collaborating experimenters are Marcus Miller, Adrian Belew and Laurie Anderson. In fact, none of those three characters made an especially large contribution to the new record. *Zoolook* is first and foremost Jarre's work, from conception to execution, with the other artists drafted in to spice things up a little as and when the composer saw fit.

It's a remarkable album in many ways. More than any other Jarre recording, it relies heavily on the talents of computer technology (in the shape of the Fairlight CMI and the Emulator), partly because the machines have improved immeasurably since the recording of *Magnetic Fields*, the composer's previous all-new release, but mostly because a major element within *Zoolook*'s sonic make-up is the sampling – and subsequent electronic treatment – of vocal snippets from a huge variety of cultures and ethnological backgrounds.

Language Samples

What inspired Jarre to attempt such a task?

'Well, it was a concept I'd been thinking about for quite a long time. Five or six years ago, the Director of the French Opera asked me to consider writing a modern opera, though not necessarily a rock opera. I was interested, but also a bit cautious about accepting the offer, because I consider that the operatic form is better suited to the 19th century that it is to the 20th: the most famous opera composers of today are in fact people like George Lucas, Stephen Spielberg and Stanley Kubrick – film directors rather than musicians.

'On the other hand, I was also interested in refashioning some kind of operatic form, treating the vocals in a manner entirely different to what rock music tends to do with them. When the China concerts ended, so did a certain period of my career: I had become tired of the more usual sorts of synthesiser music, and

particularly the cosmic *Star Wars* approach adopted by so many people today. So I became continually involved in the everyday sounds around me – instruments like the Fairlight allow you to do that nowadays.

'I did a lot of travelling at that time, and it occurred to me that the way many musicians use pure ethnic music seemed rather artificial. It's become fashionable over the last three years or so to take a group of ethnic instruments and juxtapose them with rock ones, but that seems incongruous to me. Sometimes it can work – as it does with Peter Gabriel's music – but that sort of thing I consider to be the exception. It seems to me much more interesting to take words or parts of words from different languages and work with them.

'Some of the voices and words on *Zoolook* were recorded during my travels, while the others are the result of my working with a French ethnologist, Xavier Bellanger, who had travelled a great deal himself and had a large collection of tapes. We listened to all the sounds between us and I selected the words I wanted to use. My selections were based on phonetic or musical qualities rather than what the words meant as such.'

It's the sheer scope of the linguistic samples present on *Zoolook* that gives probably the best clue as to why the album took so long coming. Languages used include such oddities as Aboriginal, Balinese, Eskimo, Pigmy and Sioux, but not all the album's samples are voices, and not all the instruments used are samplers. Because Jarre still finds time for lower-tech hardware in the form of ancient Moog, ARP and EMS synthesisers, his custom-built Matrisequencer, and a MkI Linn drum machine as well as a more up-to-date model. The assortment makes for a colourful collection full of interest and vitality, and that's precisely the composer's intention.

Synthesisers

'I like to be adaptable where synthesisers themselves are concerned', Jarre affirms. 'I wouldn't like to limit myself to any particular system, be it analogue or digital – the reason I use any instrument is simply that it can make the sound I require. Because as you know, every synthesiser has its own specific sound.

'Generations of instruments come and go, and some of them will be good and others not so good. If you take the violin world as an example, it's probably the dream of the average violinist to play a Stradivarius, an instrument built in the 17th century. And that's because nobody since then has succeeded in building a violin with the same actual sound. It's my opinion that the same goes for electronic instruments: second or third generation instruments are not necessarily preferable to those from the first.

'For example, I consider some of the sounds on the first Linn are much better than those on the LinnDrum, but because the LinnDrum has greater programming possibilities and *some* of the sounds have been improved. people have a tendency to think that it is automatically a better instrument.

'And I don't think there's any way that the newer Japanese instruments such as the DX7 will ever replace the older analogue synths. It takes a long time to edit sounds on them because altering parameters is so complicated, and in almost every respect they represent a completely different approach. If anything, the Japanese seem to be considering synthesisers as versatile organs – they're thinking primarily in financial rather than musical terms.

'That's why I prefer to weigh up the possibilities of any new instrument very carefully. And strangely, the last patch I constructed was an old Moog 55 – a modified one that used to belong to Robert Moog himself.'

And in addition to the composer's sampling computers and purely electronic sound generators, *Zoolook* also has its fair share of conventional rock instruments, courtesy of the collaborators mentioned above. As a result, some of it sounds decidedly commercial and accessible by comparison with some of Jarre's previous works, though it's unlikely Tommy Vance will ever play it on his Radio 1 rock show. Because although the instruments themselves might be conventional, the musicians playing them do so in decidedly off-the-wall ways, which is what attracted Jarre to the idea of working with them in the first place.

Collaborators

'It was a combination of factors that made me decide to use other artists on this album. I chose the people I did because I admired their previous work and because I felt they could lend something useful to the album as a whole, but there was also the fact that working with synthesisers can be very lonely. You have to approach it like a painter, alone in a bunker or something, so the idea of integrating other people came quite naturally.

'I tried to choose artists that were known not only for their session playing ability but also for working at the very edge of their particular field. For example, I consider Marcus Miller to be not only the best bass player in the United States, but also someone who has a very unusual approach to his instrument: he's able to play rock, jazz, breakdance, any number of styles. And Adrian Belew is someone who probably forgot what a typical guitar sounded like some time ago. He's able to get just about any sound out of his guitar, and was therefore fantastic to work with. Then there's the dummer, Yogi Horton, who's also a very flexible musician: he's worked with Talking Heads and on many different kinds of sessions.

'As for Laurie Anderson, she's so much more than a musician: she's really a multi-media artist. I've admired her work for quite a long time from a graphic and conceptual point of view, as well as from a musical standpoint. I enjoyed working with her enormously – she was always subtle and delicate, and the way she talks, moves and performs reminds me continually of a Japanese opera singer! She'd brought back some recordings of Japanese words after her tour there, and we mixed them into other sounds.

'I also asked her to sing something as if it had been written by aliens from another planet – the idea was that she wouldn't be able to understand the meaning of what she was singing, only the emotions behind it. She did it all beautifully.'

It can't have been an easy task, capturing all that artistic and technological energy on tape, yet already, *Zoolook* has been on the receiving end of a good deal of laudatory comment from the recording *cognoscenti*. Obviously, much of the credit for that must go to Jarre's own technical and musical expertise, but the composer himself has much praise for mixing engineer David Lord, whose own experience of producing computer instruments in tandem with acoustic ones proved invaluable.

'Only the title-track from *Zoolook* was not mixed by David Lord', he recalls. 'He knew just how to cope with Fairlight sounds because he co-produced Peter Gabriel's last album, and he also used to be a classical conductor and keyboard player in his own right. I liked his sensitivity and versatility very much. He was actually quite impressed by the Fairlight sounds I'd created and used on the album. I took a long time constructing them with a lot of high frequencies and harmonics, because as you know, wide bandwidths are difficult to achieve on the CMI. I also had to use a lot of tricks such as compressing and expanding the sound: there's actually the same amount of treble on the Fairlight voices as there is on Laurie's vocals, and

as you can imagine, that took a long time to perfect.'

But the temptation to use other instruments – such as the Synclavier and Emulator II – with wider frequency response hasn't yet been yielded to?

'Well, the new Emulator was released after the record had been completed, so it was, ahem, rather difficult to make use of it. But seriously, the trouble with modern technology is that it's not always worth learning how to use yet another new instrument, especially when you consider that it might take just as long as it would to learn the guitar, piano or flute. Just because you can play one synthesiser, doesn't mean to say you can play them all. And at the moment, I like the Synclavier but can cope much better with the Fairlight, so I'm happy with that.'

> 'I feel that the fewer statements are made about music, and the more music is listened to, the better.'

History

E&MM took a long and detailed look at Jean-Michel Jarre's musical past when we last interviewed him, back in June 1982. There seems little point repeating it all here, but one historical fact to which many commentators have attached great importance is the fact that Jean-Michel is the son of two highly musical parents. Even before he'd made his first commercial recording, his father was a notable filmscore and soundtrack composer. Did that fact really have a far-reaching effect on Jarre's career?

'Ironically, my parents separated when I was only five, and I grew up without my father as he was living in Los Angeles: I didn't see him at all between the ages of five and fourteen, and after that only once every couple of years. So I think any influence must be hereditary, and I don't think my father's being a musician has been an advantage or a disadvantage, really.

'But one man who *did* play a large part in influencing me was Pierre Schaeffer of the Music Research Centre in Paris (which Jarre attended in 1968 after graduating in harmony, counterpoint and fugue at the Paris Conservatoire). He was the first man I met who was able to think not just in terms of harmonies and rhythms, but also in terms of sound textures.

'On the whole, though, I found the whole attitude of people at the Research Centre too intellectual to be really interesting. I believe that there is some sort of quality in every type of music, but although intellectual approaches are very interesting on a purely intellectual level, I'm not so sure they're very useful from a musical point of view. In fact, I think an excess of intellectuality can actually be very dangerous. It can lead people to believe that cultural and intellectual background is what makes music more or less interesting. That tends to be the attitude of contemporary classical enthusiasts, who favour the likes of Boulez and Xenakis.

'I think it's totally absurd to have to write a book to explain a certain concept, then another to explain why that concept was a failure. Personally, I prefer to think of music in terms of whether or not it gives me the shivers! The worst crime of all nowadays is to justify the music you're writing in terms of the instruments or musical concepts you have in mind. Recently, I have come to feel more and more that the fewer statements that are made about music and the more music is listened to, the better. The end result should speak for itself. Mind you, there's nobody worse than the French for analysing and explaining.'

And, as if in acknowledgement of the truth of that last statement, Jarre continues at some length on the reasoning behind *Zoolook*'s highly individual arrangement and why its release – or the creation of something like it – has been on the cards for some time.

'After I left the Research Centre, I secured a contract with the Paris Opera, so I was quite involved with contemporary classical music as well as the rock world. I didn't want my music to be a compromise between the two, rather a means of integrating them. That's why I spent time doing so many different things, TV commercials, soundtracks, ballet music, producing rock singers, writing lyrics and generally experimenting – in unconscious ▷

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preparation for some future project that would involve music without any specific lyrics.

'I'm convinced that today's public is conditioned to listen only to songs. In their eyes, instrumental music represents only commercials and soundtracks, which to me seems crazy. *Zoolook* is vocal rather than instrumental music, but it has no lyrics as such, and why should it? What difference does it make whether or not you add lyrics to a song? On *Zoolook*, the voices are used as other instruments, so that even some of the rhythm tracks are made up of sampled words, treated and arranged to take the place of percussion.'

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Museum Pieces

Setting aside for the moment the subject of *Zoolook* (because for all the originality and elegance of its musical motivation, it sounds at times uncomfortably like a very comprehensive Fairlight demonstration record, or the sort of thing E&MM's Paul White would come up with given a drum machine, a Powertran MCS1 and unlimited 48-track studio time), the record is not in fact Jarre's first original vinyl offering for four years, as we might have implied earlier. Because in addition to there being a number of previously unreleased pieces on the live *Concerts in China* double album, the composer also made a totally new LP a year or so ago. And if you're wondering why it never appeared on the shelves of your friendly local High Street record shop, the reason is that only one copy of the disc was ever pressed. Given that Jarre must be as aware as any other artist that commercial reality and record company practice demand that he should try to sell as many records as possible, what prompted such a surprising and flagrant piece of anti-marketing.

'It started as a result of a request from a group of friends of mine who are painters and sculptors. They were planning to stage an exhibition at a Paris gallery that would include, for example, normal supermarket products transformed into art. They asked me to provide the music, which I did. So the record became a single work of art, like a painting.

'I like the idea of a record as a single object, which is an attitude that harks back in a sense to the sixties and seventies, when everything about a record was regarded as having an almost magical quality, even down to the way the sleeve was printed. It's still the same with books: the cover, and the smell and feel of the pages all count towards a book's overall quality. Yet nowadays, I think records tend to be regarded as if they were no more than Kleenex boxes.

'My album was a reaction against that, something that made the point that a record could be interesting as a single entity. In one sense, it was also a joke at the record company's expense, because it was the very opposite of their usual practice, which is to emphasise a record's commercial potential.

'That's why it was only played once on the radio – it became an open invitation to anybody wanting to make an illegal recording and then sell it. You can imagine the record company's reaction to that! It was quite fun, and it may also have made the industry realise that the reason record piracy is flourishing is that the public sees a record as a work of art, while the record companies see it as just another mass-produced commodity.'

And, like countless other composers who've stuck to their artistic guns and refused to give in to the dictates of commercialism, Jarre had great difficulty getting as far as being able to release his work to the public in the first place, as he recalls.

'Because *Oxygene* (Jarre's first successful recording) consisted of entirely instrumental music, none of the record companies thought it would work. The only people who took the 'risk' of releasing it were a small French company called Dreyfus Music. Even after it had become a hit in France, people said it couldn't possibly be a success anywhere else. Then eventually, after it got to the top of the charts in Britain and all over Europe, the critics explained that it was successful because of its originality and because of its use of melody. It's easy to be wise after the event.

'You know, there'll always be a continual fight between the artists and the music industry. In a way, I feel extremely privileged to be in a position where I'm able to write the music I want to. Every day I receive enthusiastic fan letters from England, France and elsewhere, in which people comment on the music in an intelligent fashion, and that seems to be symptomatic of a healthy relationship between artist and audience. To me, achieving contact with my audience is the most important aspect of my music.

'I don't really care whether there are only five people deciding what music is played on English radio, and that my album doesn't receive much airplay as a result, though obviously it's a very sad state of affairs. And I don't care if I don't receive any attention from the press or other media, because my records still seem to sell well without much in the way of airplay or press coverage.'

Visions of China

Jarre's dislike of the press in general, and the British press – E&MM excluded, naturally – in particular, stems from the sound battering the first of his China concerts received from almost all significant quarters. Was he affected by that criticism, and does he still look back on his Oriental trip as a satisfactory accomplishment?

'It was undoubtedly worthwhile, partly because of the fact that in China, you're free of all the Western media's attitudes to modern music. Even when I was there, they made a great fuss about my being the first person to play that sort of music in China, and set me up as some sort of Tintin figure, which was utterly ridiculous.

'The reviewers knew we were bound to have problems with power and so on during that first concert, but they took no account of that, and treated it as if it were just another gig. In fact, all the other shows were perfect: it was only at the first concert that technical problems were encountered.

'In all, I was very impressed with the Chinese musicians' standard of playing, considering that, due to the lack of power, we'd had no rehearsals as such. The first time we played together was that first show, and everything went perfectly for them. Our playing was another matter, I think, but I still regard it as most successful, from a personal as well as a musical point of view.' ■

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Making Music with Big Science

Much of her work as a performance artist focuses attention on how modern society is coping with the onset of high technology, but Laurie Anderson's live and recorded pieces use it to the full, as she explains. *Dan Goldstein*

Britain's singles charts are frequently and colourfully littered by novelty records that attain surprisingly high positions because people think they're funny, and they can be either funny ha-ha or funny peculiar. Laurie Anderson's 'O, Superman', which reached number two in the autumn of 1981, fell firmly into the latter category, but the song was a lot more artistically worthy – and a lot more serious – than most of its purchasers were ever likely to realise. Ostensibly a series of multiple vocal 'ahs' covered in assorted sequencer patterns and some fairly arcane spoken lyrics about industry, the song was actually only a part of an ambitious long-player entitled *Big Science*, which in turn was an even smaller part of a work of performance art by the name of *United States*, which Anderson subsequently presented at venues in the US, Europe and Japan.

Just to prove that there were plenty of punters able to see what lay behind the aural gimmickry of 'O, Superman', Anderson and her colleagues played to full houses almost everywhere they went. And what those audiences witnessed was a remarkable evening (or in most cases, two evenings) of perceptive scientific, ethnological and political comment, presented through media both musical and visual. Accompanying Anderson were a bevy of session musicians, slide technicians and tape operators, with the technological hardware comprising Prophet 5 and Roland Vocoder Plus keyboards, a trusty Revox B77 (for all those 'ah's, among other things), and a whole host of harmonisers, delays, and other speech processors to help Anderson simulate the voices of the many 'characters' within *United States*' complex and occasionally unwieldy plot.

Voices

If there's one theme that runs through all Ms Anderson's musical work, it's the importance of the words people use, what they mean and the way they're spoken. To find her actually singing on one of her tracks is rare: more often she'll simply speak the lyrics over a musical background or intone them in a vaguely musical fashion. Have words and voices always been of importance to her as an artist?

> 'I prefer to treat synthesiser sounds as well as acoustic ones, because I don't really like the sound of electronics straight from the can.'

'Well, I think my fascination for words has come about from my writing, first at school and then through my work as an art critic. They became the initial medium through which I wanted to express myself – the music came later. The thing is, I never write lyrics that scan properly in the usual sense, so I began writing and recording music to act as a counter-rhythm against the words.

'What's happening now is that things happen in different ways, so that when I'm working, it's difficult to know what'll come first – the music or the words.'

And as the performances of *United States* proved, Anderson has little difficulty sustaining an audience's attention, so that each new event, whether musical or lyrical, is as fresh as the last. She excels at taking everyday words and expressions, pulling them out of their normal context

and putting them to use in different ways, thereby springing linguistic surprises on the unsuspecting concertgoers, who gradually realise just how limited and vacuous their everyday speech is.

Still, it was a while before Laurie Anderson matched her artistic preoccupation with technology with a music system that would enable the means to be as contemporary as the end . . .

'I got a Synclavier round about Christmas 1983', she recalls. 'Sound sampling is a process that's more or less tailor-made for the sort of things I want to do, so I was immediately interested in what I could get out of the system personally. I wasn't interested in how the Synclavier worked inside,*because I'm not the sort of person who'd start at the beginning of a 100-page user manual and read all the way through to the end before actually using the instrument.

'For me, electronics was a part of music from the word go. Before I actually had any electronic instruments of my own, I was using tape recorders and making music by recording sounds and editing them together. I always wanted to have a studio of my own, but it hasn't always been all that up to date, and the equipment hasn't always had to be hi-tech.

'I had an antique Eventide 910 Harmoniser that I was particularly fond of. One day they gave me a call and told me they'd changed one of the circuits inside and got rid of the glitch on it, and I just turned round and said "but the glitch is the most beautiful thing about it". Progress isn't necessarily for the better.'

Instruments

Too true. Much of Anderson's work parodies progress by taking it to extremes, like the instantly movable buildings of *Big Science*'s title-track, in which an American landscape is made up only of potential occurrences rather than existing edifices. How can you give anyone directions to go anywhere if the locality only comprises sites such as 'the place where they're thinking of building a drive-in bank'?

And as well as denying that much recent technological development is likely to have any sociological usefulness, Anderson refuses to give musical technology an entirely free rein in any of her own work, either live or in the studio. Her own pet acoustic instrument, the violin, is afforded the same significance as any computer, synth, or signal processor, while it seems there'll always be room for other musicians playing acoustic instruments on future Anderson projects.

> 'The first thing Jean-Michel asked me to do was sing completely out of my range, which I wasn't really prepared for.'

'I like the way you don't have to be a technically brilliant performer to get the best out of something like the Synclavier', she muses. 'But that doesn't mean to say I'm against virtuosity – far from it. I think being able to play an acoustic instrument is actually one of the most wonderful things in the world, because it involves you so physically. The music becomes an extension of your nervous system, and playing the instrument is a very powerful, emasculating process.

'I worked with a brilliant virtuoso violinist a few months ago in Europe, and I was just amazed to watch what he was doing, what he was capable of achieving. I don't think that sort of performance will ever be simulated satisfactorily.'

Anderson's musical openness doesn't end there, either, because by her own admission, she'll use whatever sound appeals to her and seems to fit in with what she's working on at the time.

'I've always been interested in proces-

sing and treating acoustic sounds – and they could be anything, domestic sounds or noises from out in the street. I prefer to treat synthesiser sounds, too, because I don't really like the sound of electronics straight from the can.'

Sampling

We've already revealed that it's the sampling power of today's computer music systems that acts as Ms Anderson's major source of 'treatment' for sound signals both acoustic and electronic, but that's scarcely anything new in 1985. What is less usual is the degree to which she's collaborated with contemporaries who've also sought to exploit the musical potential of high technology.

Peter Gabriel, arguably Britain's best-known exponent of the Fairlight CMI, co-wrote one of the tracks on *Mister Heartbreak* (the follow-up to *Big Science*, released last year), while even more recently, of course, she was invited by France's Jean-Michel Jarre to make a vocal contribution to his largely Fairlight-based long-player, *Zoolook*. She actually appears on only one track – the appositely titled 'Diva' – but her contribution is startling enough to make it easily the most appealing piece on an album rich in vocal and technical experimentation. How did that unlikely transatlantic joining of forces come to pass?

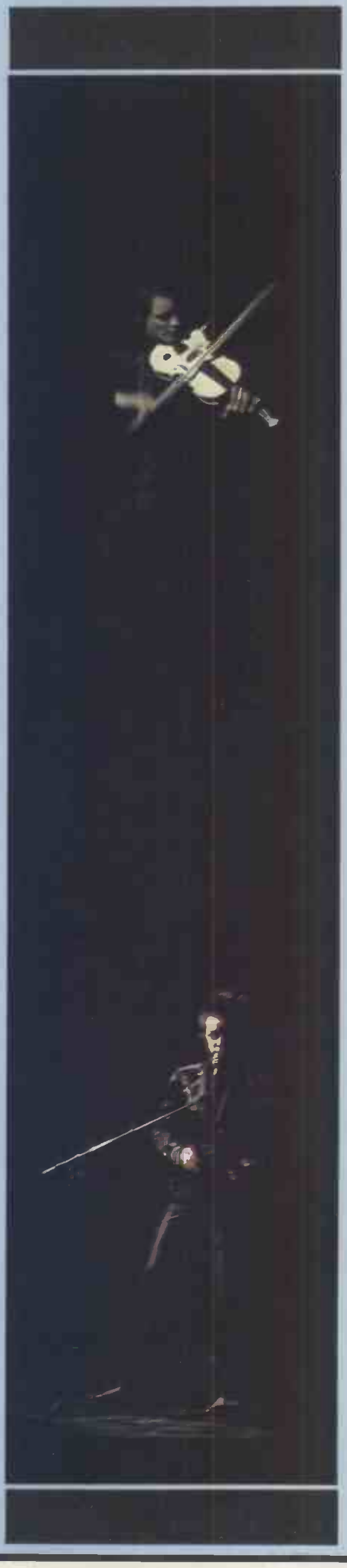
'It came right out of the blue. When Jean-Michel called me and asked me to appear on the album, I wasn't familiar with any of his previous work at all, but I listened to some tapes of what he'd finished of *Zoolook* at that time, and I thought that a lot of what he was doing – especially the way he was sampling voices and manipulating them – was very beautiful, so I agreed to do it.

'The first thing he asked me to do when I started work in the studio was to sing completely out of my range, which I wasn't really prepared for. But he talked me into it, and after we'd recorded everything I just left him to change and manipulate my voice as he wanted to. And actually, I'm very, very happy with the way it's turned out.'

There's an irony too, in the fact that Jarre asked Anderson to sing words that made no sense whatsoever in any known human tongue: so without really knowing what she'd let herself in for, she ended up adding yet another linguistic string to her already highly capable bow, if you'll pardon the pun.

Given that, musically speaking, Laurie Anderson's creative output doesn't fall into any recognisable pigeon-hole, or even a group of them, it seemed a good idea to ask what music she listened to during the course of, say, a normal week. I expected her to admit to a healthy appetite for music of most eras and ethnic backgrounds – I was wrong.

'Well, to be honest I don't listen all that much to other people's music, unless I'm doing it for work reasons, as I did for the Jarre album. I'm not the sort of person who can sit down and listen to a record or a certain piece of music over and over again just for the sake of it. I guess I'm susceptible to just about anything, but at the moment I'm getting into a lot of Cuban music, which is being played in a lot of the clubs around where I live in New York.'



I suppose it's testament to the woman's capacity for sheer hard work that she looks like packing even more into 1985 than she did the previous year. Her most significant current project is the making of a film chronicling her second major tour (though this only went as far as the US and Japan), while late spring/early summer should see her start work on another new album ('I really haven't got a clue what it'll turn out like') for WEA, the label she signed to a few years back.

In fact, the company have been remarkably good to Laurie Anderson over the period she's put her work into their care. And their faith in her as an artist that could potentially earn them more than a dollar or two is evidenced by their apparent keenness to release a live version of *United States* in all its glory, something they accomplished as 1984 began to draw to a close. Obviously, no multi-media event is ever likely to survive the transition to an entirely aural medium without some unwanted artistic degradation, but *United States* manages the change surprisingly well. Again, a lot of the credit for that must go to Anderson's remarkable way with words.

Still, at a UK price of more than £25, it's unlikely that anyone other than the dedicated few (and those that attended the show's London presentations, of course) will ever be exposed to the work. That in itself must pose the artist some kind of problem. I mean, what's the point of making social and political comment if hardly anybody is ever going to hear it? Would Laurie Anderson be doing what she's doing now if she had no record deal and consequently little means of communicating with the outside world?

'That's a difficult one – I don't really know what I'd do. All I can say is that I'll continue to work in this field as long as it pays for itself. Sure, I was surprised at the success 'O, Superman' had over in England, but things have been quite steady since then, and *United States* has been doing pretty well in America, so I don't have any immediate worries on that front.'

You get the impression that even if all the commercial dice were loaded against her, an artist of Laurie Anderson's wit, perception and individuality would still succeed in making an impact somewhere along the line. Few people who heard it are ever likely to forget 'O, Superman', and in fact, experience has taught me that very little of what Anderson does is easily forgettable. She has a habit of creating things – be they musical, lyrical or visual – that stick firmly in the imagination long after concurrent events have sunk without trace. And that, surely, is what being a performance artist is all about. ■

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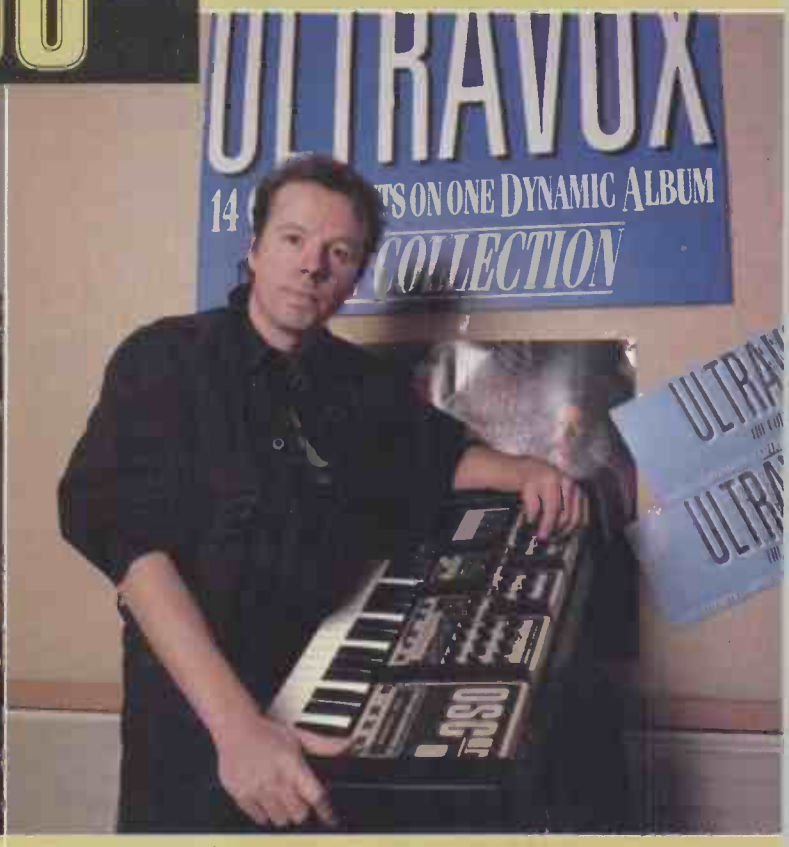

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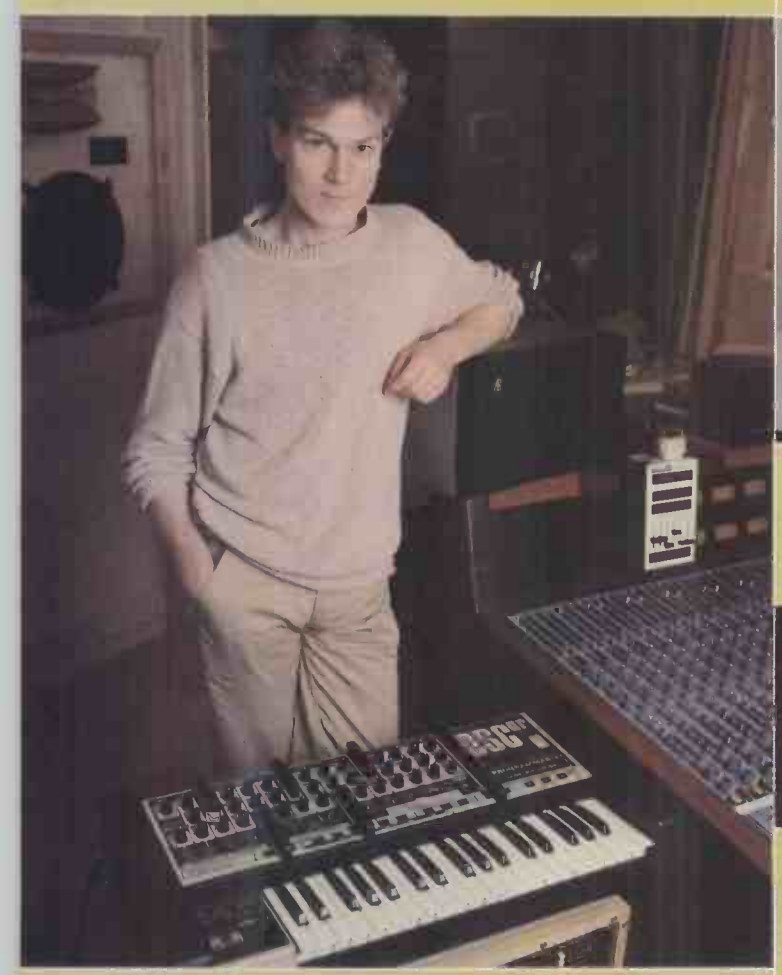

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THE OUTER LIMITS

Bob Moog speaks up as Chairman of Ars Electronica's Grand Prize jury.

The tail-end of 1984 saw two international music festivals at which modern technology was pushed to its performance limits. Here we present exclusive overviews of both of them.

Ars Electronica, Linz: *Markus Aigner*
ICMC, Paris: *Tony Mills*

You may well remember E&MM reporting on Ars Electronica back in E&MM January 83, when it was already a regular international festival with the prime objective of encouraging modern technology to be applied in interesting and innovative musical ways. Centrepiece of the festival has always been its Grand Prize competition, in which composers and performers from all over the world vie for the attentions of a panel of well-known judges. The Grand Prize competition in 1984 was as important and as well-attended as ever, but there were also more peripheral concerts and lectures than ever, too.

Constellations

Of the concerts, the most noteworthy was surely **Isao Tomita**'s astonishing performance from a specially-constructed glass pyramid suspended over the picturesque tranquillity of the River Danube. Fifty thousand people witnessed a sonic recreation of the Big Bang, brought about courtesy of Tomita's synth genius, an enormous lighting rig and no fewer than seven individual (and very high-power) speaker systems.

The wizard presented a cross-section of his recorded output, with excerpts from his *Kosmos* (Strauss, Wagner), *Daphnis et Chloe* (Ravel) and *The Planets* (Holst) arrangements, as well as some new interpretations of Rimsky-Korsakov's *Hymn to the Sun*, the Pachelbel Canon, and Villa-Lobos' *Bachianas Brasileiras*. As it turned out, slightly excessive length made the performance more tedious than it should have been, but while the content of Tomita's concert held few surprises, the equipment he was using – Casio's newly-developed Cosmo synthesiser system – was entirely new and well worth further investigation.

Such investigation revealed the Cosmo to be a complete computer musical instrument featuring two digital synthesiser modules (a bit of a misnomer, that, as these are actually the sound-sampling devices), six sound genera-tors, a central MIDI interface and distribution box, and a music work station comprising a 16-bit microcomputer, ADCs and DACs, disk drives, and monitor.

Each of those 'synthesiser' modules is capable of acting as a four-voice polyphonic sound-sampling system with a maximum sampling time of three seconds, a frequency bandwidth of 20Hz– 15kHz, and a five-octave pitch span. You can generate loops with the minimum of fuss (glitch-free loop points can be selected automatically by the electronics), but more interestingly, the system's microphone input has a built-in automatic triggering system that prevents the very beginning of a sample being ignored as a result of inadequate operator reactions: up to 100mS of information can be stored *before* you actually activate the Cosmo's sampling mode.

The big Casio's sound-generating modules employ the principle of Phase Distortion, a novel concept subsequently seen on the more accessible CZ101 polysynth (see review last month), though as the latter wasn't in full production at the time of the festival, Tomita used a MIDI-equipped Casio CT6000 as the controlling keyboard. The work station stores both voice waveform and performance (sequencing) data on floppy disks, and these can be retrieved for further editing if the user so desires.

At the time of writing, no further technical information about the Cosmo system was available, though **Yukio Kashio**, managing director of the company that bears his name, says it's his intention to produce an affordable sampling keyboard in the near future: the CZ101 is the first step along that road.

Sonic comparisons between the big Cosmo and competing designs such as those from Fairlight and PPG are fraught with difficulties, but I can say that a press demo of the system revealed it to be generally well-behaved, save for a slight lack of sparkle at the high-frequency end and a mild noise problem. It could be that the Cosmo system seen at Ars Electronica will never become commercially available, but personally, I hope it does.

Like the Fairlight, the Cosmo can be placed on the receiving end of any drawable waveform the user cares to input, and Tomita applied the brightness curve of the star AD Leonis (as measured at a radio observatory in Nebeyama, Japan) to form a string sound for use in his performance.

As it happens, Tomita and his prototype Casio weren't the only stars of Ars Electronica's opening concert (it was entitled 'Mind of the Universe' incidentally), as the River Danube acted as the backdrop to a mind-boggling musical and optical extravaganza. Red and green lasers cut lines dramatically through the sky and illuminated two boats, one containing Far Eastern folk musicians and the other housing a 100-strong choir to aid Tomita in his performance of Beethoven's Ninth.

If all this sounds decidedly Over The Top, that's the intention. The opening concert (and a similar one performed later that featured the **Zagreb Philharmonic Orchestra**, among other things) were more ambitious, more adventurous and more spectacular than anything Ars Electronica's organisers had ever attempted, and they worked: nearly 100,000 people attended the two events and the stir they caused must have helped the remainder of the festival's proceedings.

Applications

In addition to the Danube concerts, a number of other musical events took place during Ars Electronica's busy seven days. Local composers **Harald Zuschrader** and **Hubert Bognermayr** presented a live performance of their *Bergpredigt* recording, with several Fairlights (and a claimed 4000 sound samples), a choir, live percussion and guitar

solos, and the curious mixture of Biblical quotations and others from the present day. The concert took place in the suitably sacrosanct atmosphere of Linz' New Cathedral, and the musicians made effective use of the room-within-room effects made possible by the Quantec Room Simulator, though musically the output oscillated between *musique concrète* and department store muzak.

Urban Sax – an avant garde ensemble comprising no fewer than 40 saxophonists – treated us to a fine example of their individual modal music, while the **Dance Theatre of Vienna** presented the world première of *Tobias Zapfel* by 28-year-old Austrian composer **Thomas Pernes**, in which the chords oscillate only between F# and F#m, with just the arrangement – tapes and acoustic and electronic instruments were used – altering during the piece's length.

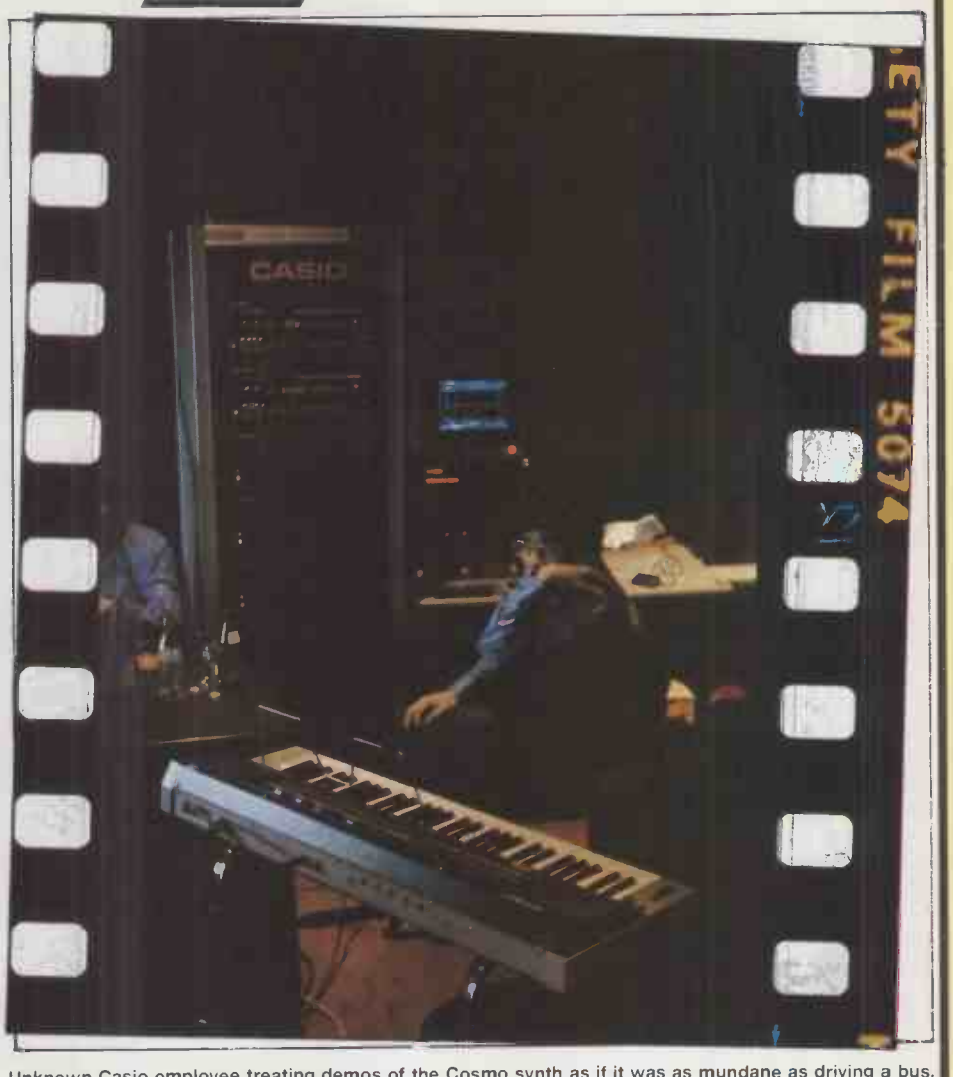
And, as is more or less inevitable during a festival of this scale, there were also a couple of disasters, like the infernal racket proffered by **Glenn Branca**'s ensemble (minimalist music at 127dB?) and the operational overkill of **Leo Kuepper**'s Sound Dome, an installation of 104 speakers and 52 stereo power amps that can be switched on and off manually by the creator – any £200 computer could have done the job better and the final artistic results in no way justified the technological expense involved.

Ars Electronica '84 also offered some fascinating lectures and workshops under the umbrella title of 'The Digital Arts'. Among the speakers were composer and studio manager **James Dashow**, who explained the relationship between FM sound synthesis and inharmonic sound structures, and how his own music aims to create a dialogue between the composer and the computer; **Klaus Buhlert**, an expert in the fields of psychoacoustics and computer music, who commented on the future of electronic music and how it could be made more accessible to modern audiences; **Bob Moog**, who spoke on the pros and cons of that wonder of the current Communication Age, MIDI; and IRCAM's **Jean-Baptiste Barriere**, who presented a detailed report on that organisation's current musical and technological activities, among them CHANT, a voice synthesis program capable of recreating a wide range of vocal examples from a Mozart aria to Tibetan folk chant. IRCAM was also the venue for the ICMC event attended by Tony Mills – see later for his report.

Machinations

Ars Electronica's Grand Prize competition seems to have turned into something of a playground for amateur constructors and intellectual hobbyists, rather than a great gathering of musical innovators. I don't think I'm alone in feeling that.

Still, an international jury chaired by Bob Moog had a reasonable selection of interesting acts from which to choose 'the most original and future-orientated new development in the field of electronic sound production'.



Unknown Casio employee treating demos of the Cosmo synth as if it was as mundane as driving a bus.

Previous winners of the Grand Prize include Bruno Spoerri (lyricon, 1979) Nyle Steiner (electronic trumpet, 1980) and Ivan Tcherepnin (electronically modulated Persian dulcimer(!), 1982), so the competitors had plenty to live up to. In the event, American **Dorothy Stone** picked up Third Prize with her 'ghost electronics box', a novel device that enables electronics to be blended into a live performance so that the electronics only become audible when the performer is actually making some sort of sound. Ms Stone utilised a German flute with a suitable pickup, while the more up-to-date hardware comprised two items, a tape recorder and the 'ghost box' itself, which contained a stereo locator, a ring modulator, an amplitude control, and

Isao Tomita used this stellar brightness curve as the basis for a Cosmo string sound.

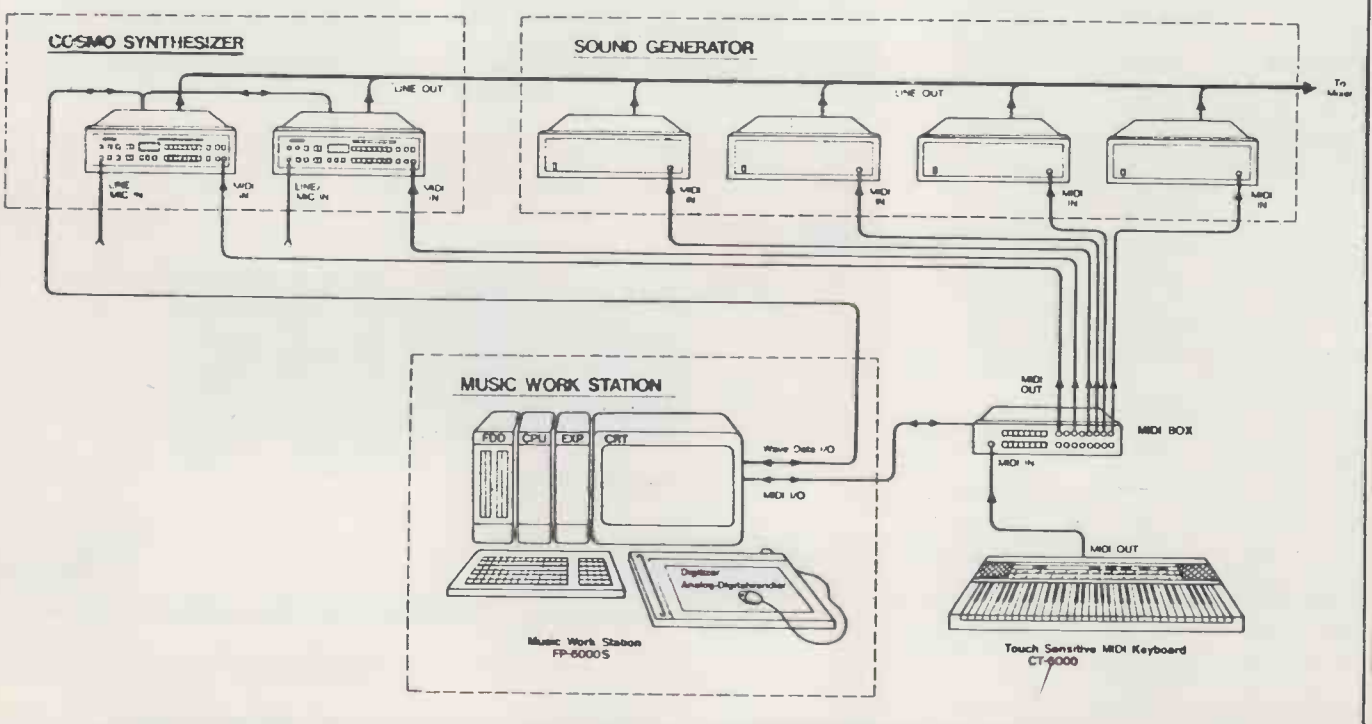
filter, octave divider, and wah sections. the tape contains high-frequency audio signals that aren't amplified but act as controllers for the electronics.

According to the judges, the competition between the musicians that came first and second was more than a little close, as both innovators came near to fulfilling the Grand Prize's specified criteria. In the end, a German, **Werner Schwarz**, took Second Prize for his 'Ballex' system, used for the transformation of dance movements into control functions for music synthesisers. It's not a new idea, of course, but Schwarz' solution was thought to be particularly elegant. Sensors are placed on the dancer's arms and legs, while the battery-powered transmitter is mounted on the back of the dancer so as not to hinder freedom of movement. Once the movements have been transmitted, a converting 'black box' receives them and produces corresponding one volt per octave control voltages and trigger signals.

And joining the ranks of new devices that have won their creators the Grand Prize of Ars Electronica is the synthophone, brainchild of Swiss computer musician **Manfred Hurni**. The acoustic element of this system closely resembles a conventional saxophone, but although it's played in a similar manner and the fingering is the same, the instrument has no sound hole as such; instead, note information, lip pressure and wind dynamics are transmitted electronically *via* a multiplexing switch array and a computer-controlled interface, and all these parameters may then be used to control various performance functions of one volt per octave equipment. To demonstrate his invention, Hurni used a system comprising synthophone, analogue synth (PAiA Proteus I), and an Apple II with alphaSyntauri. The latter was used to reproduce pre-programmed sequences, and took the part of the kithara in what turned out to be a modern-day adaptation of the Ancient Greek musical ensemble.

Prize-winning duo – Martin Hurni and synthophone, aided by PAIA synth and Apple micro.

The synthophone acted as a sort of hi-tech aulos, while the piece – appositely titled 'Ikaros and Daedalos' – was one of Hurni's own. Impressive – and by no means imitative – stuff.

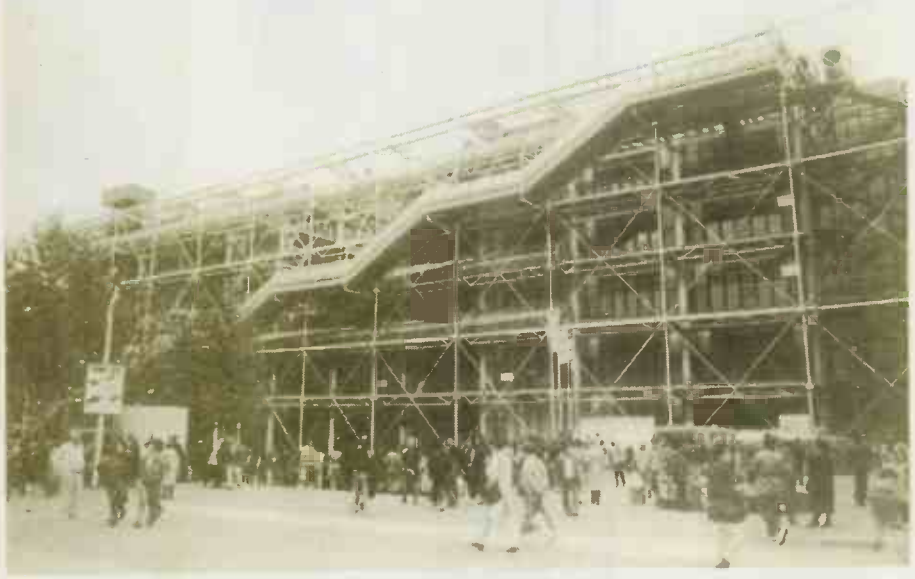


Block diagram of the Cosmo system as it exists in prototype form.

Last October's International Computer Music Conference was held for the first time at IRCAM, that technological temple hidden beneath Paris' popular arts centre, the Georges Pompidou. Why IRCAM had never been picked as a setting before is something of a mystery. Apart from some of the most advanced computer music research equipment in the world, it boasts access to fine concert halls, plentiful leisure activities and good food (unless you eat at the Pizza Tops; the nearest the French allow themselves to get to McDonalds).

The five-day conference was efficiently organised, though for some reason there were several lectures and seminars (particularly on educational music software) scheduled for dates after the event had officially finished. In any case, it was impossible to attend all the events – the choice each morning and afternoon was basically between a series of lectures in the huge *Espace de Projection*, or a selection of tape concerts in the Pompidou Centre, followed by a live concert in the evening. Demonstrations, displays and events within IRCAM itself also provided much of the interest at the conference: exhibitors included Yamaha, Fairlight, Sogitec, and many other software and hardware manufacturers.

Let's get the name-dropping out of the way first. E&MM readers might have been pleased to meet Bog Moog (again!), Donald Buchla, Max Matthews, Pierre Schaeffer, FM pioneer John Chowning, British composers Ron Berry, Dennis Smalley, Trevor Wishart and Tim Souster, alphaSyntauri expert Laurie Spiegel, German Fairlight expert Thomas Kessler, Swiss composer Bruno Spoerri, Stockhausen collaborator Rolf Gehlhaar, Yamaha demonstrator Dave Bristow and Japanese rep Katsuhiko Hirano, various gentlemen from the *Star Wars* people, LucasFilm (who are doing frightening things with computer-controlled digital audio), and Kraftwerk's Florian Schneider. Among the lecturers and performers were some big names in academic computer music, *viz* Barry Vercoe, Xavier Rodet, Lars Gunnar Bodin and Gottfried Michael Koenig (bet David Coleman would have a spot of trouble with that lot).



Paris' most visited landmark is the Centre Georges Pompidou. The Eiffel Tower comes second.

And beneath the Pompidou . . . IRCAM, home of the International Computer Music Conference.

Conversations

It's important to keep in mind that ICMC was an academic event, devoted mainly to the research and development currently going on in Universities and research centres such as IRCAM otherwise you're unlikely to appreciate the degree of uproar caused by **Dave Bristow** and other supporters of MIDI and 'budget systems' (as far as I can make out, this refers to anything costing less than £1m). The panel session on MIDI and other interfaces became quite heated, the system being described as a disaster by some and as an important step forward by others. The overall feeling was that MIDI is too slow and too keyboard-oriented (that is, designed to play a conventional tempered scale) for most 'experimental' music.

At the same time, Dave Bristow's stand (at which he demonstrated the DX7, CX5, TX816 modules and QX1 sequencer) was packed throughout with inquisitive Swedes from various University research centres, and others pretending to look at something else as they ogled the possibilities of the DX7. Much experimental computer music research is based on creating FM pairs of oscillators in software or hardware, and the prospect of a £1000 keyboard offering these facilities was simply too much for some composers who had spent months struggling with systems such as IRCAM's own Sogitec 4X synthesiser, which works only when supported by a PDP minicomputer.

Slightly less interest was shown in the Fairlight stand, possibly because the company had chosen to display a repeating Page R Pattern which, while undoubtedly impressive, was simply too rock-oriented for the audience present. However, Fairlight did have two interesting new products on show – a low-band video graphics generator (now on show at Syco Systems in London) and the Voice Tracker, a monophonic Pitch-to-MIDI converter with various display options direct to a monitor. Mind you, this doesn't mean they're giving up on the Fairlight CMI – the updated model due for early 1985 is still expected to be a real stunner.

Returning to the subject of budget systems, it was pleasing to see that many researchers were using MIDI-based setups (usually incorporating DX7s) and applying them to all sorts of research. Canadian **Kenneth Newby** demonstrated a system that uses MIDI *parameter* commands, rather than note commands, to play the DX7: this makes it possible to introduce glides and unusual tunings, albeit with reduced tonal complexity. Encouraged by this, some of the audience gradually admitted to owning MIDI synthesisers, and in one case argued strongly for the adoption of a more 'rock 'n' roll approach' to interfacing, whatever that means.

These topics were aired once again in **Bob Moog**'s lecture, but surprisingly, he began by criticising the limitations of MIDI quite forcibly. Now Chief Scientist ▷

Suck it and see. Thomas Kessler prepares for his Fairlight-based 'Flute Control' performance.

for Kurzweil, Moog's main responsibility lies in developing better and more responsive keyboards for the company: no doubt experience from his own company, Big Briar, will be brought to bear. The touch pads, multi-sensitive keyboards and Theremin-type devices marketed by Big Briar are now all MIDI-equipped, and Moog's suggestion was to take full advantage of the System Exclusive codes made available in MIDI for individual experimentation: his touch pads and other devices transmit information faster and more efficiently in System Exclusive mode than was ever possible with the very note-oriented System Common mode.

Several of the speakers expressed support for MIDI, while at the same time hoping it could be used only as a final control language for budget synths, leaving faster computer languages to make the musical calculations involved in playing complicated computer music. The Americans (and to some extent the French) seem particularly keen on Apples, as evidenced by demos of several systems ranging from the compositional to the educational. On the subject of educational software, a few examples were on show from Logimus and others, but many of these were designed for the Thompson home computer, which may be big across the Channel but hasn't any presence in the UK at all.

Presentations

The concerts were something of a mixed bag, most of them being tape-based for obvious reasons. Some composers did have a go at live computer pieces. For instance, **Thomas Kessler** and a flautist played 'Flute Control' for the Fairlight, in which the flute's pitch and volume (*prospectively* through the Fairlight Voice Tracker but in this case through a Korg interface and custom ring modulator) were used selectively to replay portions of a complex voice-based sampled sound. **Larry Beauregard** played Barry Vercoe's 'Synapse', this time with the flute being followed intelligently by a 4X/PDP system programmed with the score of the piece in the computer language 'C Script'. Beauregard plays too fast, the computer plays faster. Beauregard plays slower, the computer slows down. Beauregard misses a page in the score, the computer goes mental. That's life.

Dave Bristow in the process of trying to persuade academics not to write off a sub-£10,000 musical instrument.

The tape pieces varied from the interesting to the monumentally dull and the physically painful. **Horacio Vaggione**'s 'Fractal C' used millions of short staccato events to build up a convincing impression of an irregular surface (a sponge, for instance, is one example of a fractal surface) but the levels and pitches used were nothing short of ear-piercing. **Kaija Saariho** presented 'Verblendungen', with an orchestra and a tape based on orchestral samples, but the electronic element was small. Meanwhile, there were other pieces that had been composed using random computergenerated elements but which were played by conventional chamber instruments, and these were also pretty lifeless.

On the pop front, **Florian Schneider** of Kraftwerk was exceedingly reticent about plans for the band's long-awaited new album. Two days of gentle questioning elicited the following information: it's called *Techno-Pop* (we knew that), they're still working on it (hard to believe), and they're not using anything you can't buy in any music store. We did find out that they're using a Fairlight, though Schneider himself strenuously denied this.

Similarly publicity-shy (though a little more forthcoming) was instrument designer **Don Buchla**, whose 400 series has now been taken up by Kimball in the US. Although he denied his invention was a pop/rock instrument, and won't even admit to calling it a synthesiser, there's no doubt the machines are getting much wider use in the States, even among pop and rock bands.

Over the five days of the conference, it became more than clear that this was not a gathering of synthesiser enthusiasts, but an academic and sometimes highly technically specialised get-together. Given that, it was satisfying to see just how much the field had been shaken up by MIDI, affordable instruments such as the DX7, and simple interfacing for Apples, if not for smaller home micros. It was disappointing to see how out of touch the academic field remains from developments in rock technology: no sign of any live concerts played by men squatting over huge banks of synthesisers (*á la* Tangerine Dream), and little evidence of the power of rock music in either the tape or live concerts. And the 'Electronic Music Now' tour, sponsored by the Arts Council Contemporary Music network a couple of years ago, showed that the situation is no better in the UK than it is anywhere else.

With luck, 1985 will be the year academic computer musicians realise it's time to come out of their ivory towers. The decision may well be made for them – it's going to be very difficult to justify mucking about on a mainframe if, by this time next year, they could just as well be sitting at home with something the size of a Yamaha CX5 but the musical power of a PDP minicomputer. ■

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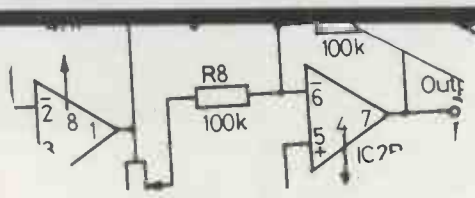


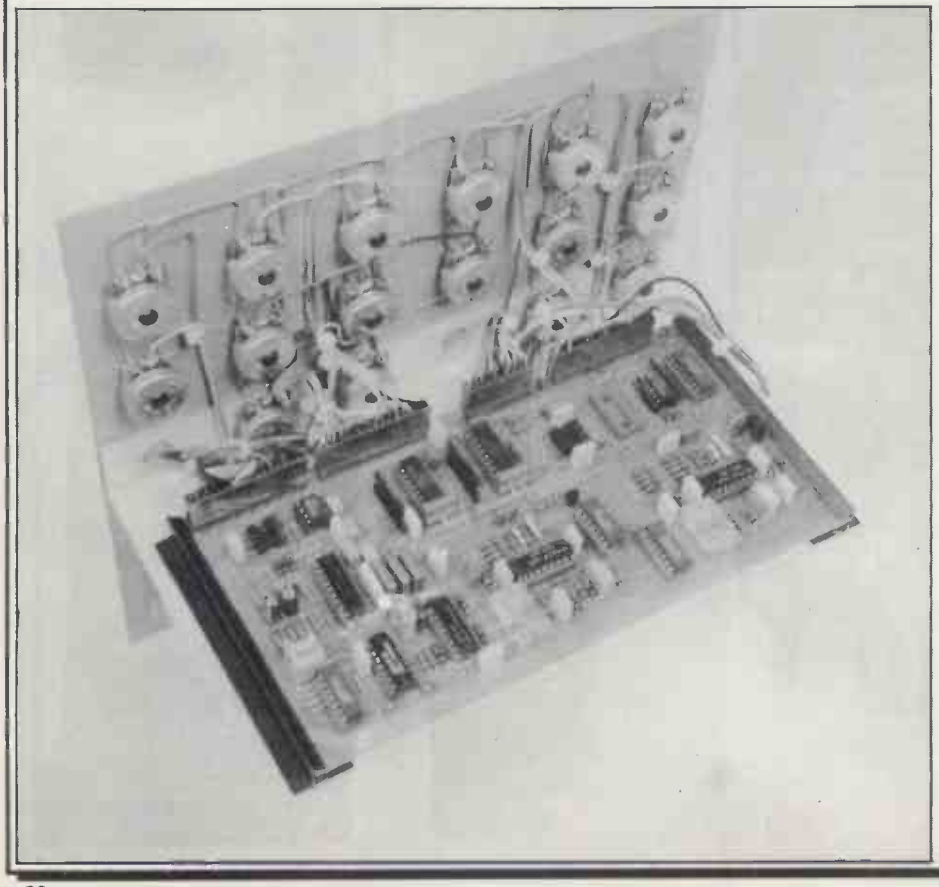
Digisound Voice Card

PART ONE

Connect it to a keyboard and you've a complete monophonic synthesiser, build several modules and you've got a versatile polysynth. Whatever you do, the Voice Card represents value for money. *Charles Blakey, Simon Bailey & Pete Blakey*

The voice card design presented in this article provides the complete sound processing circuitry for a monophonic synthesiser voice. On-board design includes two VCOs, a four-pole low pass VCF, two ADSR envelope generators and five VCAs which together comprise a relatively elaborate synthesiser voice. Some of the interconnections between the above circuit blocks are hardwired, but a degree of flexibility has been maintained by the use of electronic analogue switches. The circuit functions are controlled either by manual potentiometers (which are disabled on insertion of a jack plug into the appropriate CV input socket) or by independent potentiometers and external CV input sockets.

A schematic diagram of the voice card circuitry is shown in Figure 1. The design utilises two CEM 3310 VCTGs, two CEM 3340 VCOs, a CEM 3360 dual VCA and a CEM 3372 signal processor. An accurately scalable keyboard control input is provided and may be calibrated to the usual one volt per octave control voltage standard. Inputs are also provided to enable connection to external equipment such as LFOs, sample and hold networks and other control voltage generators. An audio input is also available, allowing an external noise source (or additional oscillators) to be mixed with the audio output of VCO1.



Many constructional options exist, and these include:

a) Use of a single voice card, with associated pots and switches mounted on a suitable control panel

b) Use of several voice cards together in parallel on a simple motherboard with a common control panel and separate input/output sockets

c) Use of multiple voice cards with individual panels

d) For experienced constructors, microprocessor control of one or more voice cards *via* a suitable interface.

Additionally, owners of existing keyboard equipment may use voice cards as expansion units, always assuming that a one volt per octave keyboard CV and positive-going gate signals are available.

General Design

The complete circuit diagram for the voice card is shown in Figure 2. The circuit design is centred around six custom music ICs from Curtis Electromusic Specialties. It's the use of these devices that's enabled a highly compact dual VCO synthesiser voice to be built on a standard 100 × 200mm Eurocard.

The design makes use of all-electronic internal switching and patching (controlled by panel-mounting SPDT sub min toggle switches S1 to S16) and is arranged for maximum flexibility. Connections to and from the PCB are grouped along one long edge of the board and may be effected either by hardwiring or by the use of Molex connectors and a small

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motherboard. It's the first of these options that we'll discuss here. There are 57 connections in all and these can logically be subdivided into the following groups: control voltage inputs (26), electronic analogue switch control lines (16), audio inputs (1), audio outputs (1), gate inputs (1), power supply connections (5) and those reserved for future expansion (7). All the control inputs provided will accept voltages in the range −5V to +5V (see Table 1), making interfacing to microcomputers a simple matter.

Both **VCOs** are based on the CEM 3340, and are configured in a similar manner. For this reason detailed analysis of only one of these oscillator blocks is necessary, though we'll mention any differences at the relevant point. The main frequency control input is at pin 15, configured as a summing stage and thus allowing multiple independent frequency control. In this application, resistors R1–8 effect the required voltage control, with two on-board CV inputs and four independent CV inputs being available for connection to external equipment. The on-board CV inputs are:

a) Possweep – ADSR output *via* VCA and to CEM 3340 *via* R4

b) Internal exponential modulation – from VCO2 *via* a separate VCA.

The other inputs are:

a) Frequency – *via* R1 to effect tuning of the oscillator

b) Keyboard CV – *via* R6 for connection to a musical keyboard (commoned to both VCOs)

c) Pitch bend – allows detuning of VCO1 or connection to joystick controllers and the like.

d) Exponential LFO – for connection to an external LFO whose output will vary frequency in an exponential manner

Pin 14 of the CEM 3340 is used as a scaling factor. Since the current gain of the internal multiplier is set near unity, 100K input resistors and a 1K8 scaling resistor (R16) produce the standard one volt per octave response and about 18mV at the base of Q1 (internal to IC). R8 and RV19, together with an incoming reference voltage (in this case +15V), set the initial frequency of the oscillator, and have been chosen so that with no external voltage applied, the frequency may be adjusted to 65.406Hz, the frequency of the lowest note on a four-octave keyboard. For greatest accuracy of the internal multiplier, the current from pin 2 should be close to that from pin 1. This balance is achieved by way of RV20.

Pin 13 is available for use as a linear frequency control input with R12 present for connection to an external LFO. R12 produces a 10% change in frequency per volt at this input. Similarly, the inclusion of R10 and its associated electronic switch (IC11D) connects

pin 13 to the output of VCO2 in the same way (and to the same modulation bus) as the internal exponential modulation input. Note that if the output from a suitable LFO is not capacitively AC coupled, any DC offset present will cause detuning of the oscillators. In addition, a negative current at pin 13 which is in excess of the reference current will gate the oscillator off.

The 3340 is compensated against temperature-induced drift and also included as part of the chip is a method of overcoming high frequency tracking error, an effect resulting in a slight flattening of the frequency at the extreme high end of the audio range. This produces a reliable voltage-to-frequency conversion over the entire audio range.

Three simultaneously available waveform outputs are produced by the CEM 3340, namely sawtooth, pulse/square and triangle at pins 8, 4 and 10 respectively. The sawtooth and pulse/square outputs pass *via* R17 and R18 to CMOS analogue switches (IC11A and IC10A) for later mixing at the input of the VCF. However, the triangle output has a finite resistance and needs buffering to maintain VCO performance.

Pulse width control is achieved by direct injection of a 0V to +5V analogue voltage to pin 5, allowing pulse width to be varied from 0 to 100% values of mark/space ratio, *via* RV2 or an external CV into J5.

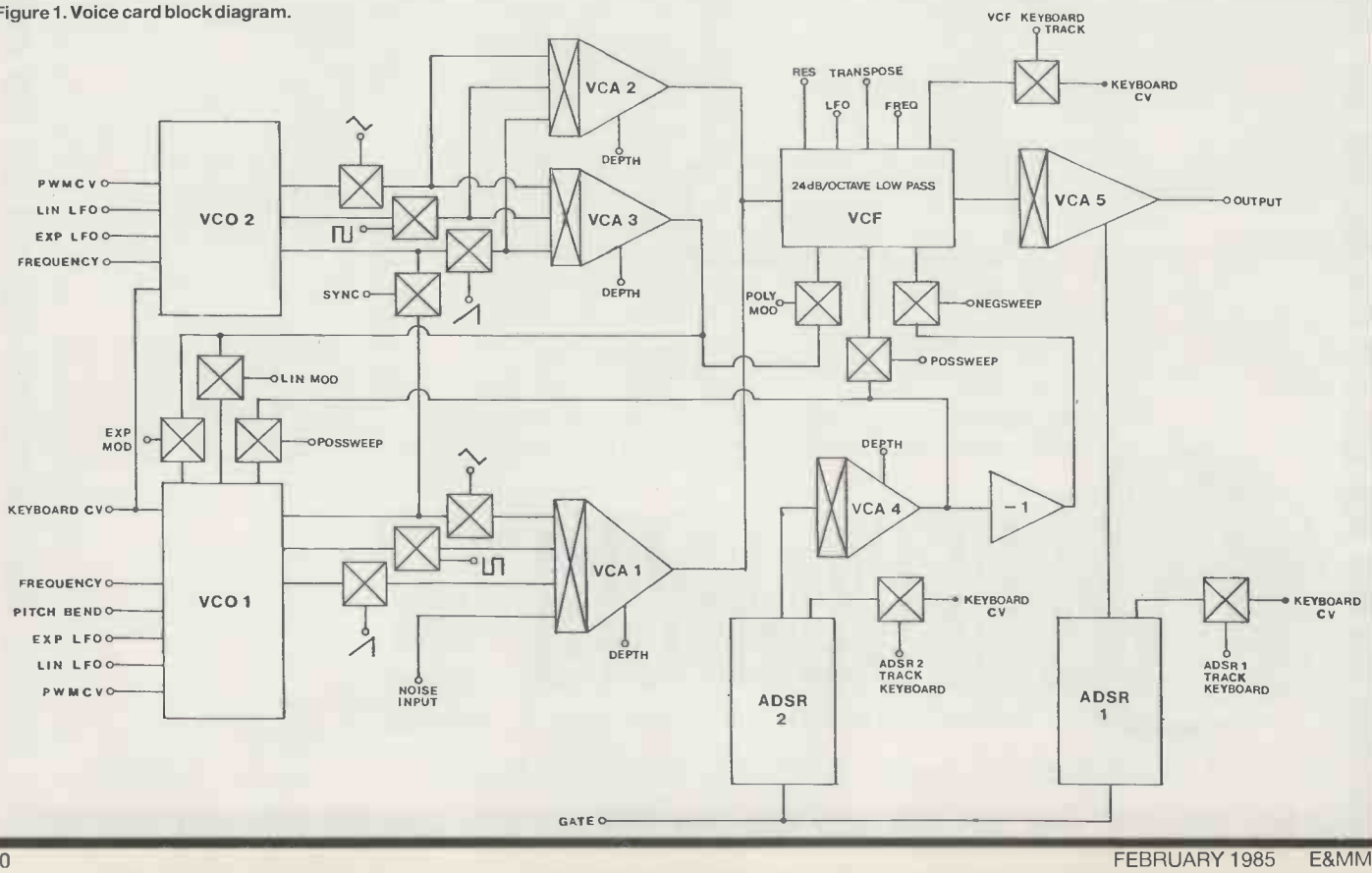
The main difference between the two VCOs is the sync arrangement. In the voice card design, VCO1 becomes the 'slave' oscillator and VCO2 the 'master'. The method of sync used (the CEM 3340 permits two types) is soft synchronisation, which on selection causes the triangle upper peak to reverse direction prematurely, with the result that the oscillation period is an integral multiple of the pulse period. The only other difference between the external circuitry of the two VCOs is that VCO2 allows less resistive mixing of control voltage inputs.

Power supply to both CEM 3340s is a stable +15V to pin 16 and −5V to pin 3. Note that the use of well regulated supplies is essential to maintain oscillator performance.

The **VCF** in this design is based on the recently introduced CEM 3372 signal processor. The filter response is of the Butterworth type, with a sharp 24dB/octave roll-off characteristic, almost ideal for electronic music applications. Internal to the CEM 3372 is a VCA to allow overall signal feedback, and hence resonance (or 'Q' value) to be voltage controlled. The passband gain remains constant as the resonance is varied, and this eliminates the drop in volume as resonance increases, often a problem with this type of filter. The CEM 3372 also features low noise, low control feedthrough and temperature-compensated transconductors for cut-off frequency stability.

Also included on the chip is a VCA of the current in, current out type, and this allows

Figure 1. Voice card block diagram.



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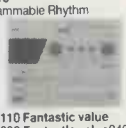

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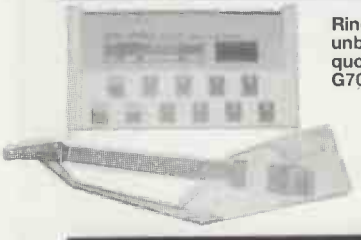

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ready-mixing of multiple inputs. In this design, the input to the VCA is direct from the output of the VCF so no mixing is required.

The two channels of the voltage controllable input mixer are each fed by three electronically-switched outputs from the CEM 3340s. In addition, though on channel 1 only, there's a noise input to the VCF that allows a noise source to be mixed into the audio bus of the voice card. The signal levels of channels 1 and 2 are controlled by positive-going control voltages (0V to +5V) to pins 5 and 8 respectively. Capacitors C15 and C16 shunt any AC voltage to ground.

Within the CEM 3372 four independent filter stages are hardwired to low pass configuration. Filter capacitors C11 – C14 are chosen such that the filter frequency range covers the entire audio spectrum (less than 20Hz to greater than 20kHz) while control of the cutoff frequency is by means of voltage control at pin 15. In order that multiple voltage sources may simultaneously adjust the filter frequency, resistors R44 to R51 effect a summing stage. The voltage-to-frequency scale is adjustable to precisely one volt per octave by the combination of RV26 and R51: provision has been made for connection to an external LFO *via* R47. Transposition of filter frequency by potentiometer RV7 is possible *via* R46, and an initial cutoff frequency may be set up *via* RV25 and R45 such that with no frequency applied to pin 15, the VCF passes no audible frequencies (individual circumstances will dictate the most useful position of this trimmer). A suitable connection to an external CV jack socket (J13) may be made *via* R44, which is preceded by a standard sample-and-hold network (IC8B and C19), included for future expansion. Resistor R48 is hardwired to the internal modulation bus which is sourced by VCO2, thus implementing an internal VCLFO function. Resistors R49 and R50 carry the ADSR signal from the 'sweep' bus, the former connection being positive-going (hence possweep) and the latter being an inverted version of this. These two control voltages are selected by control of analogue switches IC13B and IC13A. If both of these are selected, no change in filter frequency will occur.

The circuitry allows resonance to be varied from a Q factor of 0.7 up to oscillation. Pin 12 is the signal input to the fixed VCA, the gain control of which is buffered, brought out to pin 13 and hardwired to the output of ADSR1. The output of the fixed VCA is at pin 14 of the CEM 3372 and passes *via* a low noise BI-FET op amp to J20, the audio output.

The production of suitable **ADSR** control envelopes is achieved by the use of two CEM 3310 envelope generators. In this design, both ICs are gated simultaneously from a common gate input at pin 4. The gate input jack socket (J16) is wired such that with no plug inserted, the gate input is held at 0V.

Pins 15, 12, 9 and 13 permit voltage control of attack, decay, sustain and release respectively. These three inputs require negative-going control voltages between 0V and −5V, whereas the sustain input requires a CV of between 0V and +5V. In all cases, the greater the deviation from 0V, the larger the A, D, S or R contour produced.

ADSR1 is hardwired to control the final VCA (internal to the CEM 3372), whilst ADSR2 controls the frequencies of VCO1 and the VCF. This attenuable ADSR signal is subsequently buffered by IC7A and split so that two electronic switches allow the signal to alter both the pitch of VCO1 and the cutoff frequency of the VCF. This same signal from IC7A is also inverted by IC7D, providing an inverted sweep to change the VCF cutoff frequency. These three effects are selectable by closure of the relevant

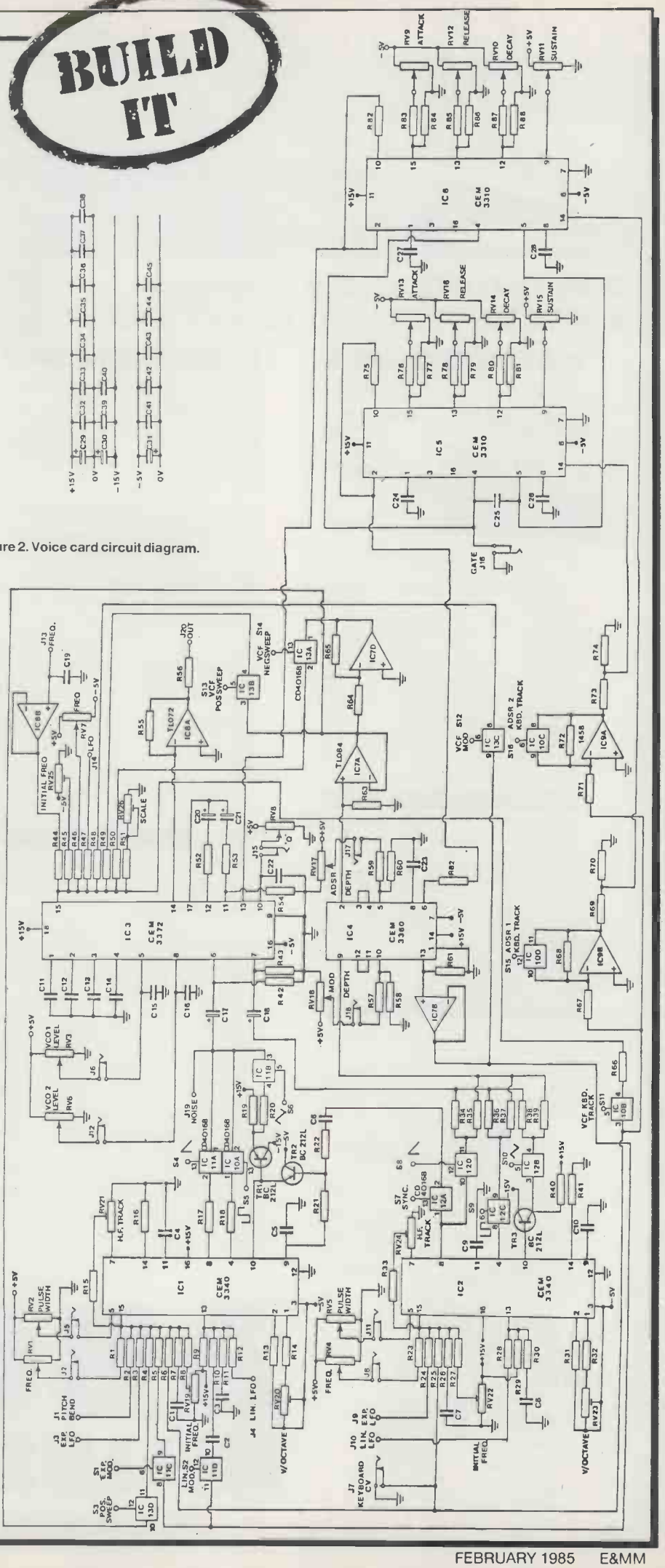

Figure 2. Voice card circuit diagram.

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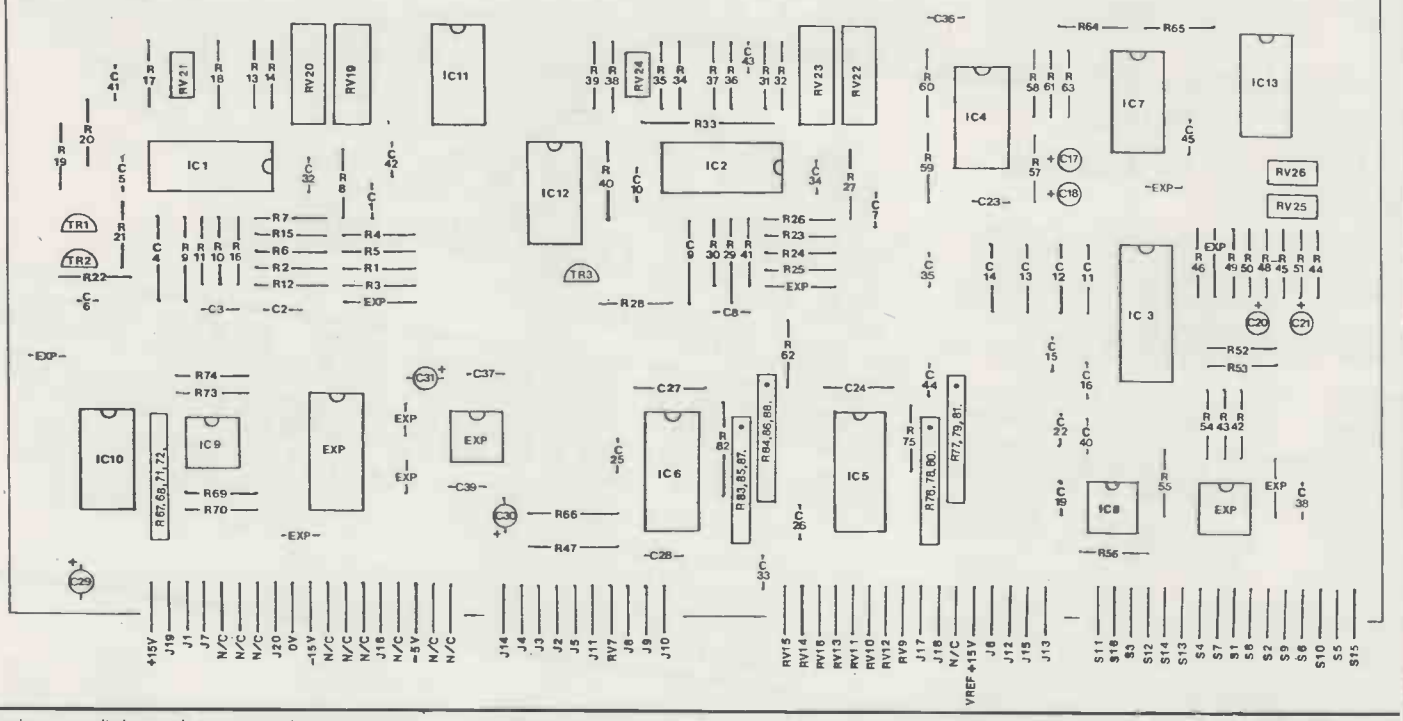
Figure 3. PCB component overlay.



analogue switches, whose controls are situated at S3 (possweep VCO), S14 (negsweep VCF) and S13 (possweep VCF).

Simultaneous control of the three time constants (A, D and R) is made possible by injecting a control voltage at pin 14 of the CEM 3310. These control voltages are derived from the keyboard control voltage (J7) using the two op amps within IC9. On closure of the two electronic switches IC10C and IC10D, feedback resistors R68 and R72 are effectively shorted out, and the keyboard track ADSR functions are therefore disabled. Power to the CEM 3310s is +15V and −5V at pins 11 and 6 respectively.

As already mentioned, the output from ADSR2 is passed through a **VCA** to allow attenuation of envelope amplitude. The latter is one of a pair of independent VCAs available within the CEM 3360. The two VCAs are of the current in/current out type, with both linear and exponential control of gain over greater than a 100dB range.

The ADSR output is fed *via* current-converting resistor R62 to pin 6 of IC4 (signal input to VCA1) and is available again at pin 2 (signal output). Control of signal amplitude is made possible by positive-going (0V to +5V) CV to pin 5, which allows access to the internal logarithmic converter. Thus an incoming linear control voltage (in this case potentially divided by resistors R59 and R60) will modify gain in an exponential manner. The output then passes to buffer IC7A and inverter IC7D as previously described.

The second VCA is used for modulation attenuation. Modulation waveforms are produced by VCO2 and mixed resistively by R35, R37 and R39 into pin 9 of IC4, the modulation waveshape being selectable by IC12B, IC12C and IC12D.

Construction

The voice card has been engineered to be built on a double-sided 100 × 200mm PCB, the two sides being linked by track pins. Because of the high component density, groups of copper tracks run parallel to each other with minimal bare fibre-glass between them, thus providing increased opportunity for solder splashes to bridge two or more tracks. So keep a watchful eye on the amount of solder you use per joint, particularly on the track pins.

Components are best assembled onto the board in the following order:

1 Track pins
2 Resistors
3 IC Sockets
4 SIL Resistors
5 Trimmers
6 Capacitors
7 Transistors
8 ICs

Track pins should be located in *all* component side holes that terminate in a solder pad: any other holes are for normal components. Push the track pin firmly through the hole and snap off from the strip of pins provided. Solder the top side of all pins first and then solder the underside.

Once you've pinned through the entire board, select and preform the resistors. Resistor leads should be bent so that no excess lead is evident, as on the component side this could give rise to a dry short with a nearby length of track. Component placement is detailed in Figure 3, and should be adhered to for all listed components. After installation of the components, the use of a PCB solvent cleaner is strongly recommended.

To aid construction and connections to panel hardware, a PCB mounting bracket is used. This bracket is secured to the front panel by means of potentiometers RV3, RV6, RV11 & RV15, while the PCB itself is held in place by two PCB slides. The bracket is used in such a manner that the plastic-coated side is face up and parallel to the PCB, providing added insulation in the unlikely event that the PCB and bracket should touch.

Connections from the PCB can be made in one of two ways – using either single-sided terminal pins or standard Molex plug-and-socket arrangements. The former of these options effectively 'hardwires' the PCB to the panel, while the latter facilitates its removal. Connections to the switches and 3.5mm jack sockets are best achieved by passing the appropriate wires through the two holes in the mounting bracket provided for this very purpose. Before the toggle switches S1-S16 are wired up, it's necessary to install a 4k7 pull-down resistor (R89–R104) on each one. Each resistor has one lead connected to 0V and the other to the switch pole, ie. the appropriate 'S' point.

Panel wiring is arranged in such a manner that control potentiometers RV1, RV2, RV3, RV4, RV5, RV6, RV8, RV17 and RV18 are disabled after the insertion of a jack plug into the appropriate socket, thereby providing a facility for either potentiometer or external voltage control. Control of the functions of both envelope generators is by means of potentiometers only (RV9 – RV16), while VCF frequency may be controlled by both RV7 *and* externally *via* J13. So the wipers of potentiometers RV7 and RV9 – RV16 go directly to the appropriately marked points on the PCB, while all other connections from the PCB link to jack sockets (J1 – J20) and switches (S1 – S16).

As previously mentioned, the PCB is fixed onto the mounting bracket by two self-adhesive PCB slides. If terminal pins have been fitted, it's recommended that the two slides be attached to the PCB, though *not* stuck down onto the bracket until the board has been tested. This is because removal would require either the slides to be replaced or all the connections to be unsoldered, which you probably don't need to be told isn't a very happy state of affairs. If, on the other hand, Molex plugs and sockets have been employed, the PCB may be unplugged and slid out for inspection.

Power supplies for a single voice card are a stable +/−15V at 300mA per rail and +/−5V at 100mA per rail. Note that the +5V rail is not connected to the PCB but has to source a number of control potentiometers on the front panel. Other power supply connections are best taken direct to the PCB and from there to panel mounted components.

Part Two next month... ■

A complete kit for the Voice Card including all parts noted in the components list (except the pots and switches) and a double-sided PCB is available from Digisound Limited, 14/16 Queen Street, Blackpool, Lancs FY1 1PQ for £74.40 inclusive of p&p and VAT. A set of 18 control pots and 16 control switches is available for £21.05, while a 9" × 9" front panel and PCB mounting kit is also available for £17.20. For further information, write to Digisound Limited at the above address or ☎ (0253) 28900.

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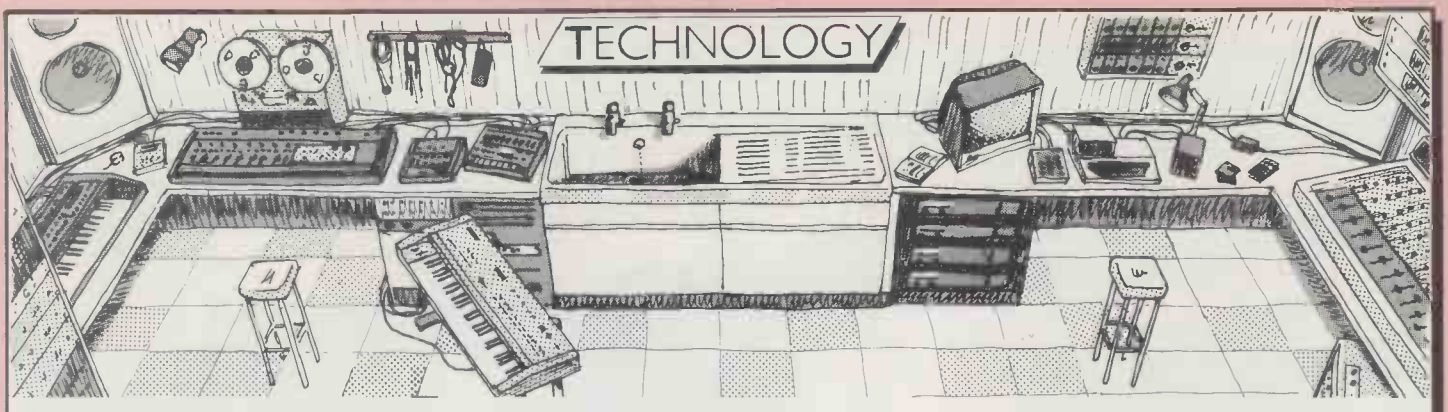


Everything but the Kitchen...

The concluding episode of our series on hardware syncing looks at SMPTE time code and its many audio-visual applications. *Richard Atherton*

Of all the essential qualities normally demanded of a film editor, the need to be able to refer to and identify any one frame from rolls of film is an extremely important element. It's a process eased by the film manufacturer printing numbers on the edge of the film: these are printed through automatically on any subsequent copies or prints so that any one frame is always accessible by reference to this 'edge number'.

Video is different. You can't hold video-tape up to the light and see a picture through it, neither can you print numbers on any part of it. Pictures recorded on video-tape can only be viewed by playing the tape on a suitable player and watching the output on a television monitor. Picture information is still made up as frames, however, and, in Europe, there are 25 frames per second (the Americans use 30). So with the advent of video-tape recording, some system of labelling each frame had to be developed. And although several systems came to light the Society of Motion Picture and Television Engineers (SMPTE) of America and the European Broadcasting Union (EBU) standardised on a system known as Time Code.

What is Time Code.

The code is a sequential electronic 80-bit digital signal that can be recorded either on a dedicated time code track or on a spare audio track. Although it was originally developed for identifying video-tape frames, it also has many applications in the sound studio. As its name suggests, the code is recorded in the form of a 'time' consisting of Hours, Minutes, Seconds and Frames. The starting point can be arbitrary or, to follow common studio practice, set to the actual time of day (24-Hour clock, of course). As an example, the last frame before midnight would have the address 23 Hours, 59 Minutes, 59 Seconds and 24 Frames (23:59:59:29 in the USA). At midnight the address would change to 00:00:00:00. This Time Code Address, together with some additional information, makes up the Time Code Word. This word is divided into 80 equal parts called Bits (in case you didn't know, it's derived from 'binary digits'), each of which can have a value of either zero or one.

Bits are created electronically by fluctuations or shifts in the voltage of the time code signal, using a technique known as Manchester Bi-Phase Modulation. A new bit, equal to zero, is created whenever the signal shifts from one state to the other. Figure 1 shows a string of zeros: to create a 'one', there's a second voltage shift half-way through a bit period, and Figure 2 shows a pattern of zeros and ones.

In order to represent the time code address, each decimal digit is encoded into four bits using the well-known Binary Coded Decimal (BCD) technique. Figure 3 shows the decimal digits of 0 to 9 as four-bit binary codes – note that within each set of four bits, bit zero is recorded first.

The actual time code address uses only 26 of the 80 bits of a time code word. Of the remaining 54, 32 can be used to enter a further eight decimal digits which stay constant throughout the recording of the code: these are called User Bits. A fairly common practice is to enter the date of the recording (eg. 00:12:11:84), but more often than not, these bits are not used at all.

Figure 1.

BIT No	4	3	2	1	0
VALUE	0	0	0	0	0

Figure 2.

BIT No	4	3	2	1	0
VALUE	0	1	0	1	0

Figure 3.

DECIMAL VALUE	BIT BINARY
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001

The remaining 22 bits are used for technical reference information. For example, the last 16 bits are used as a fixed synchronising word: among other things, this indicates which direction the tape is travelling in, thereby ensuring that the time code is always read correctly. As for the remaining six bits, they're used in television applications to indicate correct colour framing and to distinguish between 25 or 30 frames per second modes.

Applications

Obviously, as time code was developed for television, this has been the medium that's seen its use more than any other. Until recently, at least.

A time code generator lays down time code on a dedicated channel whenever shooting is done on video. (A spare audio channel can be used if a dedicated time code track is not available). When the tapes (called 'rushes', a hangover from film days) are played in the editing suite, a time code reader allows instant access to any part or frame of the tape. Most edit suite controllers these days are computerised, and if the required time is entered into the

controller *via* a QWERTY keyboard, the tape player will search for that time code value automatically. For example, if a piece of action starts at 01:20:32:15 this address is entered into the controller and the video-tape player will then search for that frame. Using this technique, a programme can be quickly and efficiently compiled with the minimum of fuss.

One trend in video-tape editing these days lies in the field of 'off-line editing'. Never heard of it? I'll explain. A copy of all the rushes is made on a cheap video format (VHS, say), with the time code shown as part of the picture: this is created by an output from the time code reader which also generates characters. The VHS copies can then be edited 'off-line' away from the (expensive) 'on-line' edit suites. When the off-line is completed a list of all the edit points (ie. where one shot ends and another starts) is made. This edit decision list is then taken to the main on-line suite where, after the list of time code numbers has been entered into the controller, the programme can be compiled automatically. If the data is stored on a floppy disk from the off-line suite, all the editor has to do is transfer it to the on-line computer. This leaves you with nothing to do except change the tapes when instructed to do so (*Luxury – **Ed***). In practice though, you won't find any editor giving that much power to a machine. They do make mistakes, you know.

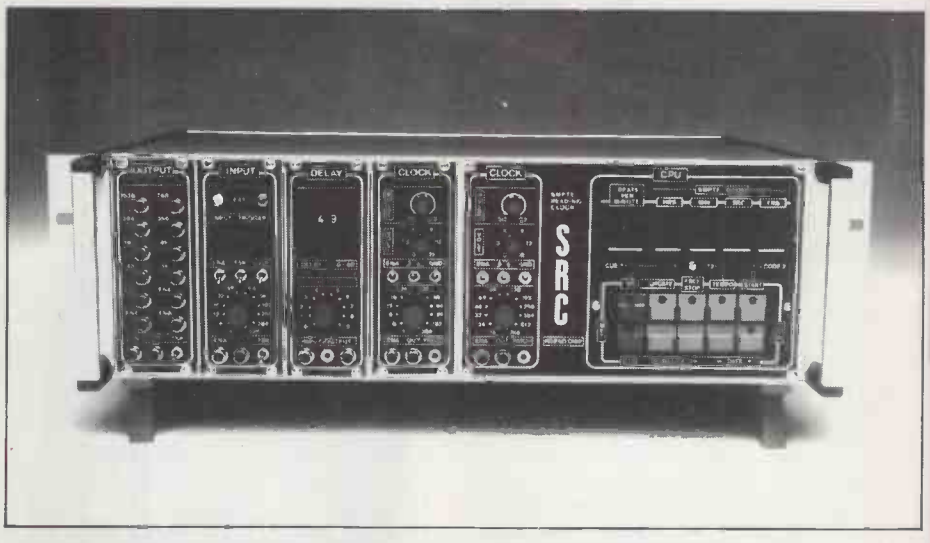
And just in case you're wondering what relevance this has to music, remember that it's an awful lot cheaper to do your creative editing on a format like VHS if you've got a SMPTE time code that makes it possible. Also of importance is the Sync Word (the last 16 of the 80 bits), which can be thought of as an electronic sprocket hole. The tape machine motors are controlled *via* a servo, which is itself controlled by the reading of the time code sync word. Hence the actual tape speed is precisely controlled, any small fluctuations being quickly counter-acted: it's this ability to regulate tape speeds that makes time code so useful in audio recording studios.

Because of the frequency of the time code signal, it's usually laid down on the outer edge track of a multitrack tape. The code is a well-known source of crosstalk and must be kept away from tracks which have bass lines and low frequencies on them.

As with video-tape recorders, the multitrack's motor servos are controlled by the reading of the sync word, yielding exact record and replay speeds. And one of the companies in the forefront of time code use and development in studios is Audio-Kinetics; their system, Q-locks, has become synonymous with all time code control systems.

Quite apart from controlling tape transport speed, the nature of time code lends itself to several other important applications in the sound studio. As with video recorders, it allows rapid access to any segment of the tape, and the Q-lock system has five memories for storing significant locations such as start of track, start of vocals, and so on. It also has the ability to play a tape continuously between any two points – obviously useful if you have an instrument solo to 'drop in' between verses, say, and you think you're going to need several attempts before you get it absolutely right.

Another popular feature of Q-lock is its ability to control up to three recorders simultaneously. If you have three 16-track recorders, these can be linked to produce a 45-track recording system. (Three tracks are used to lay the time code on.) Better still, if you're fortunate enough to have three 24-track machines you can create a 69-track studio, and even Trevor Horn would probably have trouble filling that many. The recorders don't even have to have the same time code laid down on them, because any offsets can be calculated automatically by the controller.



Mixing desks can also be controlled by time code points, so that if you want a fade at any particular point, it can be triggered by the controller. And not surprisingly, the controller can be interfaced with a computer so that all such points can be stored as data and mix-downs performed from the comfort of your own VDU terminal. As well as making the mixing process a lot less physically demanding, it also means that several identical master tapes can be produced simply by the touch of a button or two.

TV & Audio

Because video-tape recorders have only two audio channels, as often as not the audio tracks are produced in the sound studio on a multitrack recorder: this is then laid back onto the master video tape.

A 16-track tape, for example, is recorded with the time code on channel 16 matching that of the time code on the video tape. Two other tracks are used to record what the video-tape editor has laid down on the video-tape, and further effects can be added to the multitrack once it has locked to a copy of the video-tape so that the two tapes are always in sync with each other. Let's suppose a gunshot is to be added to the effects track. At the point where a small puff of smoke is seen coming from the gun on the video-tape, the time code is read and entered into one of the Q-lock controller's memories. This is then set to trigger an instant-start cartridge player. The multitrack winds back several seconds before going into normal play and at some point just before the gunshot, it drops into record mode, triggering the cartridge player to start at the exact time code point. The result is a gunshot that occurs simultaneously in pictures and in sound. As many as three cartridge machines can be controlled in this way.

Similarly, a voice-over can be added (the loop facility is particularly useful at this stage) as the artist watches a small monitor in a sound booth. When that's been done, the effects and voice-over can be mixed down onto two spare multitrack channels before being laid back onto the master video-tape.

This technique is also used in the film world, where editors work with a standard speed of 24 frames per second. The sound of Indiana Jones reaching inside his gun holster for a gun that isn't there (see *Indiana Jones and the Temple of Doom*) is actually a piece of card being ruffled inside an old motor-cycle boot, though you'd never guess it, because like all the other sound effects in the film, it was added after shooting (no pun intended) using a time-coded multitrack system.

The burgeoning field of pop video promos also takes advantage of the accuracy that a time code-locked system can give. During the shooting, the artists mime to a time code-controlled playback to make sure everything's going to be at the correct speed. When the video editor has finished putting the pictures together, his or her time code edit decision list is handed over to the audio engineer, who compiles an audio track that conforms exactly to the timing of the video. Again, this ensures that sound and pictures are always in exact sync.

Finally, musicians are now finding a use for time code to control the playing of sequencers. Syco recently gave me a demonstration of a unit made by Friend Chip by the name of the SMPTE Reading Clock (SRC for short). This allows several sequencers to be started simultaneously, and also controls the overall tempo of the music. Staggered starts are not, as yet, possible but I am informed that this is being developed. As it happens manufacturers are only just starting to realise the potential of SMPTE for use in dedicated music-related products, but one recent example of what can be done is the Roland Sync Box reviewed elsewhere this issue, which allows drum machines and sequencers to be locked to a SMPTE time code on tape. And the code itself can either be pre-recorded or generated by the Sync Box itself.

With the cost of SMPTE generating and reading systems falling dramatically, largely due to the design of special dedicated ICs, it's likely that there'll be plenty of new synchronising systems taking advantage of the sophistication of SMPTE format in the near future. Thus the average musician will have access to a time code system that outperforms conventional sync pulse standards but should remain relatively affordable.

Conclusions

Within the professional fields of television, film and audio studios, it's obvious that time code is rapidly becoming an essential fixture. Part of the reason for that is the system's inherent flexibility, as more uses are being developed for it all the time. Even the BBC Micro will soon find use as a time code reader and control unit, if current developments are anything to go by.

The world of video syncing is that rare thing, a hi-tech field where a product has been standardised and hence universally accepted. All we need to do now is persuade the Americans that they only need 25 frames per second, and life will become easier still. ■

SIGHT READING

TWO BOOKS TO DEMYSTIFY THE SYNTHESISER

The Complete Synthesiser Handbook
by Michael Norman and Ben Dickey
Zomba Books, £4.95

If you're looking for a book that'll explain, in reasonably simple terms, the techniques a synth-based group uses in the studio these days, this book may be what you are after. If, on the other hand, you pick it up hoping that it will lead you through the mysteries of synth programming, you may well be disappointed.

The chapters themselves are organised logically enough. First, 'Synthesiser Language' mentions additive synthesis, explains subtractive methods (still the more common) and mentions both computer-based direct synthesis and FM instruments like the DX range, with promises of explanations later. The problem with the explanation of subtractive methods is that it's just too dry: there's no 'what if?' section to show you how sounds are affected by different settings for individual components. The authors have succeeded in describing each element in the Voltage Controlled Synthesiser, but they've missed the point that voltage controlled devices can be affected in different ways by the same voltage – one of the most interesting and exciting aspects of the technique.

The second chapter, 'Monophonic and Polyphonic Synthesisers', is basically a historical introduction to the instruments that have influenced the development of synthesis since Moog's first system in 1965. Meanwhile, chapter three outlines the various different methods used to control synthesis, making mention of some of the weird and wonderful

techniques. Breath, keyboard, wheel and guitar-based systems are all discussed, but with no real conclusion as to why some systems are more popular, or more musically effective, than others.

Chapter four describes drums and drum machines and gives a suggested technique for programming a Linn as an example. Simmons kits are also given a good deal of attention (in the book, as in real life) and Warren Cann's drum rig, as used on the Ultravox *Monument* tour, is given the editorial once-over. Interfacing, probably the most important – certainly the most misunderstood – aspect of current and future synth usage is roughly described in chapter five, while chapter six talks about synthesisers in the studio, with particular reference to the recording of Heaven 17's 'Temptation'.

Dedicated Music Computers (actually, Vince Clarke's use of the Fairlight – nuff said) form chapter seven, and the techniques and ergonomics of live synthesis make up number eight. Worthy enough, this, particularly the description of how Ultravox performed 'Vienna' live on stage during the *Monument* tour already mentioned.

The final two chapters are made up of brief interviews with electro producers Conny Plank and Martin Rushent as well as a few suggestions from the authors as to what the future may hold for the synthesist.

In all, Norman and Dickey's effort is a disappointingly light read that gives prominence to the ill-formed chatter of the famous at the expense of much objective information-spreading from the authors. If an insight into how a couple of famous synth users is all you want out of a book such as this, you'll be happy. If it isn't you won't be.

Geoff Twigg

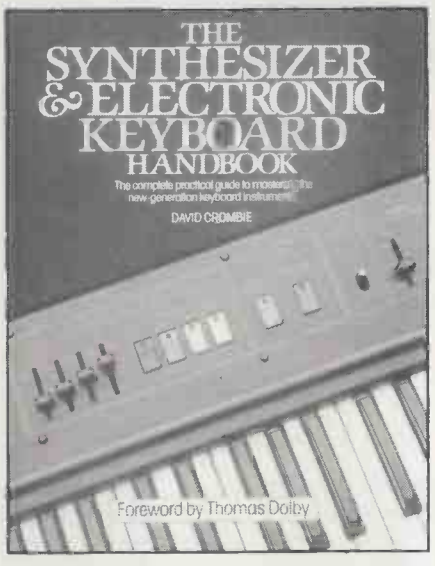
The Synthesizer and Electronic Keyboard Handbook
by David Crombie
Dorling Kindersley, £9.95

A 160-page colour hardback that aims to cover basic and essential information on electronic keyboards of all kinds, as well as the fundamentals of sound, electricity, amplification, recording, playing techniques and music theory. The man behind it is Dave Crombie, one-time E&MM contributor and keyboard store co-owner, who's in as good a position as anybody to write objectively and comprehensively on what's becoming a wider and more complex subject as each week goes by.

There's also a foreword by Thomas Dolby who also crops up with remarkable frequency during the rest of the text. That remainder is divided into five sections, each of them devoted to a different aspect of the subject and colour-coded for easy reference, while an introduction comprises a necessarily short history of keyboard playing since about 1900, from ragtime and boogie to today's pop synthesiser bands.

The main body of the book is devoted to explanations of the working processes of synths and comparisons between different models. Beginning with histories of the harpsichord, clavichord, piano and organ (complete with diagrams of their working mechanisms), the first chapter continues by examining the evolution of electric keyboards, and it's here that specific models are related to relevant artists for the first time.

This is followed by a study of how synthesisers work, the author starting from basic building blocks. What we find here is a control guide, a plan of the component modules of a typical synth and an examination of some different types and models. And taking a Prophet T8 as an example, the synth's control



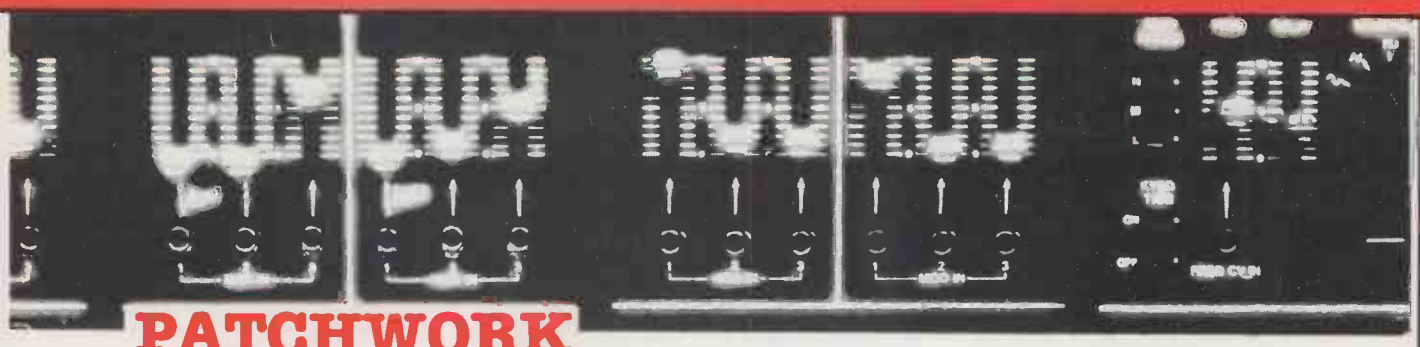
panel is analysed in both technical and aural terms. Some readers might be confused to learn about VCOs under the heading 'Voltage Controlled Filter', but for the most part the style is easy-to-understand and clear diagrams complement the text throughout.

Finally, a variety of subjects not encompassed by the headings electric or acoustic keyboard are also covered, and these include digital synthesis, sound sampling, computer music and sequencers. Portable keyboards and rhythm units also find their way into what is something of a hybrid area, but don't go looking for completeness here; one and a half pages won't teach you All You Need to Know About Drum Machines. The same goes for the section on home micros: all very well if you're new to the subject but pretty rudimentary otherwise.

Back to the good points. It may seem slightly incongruous to include a chapter on the theoretical side of music, but this section does fulfil a useful function not usually included in a more technical book of this sort. And not only does the chapter contain a guide to the fundamentals of playing technique, it also gives suggestions on how to practise, and a complete guide to musical notation. This may already be common knowledge to many people, but for beginners it represents a tutor that's neither childish in outlook nor excessively traditional, as many beginners' music books tend to be. Instead the subject is neatly presented with clear sets of instructions and diagrams.

The Synthesizer and Electronic Keyboard Handbook is a comprehensive and authoritative publication, well written, superbly packed, and blessed with a rather unwieldly title. It's unlikely that everyone will find each section of the book interesting, but the area covered is so wide that there's bound to be *something* of interest to most readers. Above all, it provides an excellent introduction to the world of electronic keyboards, and there's certainly no shortage of more complex material on the subject once this book has awoken your curiosity. The only slight problem is the book's vulnerability to rapid market change, but then again, there's always E&MM to fill you in on the latest developments as and when they happen.

Neville Unwin



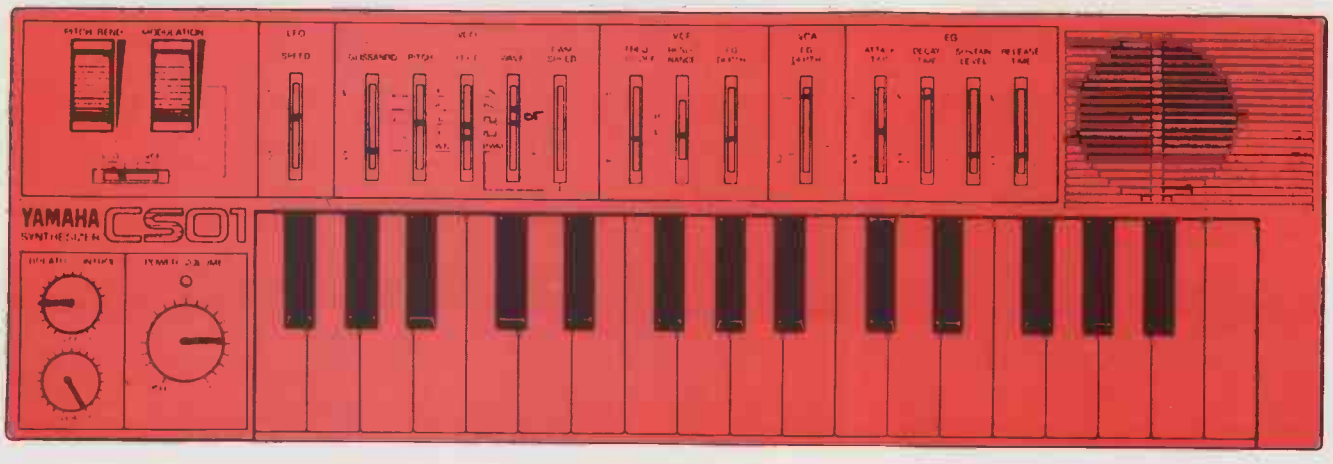
PATCHWORK

Readers send in details of their own synth patches and how to play them...

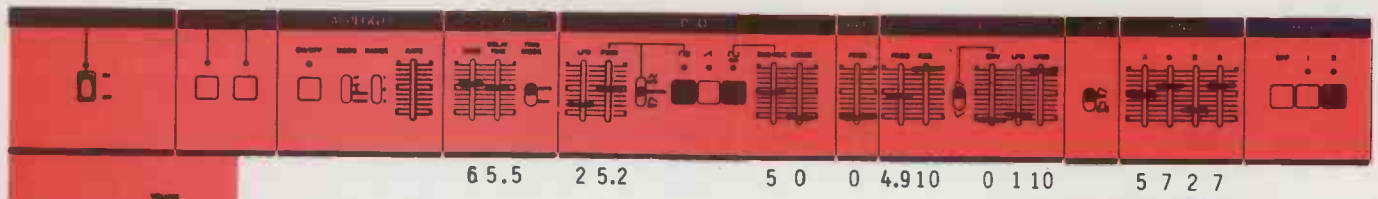
This is your chance to commandeer E&MM's pages and show off your latest creation for the synth that Santa brought . . . So if you're of a sharing nature and want to blow your own trumpet, send your offering on a copy of an owner's manual patch chart (including a blank one for artwork purposes) to ***Patchwork*, E&MM, Alexander House, 1 Milton Road, Cambridge CB4 1UY.**

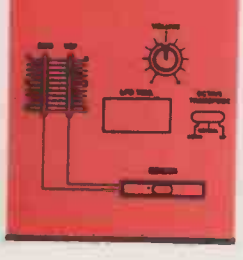
YAMAHA CS01 — 'Bass Pipes' — Lynne Tennant, Gwent

The CS01 may not be in the same sonic league as its big brothers in the DX range, but it does offer an inexpensive entry into the world of synthesis and is an extremely portable package. Lynne's Bass Pipes patch can also double as a Bassoon if the ramp wave is used, and the footage may be set to either 16″ or 32″. A brighter sound can be obtained by using the breath control, while a slow vibrato (VCO modulation) may be added to taste.



ROLAND JUNO 6/60 — 'A Choired Taste' — Ian Corden, Stoke-on-Trent





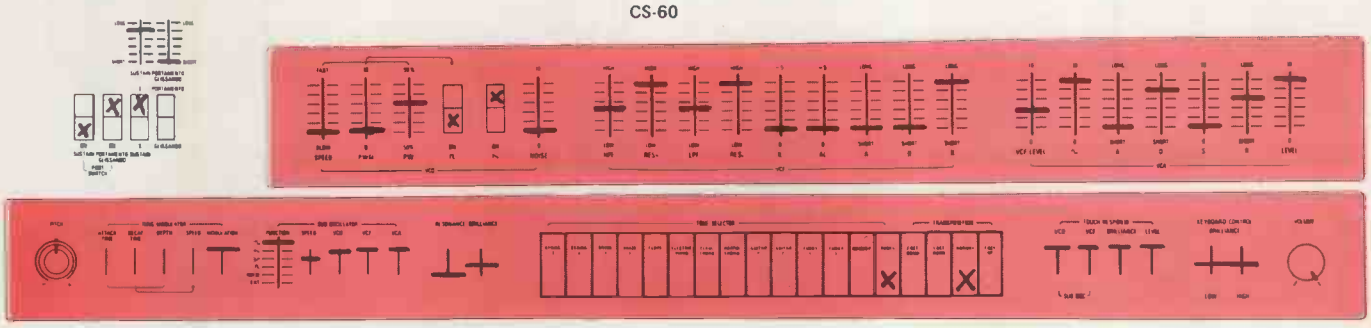
Ian comments that the settings are best adjusted carefully in order to obtain the massed 'ahhh' effect characteristic of an ensemble of choir singers. In particular, the VCF Freq setting is of critical importance, because drastic adjustment enables a wide range of soft and hard vocal sounds to be produced. Incidentally, noise is added to give the sound a breathy character, and the optimum setting for this should be around 4.

YAMAHA CS60 — 'Vibes Alive' — Brian Thomas, Solihull

Many moons have passed since Yamaha launched the faithful CS60, but there's at least one that's still being put to good use in the West Midlands.

Brian's patch sounds like a cross between a glockenspiel and a vibraphone, and he comments that the HPF and LPF settings are extremely critical: the output of the filter section should be a piercing note a few octaves above the pitch of the sine wave. A pretty good pipe organ sound can also be achieved simply by experimenting with the envelopes and relative levels in the VCA sections.

CS-60



YAMAHA DX7 — 'Syn-Phizz' — A Marshall, Brighton

'Syn-Phizz' is modestly described by its creator as a decent lead sound (not at all wimpish) with a full initial output followed by a sustained organ-like noise. Playing with increased velocity gives a brassier sound, while a portamento setting of 10 can be added to good effect, if that's the sort of thing that gives you whizz . . .

YAMAHA DX7 VOICE DATA LIST

ALGORITHM	FEEDBACK	LFO WAVE	LFO SPEED	LFO DELAY	LFO PMD	LFO AMD	LFO SYNC	MOD. SENSITIVITY PITCH	MOD. SENSITIVITY AMPLITUDE
22	6	TRI	41	74	2	50	OFF	4	1

	POLY/MONO	PITCH BEND RANGE	PITCH BEND STEP	PORTAMENTO MODE	PORTAMENTO GLISSANDO	PORTAMENTO TIME
	POLY					

OP		MODE/SYNC	FREQ. COARSE	FREQ. FINE	DETUNE	EG RATE 1	EG RATE 2	EG RATE 3	EG RATE 4	EG LEVEL 1	EG LEVEL 2	EG LEVEL 3	EG LEVEL 4	BREAK POINT	KEYBOARD LEVEL SCALING L CURVE	KEYBOARD LEVEL SCALING R CURVE	KEYBOARD LEVEL SCALING L DEPTH	KEYBOARD LEVEL SCALING R DEPTH	K.BOARD RATE SCALING	OUTPUT LEVEL	VELOCITY SENS.
6	R	ON	1	00	0	64	16	19	32	99	75	90	0				0	0	4	88	1
5	R		5	00	0	64	16	19	37	99	95	90	0				0	0	4	99	0
4	R		2	00	0	64	16	19	37	99	95	90	0				0	0	4	99	0
3	R		1	00	0	64	16	19	37	99	60	30	0				0	0	4	99	0
2	R		2	00	+7	64	16	19	37	99	95	90	0				0	0	4	95	1
1	R		2	00	+7	64	16	19	37	99	95	90	0				0	0	4	99	1

PITCH EG RATE 1	PITCH EG RATE 2	PITCH EG RATE 3	PITCH EG RATE 4	PITCH EG LEVEL 1	PITCH EG LEVEL 2	PITCH EG LEVEL 3	PITCH EG LEVEL 4	KEY TRANSPOSE	VOICE NAME
50	50	50	50					C2	Syn-Phizz

MODULATION WHEEL RANGE	MODULATION WHEEL PITCH	MODULATION WHEEL AMPLITUDE	MODULATION WHEEL EG BIAS	FOOT CONTROL RANGE	FOOT CONTROL PITCH	FOOT CONTROL AMPLITUDE	FOOT CONTROL EG BIAS	BREATH CONTROL RANGE	BREATH CONTROL PITCH	BREATH CONTROL AMPLITUDE	BREATH CONTROL EG BIAS	AFTER TOUCH RANGE	AFTER TOUCH PITCH	AFTER TOUCH AMPLITUDE	AFTER TOUCH EG BIAS
99	OFF	ON	OFF									90	ON	ON	OFF

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BACK TO BASICS

The second part of our series for the complete newcomer to the world of synthesisers. *Steve Howell*

Having looked at the basic working principles behind every analogue synthesiser, we can now safely move on to discuss individual modules in turn. And what better place to start than the foundation stone from which all analogue synths are built? I refer of course to the oscillator, and to begin with, those oscillators whose operation is governed by the principles of voltage control discussed last month.

An oscillator's purpose is simple: to provide a basic tone at a variety of different pitches. That basic tone takes the form of a variety of waveforms, whose pitch is determined primarily by the synthesiser's keyboard. Before we start going into too much detail about a VCO's output, however, perhaps a quick lesson on the physics of pitch wouldn't go amiss.

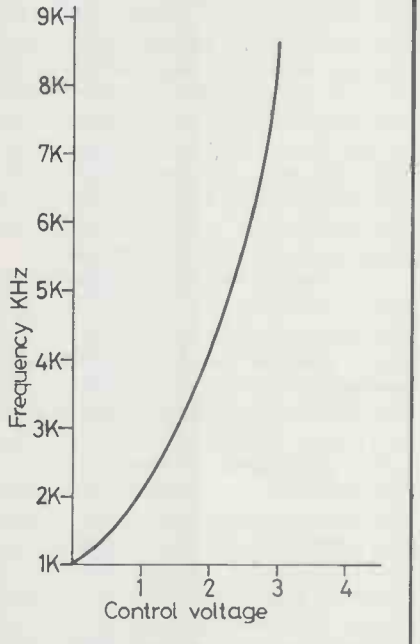


Figure 1. The relationship between frequency and voltage.

In order for human beings (and I imagine that probably covers most of you) to perceive the pitch of a sound, that sound must vibrate (or oscillate) at a rate of between 40 and 15,000 cycles per second, or as technical terminology would have it, 40Hz–15kHz. And one rule we can apply to all sources of sound is that the more cycles there are in the space of a second, the higher the sound's pitch will be perceived as being.

If you're having problems visualising how this principle might work out in real life, imagine the workings of a common or garden record player. Play a 33⅓rpm disc at 45rpm and its pitch sounds higher than it ought to be, and it's much the same with synths: the faster a VCO oscillates, the higher its pitch will be. The two parameters work in proportion to each other, too, so that a doubling of frequency results in a doubling of pitch. In other words, 200Hz is an octave higher than 100, 400 is an octave higher again, and so on until the end of the Universe.

How does electronics get into all this? Well, purely and simply because applying a voltage to a VCO's input alters its resultant pitch. And one volt per octave synths – which is a lot of them – usually follow the rule that one volt of change will result in a pitch change of one octave, so that, for instance, a 1V input gives a 200Hz output, 2V gives 400Hz, 3V gives 800Hz, and so forth. See Figure 1 for a pictorial realisation of this concept (man).

Even with the help of the diagram, this theory might seem a little on the complicated side to some of you, but if it does, don't panic. For one thing, it's really the only bit of theory you have to know in

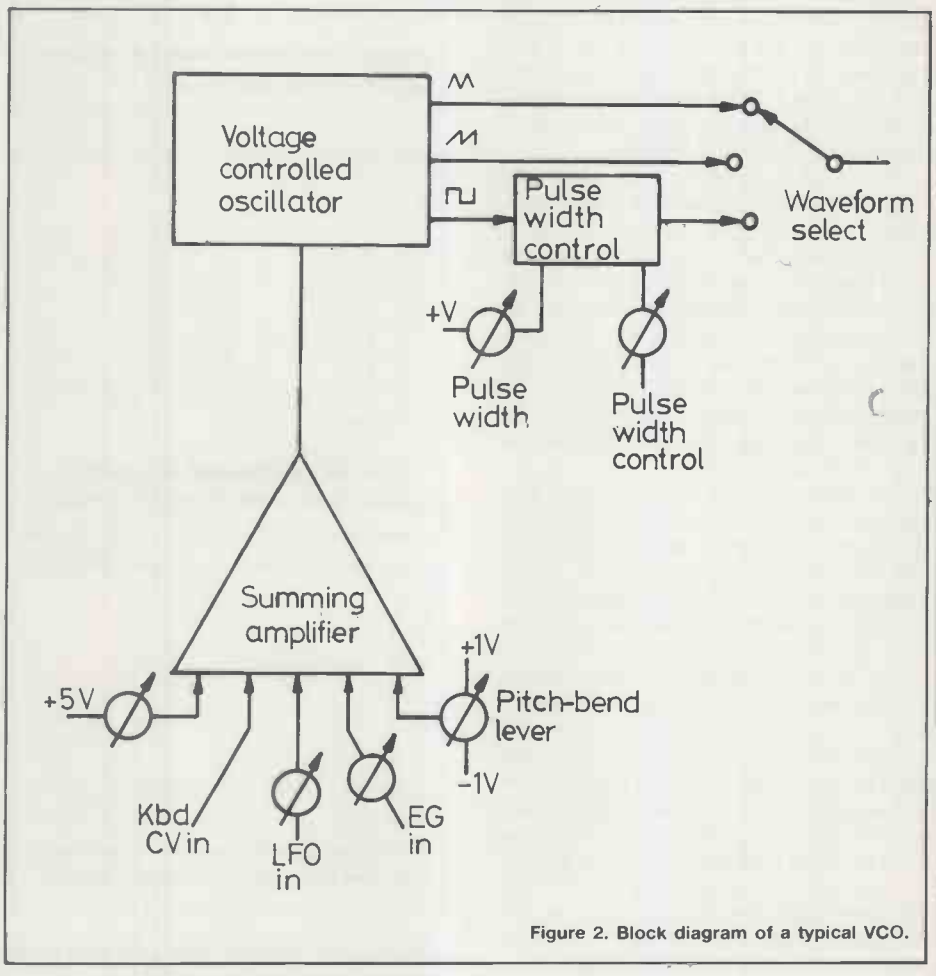


Figure 2. Block diagram of a typical VCO.

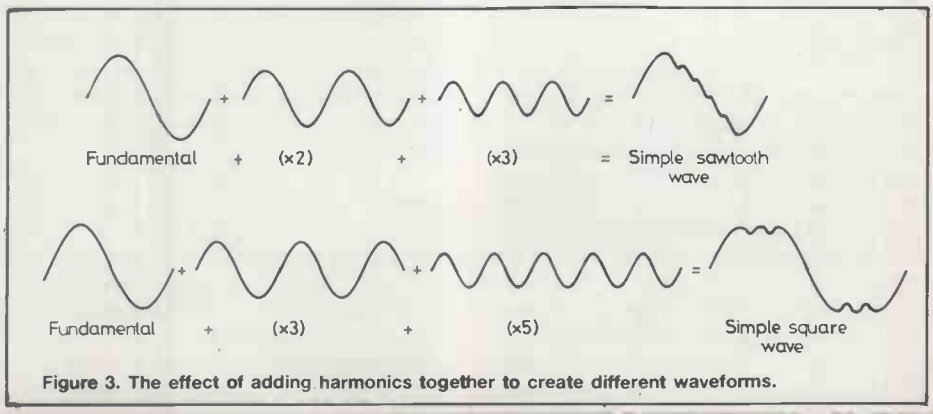


Figure 3. The effect of adding harmonics together to create different waveforms.

connection with oscillators, and for another, it won't really harm you all that much if you don't really get the drift of it at all. Take the time to get to know it, however, and it'll gain you a greater understanding not only of synthesisers but of sound in general.

Inputs

So, having gotten the heavy stuff out of the way, let's look at the VCO in detail – Figure 2 shows the layout of a typical one. You'll see that this imaginary oscillator outputs three different waveforms, selectable by means of a simple switch. It also has an input mixer that allows you to mix a variety of control sources such as the keyboard, the low frequency oscillator (LFO), envelope generator (EG), and pitch-bend levers, to name the most common elements. The mixer also has the job of mixing in a number of DC voltage sources necessary to set the basic range of the VCO and tune it to other sound sources, and because it goes about its business by adding voltages together, the mixer is known as a Summing Amplifier.

How does it work? Well, let's say you press Middle C on the synthesiser keyboard: this will send 1V to the VCO's summing amplifier. If you then adjust the Tune control to give a 1V output from the DC source, this will add another volt to the summing amplifier and the pitch will rise by an octave as a result. Move the pitch-bend wheel or lever down to its minimum position and you'll add −1V to the summing amp, so the pitch will go back down an octave.

The above is just an example that illustrates how voltages are added and subtracted in different ways to produce different pitches, but in fairness, you're unlikely to need to check voltage readings from the various controls with a multimeter every time you set up your favourite string sound, so it's not a process that needs to be retrieved from the memory cells every time you start programming your synth. On the other hand, knowing how the input stage of a VCO gets its act together *will* enable you to predict what results your programming manipulations are likely to have on the final sonic outcome. Which is a much more agreeable situation than aimlessly fiddling with your instrument in the hope of getting some sort of result (*know just what you mean – **Ed***).

Outputs

But enough of input stages for the moment. Let's look at what happens at the other end of a VCO's scale of operations by trying to discover what waveforms are all about. The bad news here is that I'm going to have to delve into the world of physics again to start off with, I'm afraid.

Most sounds contain a phenomenon you've probably all seen referred to in the past as Harmonics. These are actually rather important as they're what enables us to perceive the tone (or as the French, and probably the Californians, would call it, the timbre) of a sound. And as a general rule, the more harmonics there are in a sound, the brighter we perceive that sound as being.

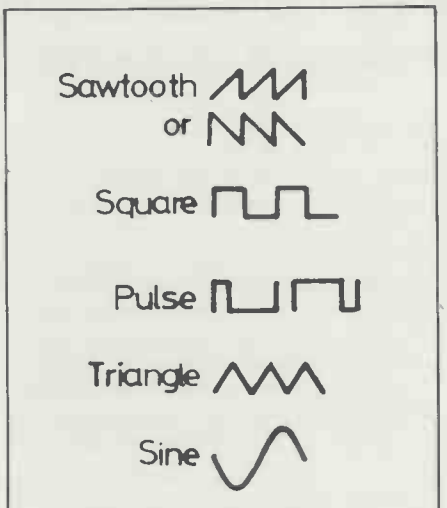


Figure 4. The standard analogue oscillator waveforms and their symbols.

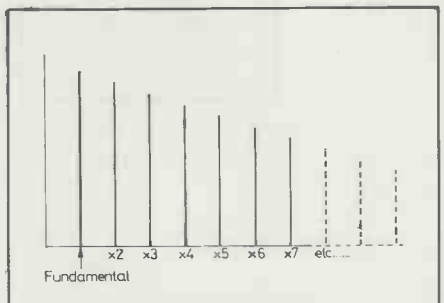


Figure 5(a). Spectragraph of a sawtooth wave, showing odd and even harmonics.

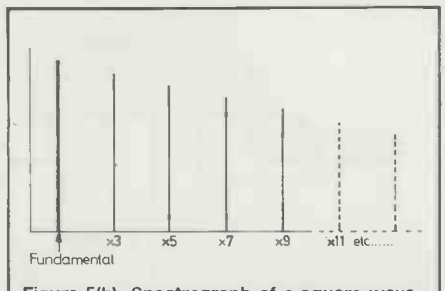


Figure 5(b). Spectragraph of a square wave. Note that only odd harmonics are present.

What are harmonics? Quite simply, they're multiples of the fundamental waveform, the sine wave. In fact, as Figure 3 shows, harmonics are also sine waves, as multiples of the fundamental's frequency.

So having said all that, why have different waveforms in the first place? Well, the reasoning lies in the fact that most sounds, in addition to having more or less harmonics, also have them arranged in various different ways. For example, a trumpet has both odd and even harmonics, while a clarinet has only odd ones. And in order that the poor, unsuspecting synth player might have a bash at programming sounds that approximate as many acoustic equivalents as possible (as well as voices that have no precedent in the acoustic arena at all, of course), synth designers have kindly seen fit to endow their produce with waveforms that possess different harmonic structures.

The most commonly found waveforms are as follows. First, the **sawtooth**, a waveform that comprises both odd and even harmonics, and sounds bright (and vaguely brassy) in its raw state, ie. unfiltered by any later synth module or signal processor.

The **square wave**, by contrast, contains only odd harmonics and is therefore useful for mellower sounds such as those of woodwind instruments. It can also come in handy for injecting 'welly' into bass and lead line sounds. **Pulse waves** are a little bit complicated as they don't technically constitute a classification of their own: they're usually obtained by varying the width of an existing square wave. And because pulse waves possess a continuously variable waveshape, it's impossible to say precisely what their harmonic structure is. Suffice to say that most pulse waves sound thin and nasal, and are therefore well suited to the imitation of delicate acoustic timbres such as harpsichord sounds. It's possible to vary the width of a pulse wave automatically using voltage control – this sweeps the width from one extreme to the other and is useful for chorus and flanging effects *à la* Gary Numan.

The **triangle wave** is similar to the square in that it also contains only odd harmonics: the difference is that there are less of them, and as a result of this, the waveshape's sonic output is more muted than that of a square wave and is useful as a source of flute sounds and the like.

The **sine wave** is totally devoid of harmonics, and is therefore the purest waveform available to mankind. In practical terms, it's not actually a particularly useful waveform, though its ability to reinforce the fundamental of a sound makes it useful for beefing up weak voices. As it happens, few synth VCOs are equipped with sine waves as they're none too easy (read 'cheap') to reproduce electronically without any distortion. If you're one of the majority without a sine option on any of your variable oscillators, you can use a filter to do the same job, but we're beginning to leap ahead of ourselves.

The waveshape symbols illustrated in Figure 4 are graphic representations of what you'd see if you connected the VCO's output to an oscilloscope. A synth from one manufacturer should produce much the same visual result as a model from any other, so these symbols have now been almost universally adopted as the standard means by which different waveforms can be identified visually. Once you know what each symbol represents, you're halfway towards achieving positive programming results.

Combinations

You'd be quite blameless in thinking that what we've talked about so far this month is quite complicated, but in reality we've only uncovered the tip of the waveform iceberg. It's all very well discussing individual waveshapes in isolation, but what happens when we start using different waveforms in combination with each other?

Consider that all mixer modules present on an analogue synthesiser – whether voltage or audio – are summing amplifiers, and are capable of adding one voltage to another to form a composite result. The waveforms generated by VCOs are little more than AC voltages oscillating at audio frequencies anyway, so they can be added together to create new voltage shapes, or in other words, new waveforms.

Well, that's the technical version. All you really need to know in practice is that by combining waveforms together, you can drastically increase the range of sonic possibilities at your disposal.

Figure 6(a) shows the effect of mixing a sawtooth with a square wave, and the relative levels of each waveform should yield a variety of different timbres. Figure 6(b) shows a similar mixing process, except that the two waveforms concerned are both of the sawtooth variety, tuned slightly apart. The result of this is that the waveforms are out of phase with each other. Depending on just how *far* the two oscillators are tuned apart, this arrangement is capable of providing a broad range of effects from mild flanging to heavy chorus. The fluctuation in level caused by the phase difference between the two VCOs is known as Beating, and the wider the pitch difference between the waveforms, the more rapid this beating becomes.

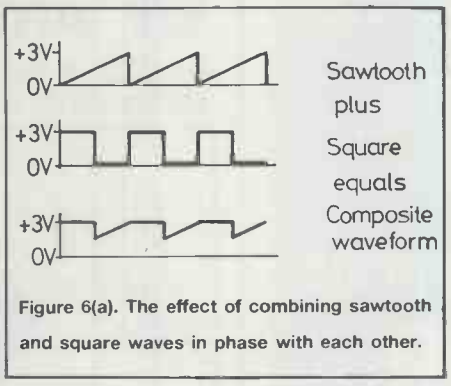


Figure 6(a). The effect of combining sawtooth and square waves in phase with each other.

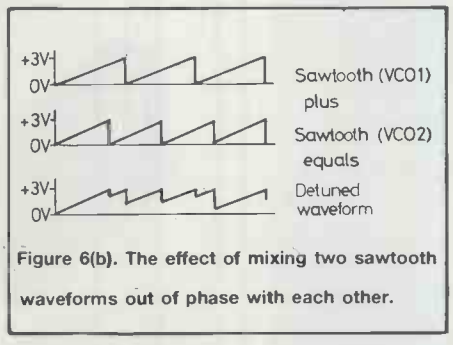


Figure 6(b). The effect of mixing two sawtooth waveforms out of phase with each other.

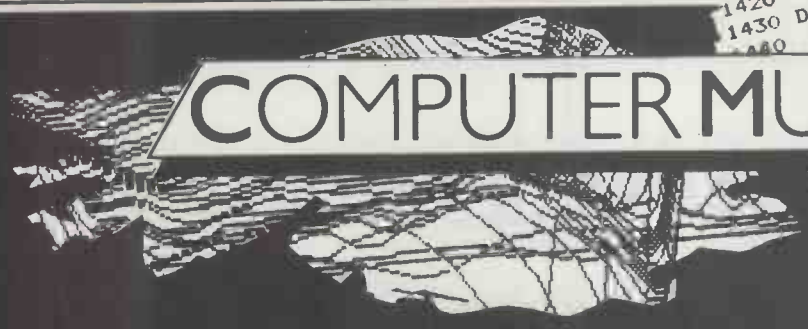
In addition to tuning oscillators only slightly apart for ensemble and associated beefing-up effects, it's also possible – on many two-oscillator synths – to tune them apart by a standard musical interval such as an octave or a fifth, which has the thoroughly agreeable effect of making your lone synth sound like it's twice the instrument it really is.

Guidelines

As I've been at pains to point out, an in-depth knowledge of how your synthesiser does everything it's capable of is by no means a prerequisite for enjoying playing and programming it. After all, you don't have to know the precise mechanism by which each moving part of a piano does its job to become a great concert pianist.

Understanding the physics behind the synthesiser's *modus operandi* – which is what this series is all about – should enable you to get better results out of programming in a shorter time. But one trap you should beware of falling into is letting your knowledge of the technology of synthesis dictate the sort of music you play. As with any musical instrument, what you want to achieve from a musical point of view should determine how you apply the relevant technology, not the other way around. ■

COMPUTER MUSICIAN



So there I was, two-finger stabbing away on my BBC Micro word processor, when suddenly the screen displayed the curt error message 'Disk fault 08 at 00/01' and the drive made a pathetic scrunching sound. Rapidly coming to the bitter realisation that the best part of a couple of days' work was doomed to the great data bin in the sky, I considered my next course of action.

Now, word processors are addictive beasts, and if you're momentarily starved of their output, it's a bit like having some essential part of your anatomy lopped off. Not surprisingly, this releases all manner of aggressive behaviour patterns, and at the moment under discussion, I picked up the disk drive and slammed it against the wall. And the result of that hasty action? Well, a new error message ('Drive fault 18 at 00/00') and a bill for £11.50. But did I regret it? Not a bit of it – it felt great to put technology firmly in its place!

Given a more relaxed frame of mind, I suppose I'd have retreated, tail between legs, to the other side of the room where the typewriter sits smugly, daring me to do battle with its 12 year-old, battle-scarred keys and idiosyncratic non-returning carriage, but this time, something snapped: I'd reached the end-point of endurance of technology that was limiting my creativity.

Two factors probably played a part in bringing home this feeling. Back in the dim, distant past, I used to play the harp professionally – orchestras, sessions, all that sort of thing – but decided to ditch it all in favour of studio work. That meant selling my harp and buying multitrack gear. Five years on, however, and with the shocking realisation that the harp I once had is now worth four times its original purchase price (£2200), I've decided to resurrect that side of my musical life. So, come March, I'll be the proud owner of a nice, new harp – not a sampled harp, a DX7 harp, or any other extremely vague technological representation of a harp.

Which brings me to the other element in this honest tale of truth – a new LP called *Digital Moonscapes* by none other than Wendy Carlos. Well, I should say at the outset that I've admired the work of this man/woman ever since the days of *Switched-on Bach*, and that fact, plus her well- publicised use of and admiration for the Crumar General Development System, led me to hold certain expectations for *Digital Moonscapes*.

But sad to say, I'm disappointed. Wendy Carlos talks in her sleeve notes about creating digital 'replicas' of orchestral instruments (the harp included) that are '70–95% successful' in recreating the sound of the real thing. Furthermore, the limited bandwidth of the GDS and Synergy hardware produces a mushy sort of sound that lacks *all* the clarity and vitality of the orchestra she's trying to emulate, and I'm at a complete loss to understand how she can talk about a 'scrim-free orchestral transparency on the digitally mastered recording'. But besides the dubiousness of using technology merely to produce pale imitations of the real thing, there's the curious stylistic no man's land her music seems to inhabit – somewhere between out-takes for *Tron* and *Matinee Musicale* on a wet Monday afternoon.

The curious fact of life is that the quality of most of the music being turned out by both classical and pop electronic music studios hasn't grown with the technology that's being used to produce it. When I want to be refreshed by electronic music, I tend to go to a Philips boxed set of pieces from various European studios from the sixties for a reminder of what creative imaginations did before computers came on the scene. And how about Stockhausen's music as a prime example of this? Certainly, Jean-Michel Jarre's Fairlight extravaganza, *Zoolook*, no matter how painstakingly constructed, hardly stands comparison with that masterpiece of analogue synthesis techniques, *Gesang der Junglinge*.

So, is it the Crumar GDS that's constraining the creative abilities of Wendy Carlos, or vice versa? ■

David Ellis

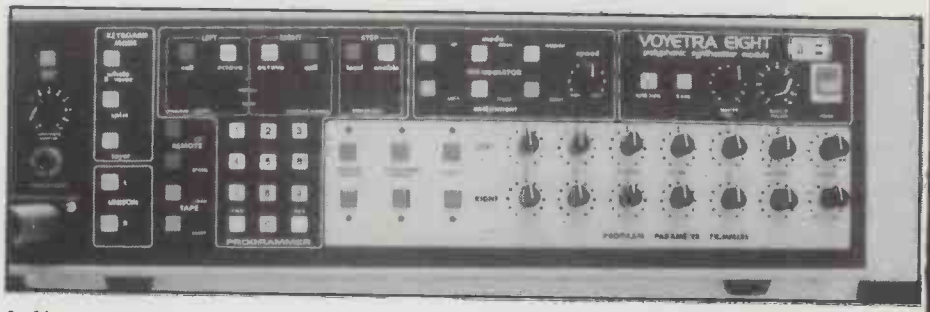
Rumblings . . .

This month's round-up of all that's new in the world of computer music.

If the rumblings on the grapevine are anything to go by, 1985 should be a pretty interesting year for musical technology. Already, pre-Frankfurt news is filtering through about a remarkable sampling (and this one really *means* 'sampling') keyboard from Malvern. No, not Malvern, Worcs, habitat of the Much Spotted Paul White, but Malvern, Pennsylvania. You know, Pennsylvania, home of . . . er, quite. Well, at least it's not yet another Californian company.

In fact, I reported on Pennsylvanian goings-on back in October's *Rumblings*, though on that occasion the company was Peripheral Visions Inc, and the product was a digital percussion add-on for the Apple II called the DrumKey. Since PVI and Ensoniq – the people behind the sampling keyboard – share the same address and technological inclinations, they're presumably one and the same. Anyway, what Ensoniq are now offering is a $1695 sampling keyboard called the Mirage. And what the sum gets you looks to be amazing value for money: a five-octave touch-sensitive keyboard, eight-note polyphony with split options, multi-parameter control including filtering, envelopes, and modulation, an overdubbable polyphonic sequencer, a built-in 3.5" disk drive for storage of sounds, and the sampling facility as standard. At a time when so many companies are offering user sampling as an optional, still to be released, and expensive extra, it's great to see the facility being included as standard, so hats off to Ensoniq for that.

Of course, if you've come to expect that sampling keyboards must be expensive, then all this may come as quite a shock, and you might quite reasonably wonder how Ensoniq have been able to do it. All well, m'boy, it all comes down to a little chip called the 'Q Chip' – well, it's quite a big chip actually – that the company have designed specifically for the Mirage. As it happens, Ensoniq/PVI seem incredibly hot at this sort of thing: the DrumKey uses a custom multisound ROM and DAC chip, and there are also rumours that Ensoniq are coming out with a sub-$200 digital drum machine using the same technology. All of which begs the question as to when we're going to see any of their products over here. So, nice people at Ensoniq, why not drop us a few of your units for review? Come to think of it, I could do with a Mirage or two myself . . . For more information, write or call Ensoniq, 263 Great Valley Parkway, PA 19355, USA. ☎ 215-647-8646.



Mimetics

One of the problems of Computer Music Studios moving 'lock, stock and barrel' to Wales, as *Newsdesk* so eloquently put it last month, is that going west also increases the length of telephone cable required to interconnect one niche of western civilisation with another, and in inverse proportion, the resultant intelligibility of the British telephone system. A casualty of this unfortunate fact of life was last month's report on the demise of Syntauri Corp. True, they are demised, no more, tinkling the ivories in the sky, kicking the heavenly bucket (brigade), etc, but the company that's been formed to continue the good work is called 'Mimetics', not 'Metamatics' (well, it *is* similar, you must admit, especially over a phone line that positively delighted in emulating World War II data encryption techniques).

More to the point, Mimetics are doing something that Syntauri should have done ages ago – replacing the ancient MusicSystem hardware with something that's more technologically up to date. What Mimetics have come up with is some brand new, 16-channel hardware that operates three times as fast as the old system, has lots of RAM on-board for waveform table storage, and comes complete with a general purpose keyboard interface, and (possibly) MIDI. The price of the hardware is likely to be around the $650 mark, though this also includes an entirely revamped version of Syntauri's Metatrak real-time sequencing software. And since up to five of these cards can be plugged into the Apple at once, there's obviously a lot of scope for expansion if both your wallet and the Apple's 6502 can take the pace. For more info, contact Computer Music Studios at Berwick Farm, Berwick Road, Bynea, Dyfed, Wales. ☎ (0554) 751169.

Plateauing Out

As 1985 gets under way, there'll be some long, hard looks at what the MIDI standard has achieved over the last 12 months. My guess is that the winners will be those whose software is either cheap or allied to the use of hardware that can see beyond its Omni or Poly mode nose. At the cheap(er) end of the price spectrum, the moves that are afoot in the Yamaha CX5M camp to produce multi-track sequencing software that divides the workload between the SFG01 FM unit and MIDI keyboards look particularly promising. But equally interesting is the software that Octave-Plateau are 'about to release' for the IBM PC, at what they'd term the 'high end' of the market. Their 64-track 'digital tape recorder', as they describe it, uses the Roland MPU401 (good to see someone using it outside Roland DG themselves) linked to an IBM PC or its clonal equivalent *via* an Octave-Plateau interface card. Each of the 64 tracks can be independently looped, transposed, and autocorrected on either playback or record, with a total capacity of 60,000 notes. Other features include 'rehearsable' punch-in and punch-out, comprehensive editing facilities, step-time capability, cue markers, and the means for creating drum scores for use by MIDI drum machines.

Also released by Octave-Plateau is some voice editing software (again for the IBM PC) for their Voyetra 8. No doubt this will be greeted with great joy by Voyetra owners, as it has to be said that the synth's 'pages' approach to analogue programming isn't the easiest thing to master without a degree in machine management.

Retail price of the MIDI software is expected to be around $450 (not including the MPU401) when it comes out after the Frankfurt show, but the Voyetra programming software is available now for $228. So, if you're either an IBM lover or a Voyetra owner, contact Octave-Plateau Electronics Inc, 51 Main Street, Yonkers, NY 10701, USA. ☎ 914-964-0225, or Computer Music Studios at the address given above. ■

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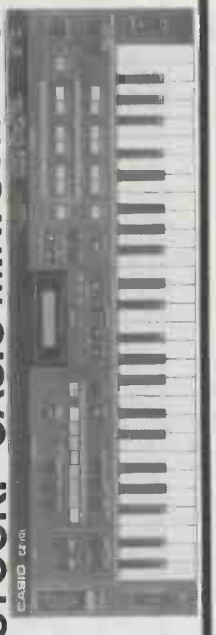

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COMPETITION

WIN ACORN'S MUSIC 500 SYNTHESISER ADD-ON

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If you scour through the pages of *Computer Musician* on a regular basis you'll already be aware of the Music 500, a synthesiser add-on for the BBC Micro that incorporates its own Music Production programming language – AMPLE – as well as synthesiser hardware of great quality and operational versatility. Like all computer add-ons, the Music 500 has the advantage of being largely software-based, so its capabilities can be extended simply by the user writing more programs to accomplish different tasks. And because AMPLE itself is capable of growing with the user, it's likely to become the centrepiece of many a computer music system to come.

Given its remarkable specification, the Music 500 looks conspicuously good value at an RRP of less than £200. And it won't even cost you that if you're lucky enough – and skilful enough – to win this month's competition.

What do you have to do to stand a chance? Simple. Just prove to us that your programming ability is good enough for you to take full advantage of AMPLE and the possibilities it offers.

Assuming that you've already got access to a BBC Micro, all you have to do is write a music program of your own and send it to us. If we judge it to be the most original, inventive, and useful of the programs submitted, the Music 500 is yours.

We'll accept a program written for just about any purpose so long as it's intended for the BBC and its internal sound chip, has a musical content that's intrinsic rather than incidental, and comes with a reasonably detailed description of what it does and clear instructions on how it's loaded and run.

Any storage format (cassette tape, 40- or 80-track disk) is acceptable, and although we'd like to see a listing if possible, printerless software writers needn't worry that their program's chances are going to be jeopardised by the lack of one. They won't be. We regret, however, that tapes and disks submitted are not returnable.

As an added incentive, we're also giving away five copies of a new book – *Creative Sound on the BBC Microcomputer* – as runners-up prizes. Co-written by David Ellis and Chris Jordan, the book comes complete with a cassette (or alternatively, two dual-format disks) comprising all 35 programs contained within it.

Both Ellis (CM's Consultant Editor) and Jordan (of Hybrid Technology, the company that developed Music 500 in the first place) will be on the competition's panel of judges, with E&MM Editor Dan Goldstein making up the trio.

If some of the entries are of a high enough standard, we may well publish a few of them within the pages of *Computer Musician* in months to come, so in addition to your standing a chance of winning the Acorn add-on, there's also the possibility that your program will be featured in a future issue of the magazine.

Finally, closing date for entries is Tuesday, February 26, so if your program still needs a bit of work before it's right, you should be able to undertake that work and still submit your entry in plenty of time.

Best of Luck!

E&MM MUSIC 500 COMPETITION OFFICIAL ENTRY FORM

Name .....

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.....

..... Postcode ..... Daytime ☎ .....

Name of Program(s) .....

Tape or Disk Format .....

Send this form, complete with the software and accompanying notes, to: Music 500 Competition, E&MM, Alexander House, 1 Milton Road, Cambridge CB4 1UY, to arrive not later than second post, February 26, 1985. We regret that no photocopies of the form can be accepted.

RULES

All entries must be accompanied by the official entry form published in E&MM February 1985, though more than one program may be submitted. The winner will be the competitor whose submission is judged to be the most original, inventive, and useful program, this being determined by the named panel of judges. The judges' decision is final, and no correspondence regarding the choice of winner or runners-up will be entered into, though it is expected that details of at least the winning program will appear in a future issue of E&MM. Employees of Music Maker Publications, Acorn Computers, Acornsoft and Hybrid Technology and their families are ineligible for entry.

Siel 16-track Live Sequencer

Software for Commodore 64 and Spectrum

The company's step-time MIDI software didn't exactly get a rousing reception when we looked at it last December, but does Siel's new real-time package render those criticisms invalid? *Steve Howell*

Hot on the heels of their MIDI Composer package comes some new Siel software which almost looks as though it's been introduced as a direct (and very rapid) reply to my comments on that earlier package, which obliged the user to enter each note, step time and gate time, numerically from the computer keyboard. Because while that method undoubtedly promises great programming precision, there's no denying it's a laborious and cumbersome way of inputting music data.

Anyway, the new Live Sequencer is a multitrack package capable of recording 4500 notes across 16 polyphonic tracks from your MIDI keyboard(s). Mind you, the mere fact that it employs real-time input means that it's very much a 'warts and all' system, which means it'll faithfully reproduce as many bum notes as your technique will permit you to play. And unfortunately, because the package offers nothing in the way of quantisation or editing facilities, the only way to rectify a slightly duff performance is to go back to the beginning and record the piece all over again.

Loading

To load the program, all you do is insert your disk or tape (either format is available) and type the required command. The screen remains blank for a few seconds, after which an ornate and highly colourful bit of graphics asks you to wait. Another minute or so and the main menu comes up on screen, and you're in business. Options listed include Record, Play, Edit Play, Song, Beats and Clock, as well as (on the disk-based review sample) a Disk option that allows you to save, load, erase and manage your files of recorded music.

This isn't the most awe-inspiring main menu in the software industry, so I'll be brief about what each option means. Not surprisingly, the Record page allows you to start recording while the Play one lets you hear your masterpiece once it's been stored. The Edit Play page is somewhat less useful than its title might suggest, because all it enables you to do is assign MIDI channel numbers to tracks and transpose the entire recorded work up or down. Moving on, Beat allows you to select your own time signature, Clock gives you a choice of internal or external clock with an option for selecting different trigger types, while Song allows you to combine and re-arrange tracks to make up songs. Situation normal, in other words.

Once you've selected Record and the corresponding page has come up on screen, you're asked which of the 16 tracks you want to record on and which sound you want to use. Obviously, answering the latter question entails entering some sort of number, and it's here that we encounter the somewhat eccentric numbering system employed throughout this package, and indeed on an awful lot of Siel gear. You see, instead of starting at 1 like the rest of the known Universe, Siel's software writers seem intent on starting at zero, which means voice number 12 on your synth has to be entered into the micro as number 11, otherwise you'll end up with a Hendrix soundalike guitar solo being played by a woodblock. Or something.

No, this is not an insurmountable problem, because after an hour or two, subtracting one digit from each number that comes into your head for the purpose of making it computer-digestible becomes an entirely natural process – but it's still a bizarre system, and one I'd like to see consigned to the Great Software House in the Sky.

But back to recording. The relevant screen display shows information pertaining to number of notes played and time (in minutes and seconds) elapsed, and once you've adjusted the tempo and volume of the system's built-in metronome, all you do is press f7 and you're away. You get a count-in of one bar (I'd have preferred two), after which everything you play is digitised and stored by the

computer: there's no limit to note length because the system's resolution appears to be very good indeed. When you've finished, pressing f7 stop the recording and you're free to go back to the main menu (*via* the * key) so that you can replay your masterpiece.

Playback

You have to press f7 twice to get any action out of the Play page, once to set the metronome tempo and once to activate playback, which is executed once only. Actually a lot of the Play page's methods of operation are more than a little unsatisfactory. For one thing, having to adjust the metronome tempo every time you want to replay anything is not only daft but also, in view of the lack of a visual guide to tempo speed, uncomfortably imprecise. For another, there's the absurd system whereby once you've put a stop to the playback, you have to exit the page, go back to the main menu, reselect Play, answer the Play option, reset the tempo and press f7 yet again. And all to play a piece twice over instead of once.

Assuming you're satisfied with what you've recorded as your first track, you can overdub as many as 15 further parts, and the software makes things a little easier here by automatically incrementing the current track number by one. The procedure for recording a second part is the same as it was for the initial one, with the obvious exception that second time around, you hear your first track in the background so that you've got something audible to play along to. What you probably won't be prepared for is the fact that, when you've gone through the whole rigmarole of getting back into Play mode, you won't actually be able to hear the overdub you've just so lovingly recorded. Why? Because the software automatically assigns each newly-dubbed track to the next MIDI channel number, quite regardless of how many MIDI instruments are actually connected. Which means that if you're only using one MIDI keyboard, say, you've got to get into the Edit Play page and change the channel assignment to match the way things are in reality rather than the way Siel's software writers envisage an ideal MIDI world as being.

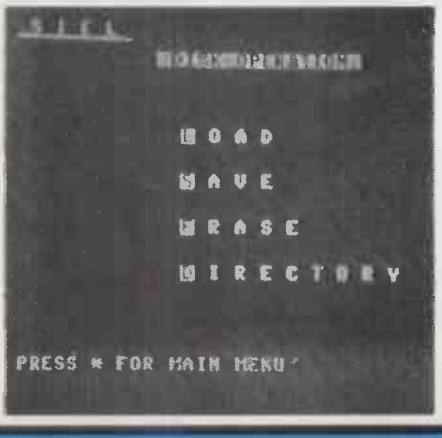
MIDI Data

It's obvious not only from their current product range but also from what we know of their future plans that Siel are deadly serious about the subject of MIDI. No matter how silly the auto-incrementation of channel numbers on the Live Sequencer may be, the fact that the company clearly believes there *will* be a time when the average synth player has four or five MIDI keyboards and expanders to choose from has got to be good news for the pro-MIDI fraternity.

And that's only the start of this particular MIDI story, because not only is the Live Sequencer capable of storing patch changes (though watch those numbers), it stores them as just one MIDI event, so you're not going to have to sacrifice memory space for arrangement versatility. The software will also store data relating to keyboard velocity and after-touch (assuming your synth is up to it), though on the debit side, there's no provision for remembering some of the other commonly MIDI'd parameters such as pitch-bend and vibrato.

Moving away from MIDI, the system will also sync to an external clock provided by a drum machine or somesuch, but the wiring of the DIN socket fitted to the Siel computer interface (it's the same as the Jellinghaus one, remember) obliges you to use a one-shot trigger pulse such as that provided by the hi or lo tom on the Roland Drumatix, for example. Owners of Roland DIN-sync standard drum machines might be forgiven for thinking that the Siel will handle a multiple pulse per event system, usable *via* that DIN socket – it won't.

'The software will store data relating to keyboard velocity and after-touch, though there's no provision for remembering some of the other commonly-MIDI'd parameters such as pitch-bend and vibrato.'



RRP of the Live Sequencer as tested is £69.50 (disk) and £64.00 (cassette), both inclusive of VAT. The Siel MIDI Interface is £99.00 inclusive of VAT. Further information from Siel UK, Ahed Depot, Reigate Road, Hookwood, Horley, Surrey RH6 0AY. ☎ (02934) 76153.

Conclusions

Overall, I have to confess to having mixed feelings about this particular software package. As a basic system aimed at musicians wanting an entirely digital equivalent to a multitrack tape machine – though with the additional timing and voicing versatility a MIDI-based system implies – it could be a winner, though the unbelievably laborious playback routine does diminish its appeal by no small amount.

Personally, I'd like to see a lot more in the way of editing facilities (in preference to the provision for connecting 16 MIDI instruments, say), though Siel defend the Live Sequencer's lack of these by saying it's intended for keyboardists who are already reasonably proficient at what they do and are therefore less likely to make the kind of performance cock-ups an editing system would be used to correct. They also say that the absence of such a system is the price you have to pay for such a high note storage maximum. Actually, I can't help thinking 4500 notes wouldn't go all that far if you spread them across 16 MIDI keyboards: just think of the damage a few eight-note chords on each would do . . .

In many ways, it seems Siel have put their software betting money on two extremes. On the one hand, they market a step-time package that's extremely versatile but makes high demands on the user's patience, while on the other, they've written a real-time program that's relatively easy to use but doesn't have anything like enough editing and composing functions to make it a universally worthwhile proposition. Still, I have a feeling they'll get there in the end. ■

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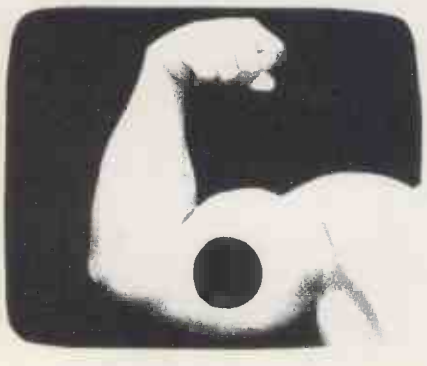

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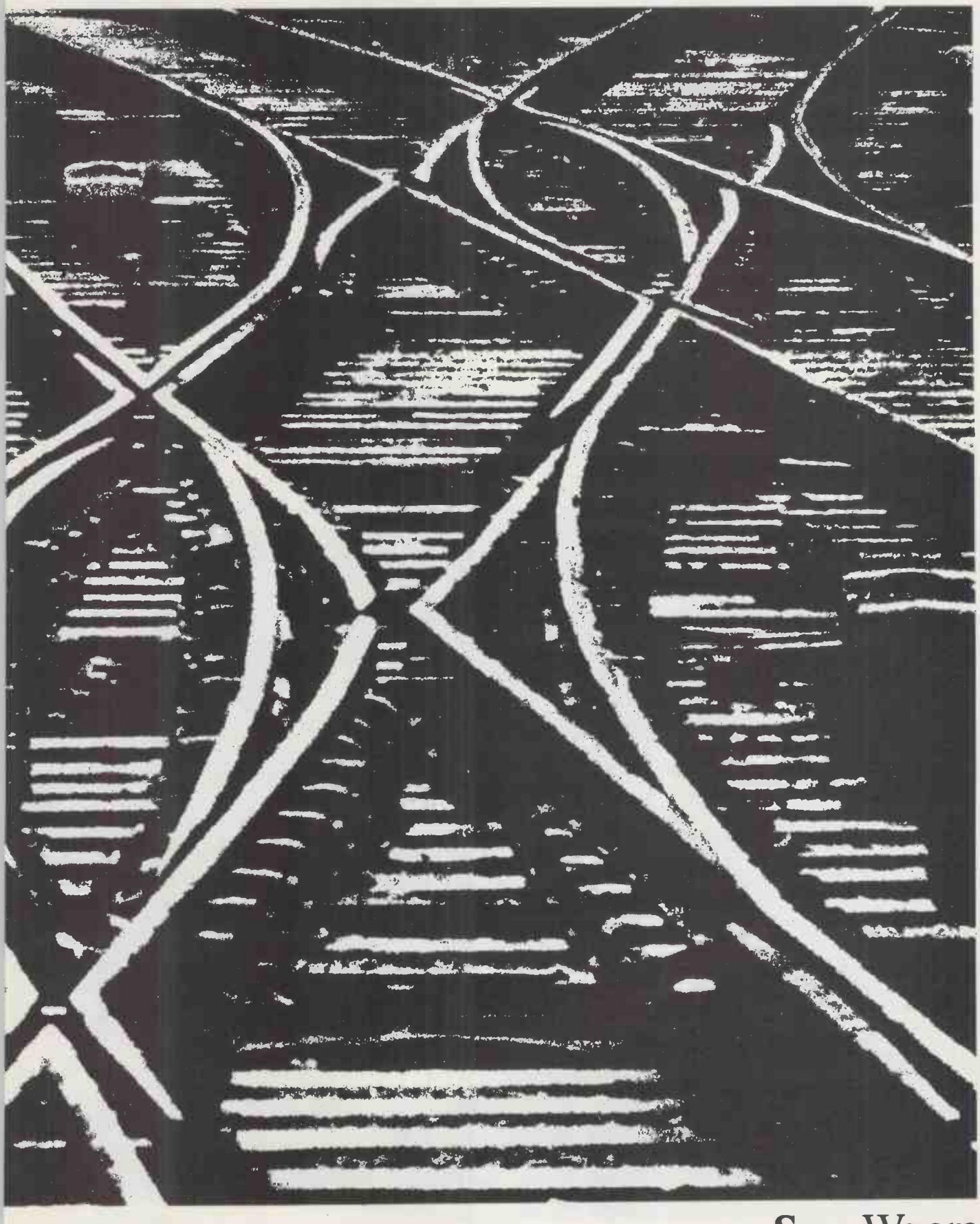

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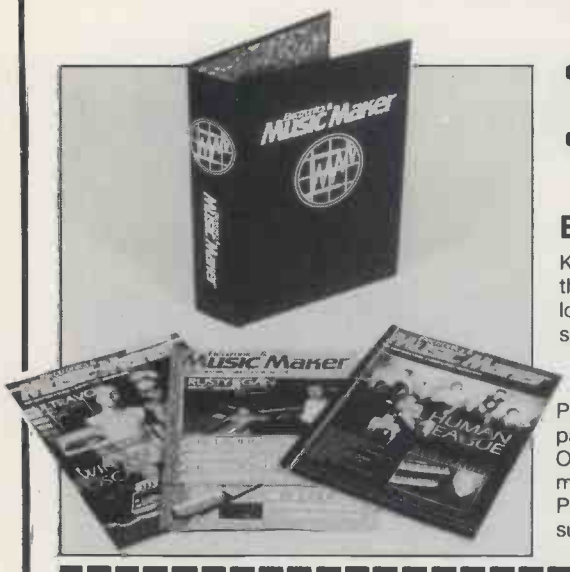

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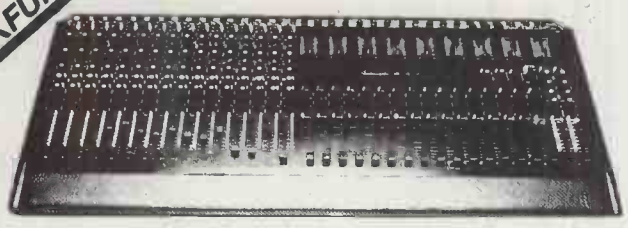

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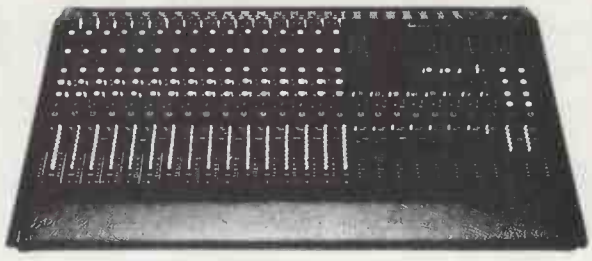

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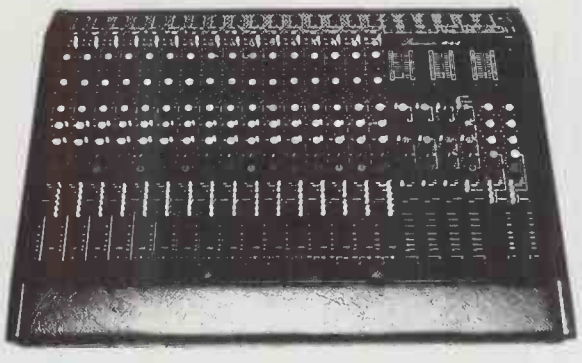

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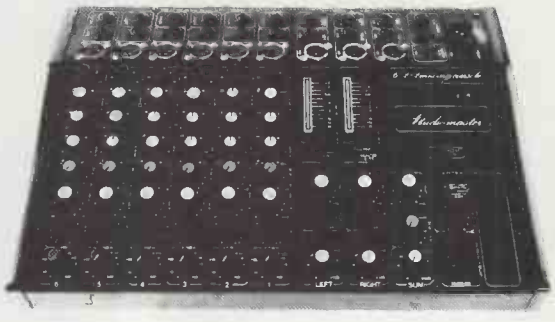

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EMR MIDItrack Performer

Software for Sinclair Spectrum

EMR's first MIDI software package – for the BBC Micro – didn't exactly stand the music world on its head. Now they've turned their attention to the Spectrum – will it prove a more fruitful combination? *John Harris & Shirley Gray*

The latest software offering from Electromusic Research is the MIDItrack Performer, designed for use with the Sinclair ZX Spectrum (48K) and EMR's own MIDI interface unit. Basically, the program allows you to record eight separate tracks with control over bar length, tempo, transposition, and simple touch-sensitivity (full or without pressure). Each track can be mono or polyphonic, assigned to any MIDI channel between 1 and 16, and the whole lot synced to tape by connecting the Clock Start/Stop on the interface unit to any rhythm unit, sequencer, or microcomposer with a sync-to-tape capability (for more information on this area of synchronisation, see Trish McGrath's review of the Korg KMS30 elsewhere this issue). All eight tracks will accept any form of performance data the connecting synth is capable of transmitting *via* MIDI, and a metronome (complete with selectable count-in) is always on hand for you to keep time to when recording, which is all accomplished in real time. Once your composition has been recorded, you can of course save it to cassette for future delectation and disturbance.

Operation

After you've made all the appropriate connections (using standard-wired five-pin DIN cables to connect the interface to your MIDI instruments) and loaded the program, all control operations are carried out using the colourful main screen display. The upper portion of the screen shows the current settings for each of the eight tracks, and each of these can be altered once you've selected it with the cursor keys.

Play allows you to replay an already-recorded track, Channel is used to select the MIDI channel you wish to assign the track to, Pitch lets you alter the tuning of the selected track up or down in semitone intervals, while Mode enables you to select either of two MIDI modes – Mono and Poly. Mono mode is what you select if you're using a keyboard capable of linking all its oscillators together in unison on one note, or a multi-timbral system such as that inherent in the SCI MAX and SixTrak. Back at the main menu, Control enables you to choose whether or not you want to record dynamic information (the after-touch on the Yamaha DX7, for instance), as this uses up large amounts of valuable memory.

Most lower screen features are accessible by selecting the highlighted screen letter, and this can be done whatever the position of the cursor. If you want to playback one or more tracks from any selected bar in the composition, this can be achieved with the Start control once you've checked the non-user accessible Bar reading. No traditional music notation is used in this software, but you can set a number between 2 and 7 to set the number of beats in a bar, and if you don't have a rhythm unit connected *via* clock or MIDI, the metronome and adjustable count-in are obviously extremely useful features. The metronome is created by sending a brief pitched note to any MIDI instruments set to channel 1, and fortunately both the pitch and loudness of the metronome can be altered – it can be more than a little distracting if it's in a different key to the one you're playing in.

The overall tempo of both recorded and replayed signal can be set to be anything between 1 and 1026 beats per minute (!) if you're using the internal clock, while for external clock control, the interface unit is compatible with the Roland 24 pulses per quarter note sync code, and an optional clock converter is available from EMR for owners of Korg, Linn, Oberheim, and E-mu equipment, among others.

Play sets the number of repeats of the whole composition (0–254), and if you're courageous enough to select 255, the track runs continuously until you press Break/Space on the Spectrum. If you're worried about how much memory you're using up, Free is updated after each recording to show how much memory remains. Finally, if you suddenly have a brainstorm and decide to remove a piece completely from the memory, you just use the Z (for Zap, what else?) button. Simplicity itself.

Recording and Playback

Recording is pretty straightforward. Once you've set all the above-mentioned parameters so that they fit in with your idea of sequential heaven, you need press only two keys followed by Return to get the recording ball rolling – a quick stab at the Break/Space key stops it again with the minimum of fuss. When you go to record subsequent tracks, those recorded previously will automatically play in sync, and it doesn't matter which order you record the tracks in. The length of the piece as a whole is determined by the length of the longest track, so if you're only playing on the intro on one track, you can stop recording as soon as you've finished rather than having to wait for the end. As you record, the display tells you not only which bar is currently being played, but also how much memory you have left, this latter feat being accomplished by a bar across the top of the screen that gradually fills up

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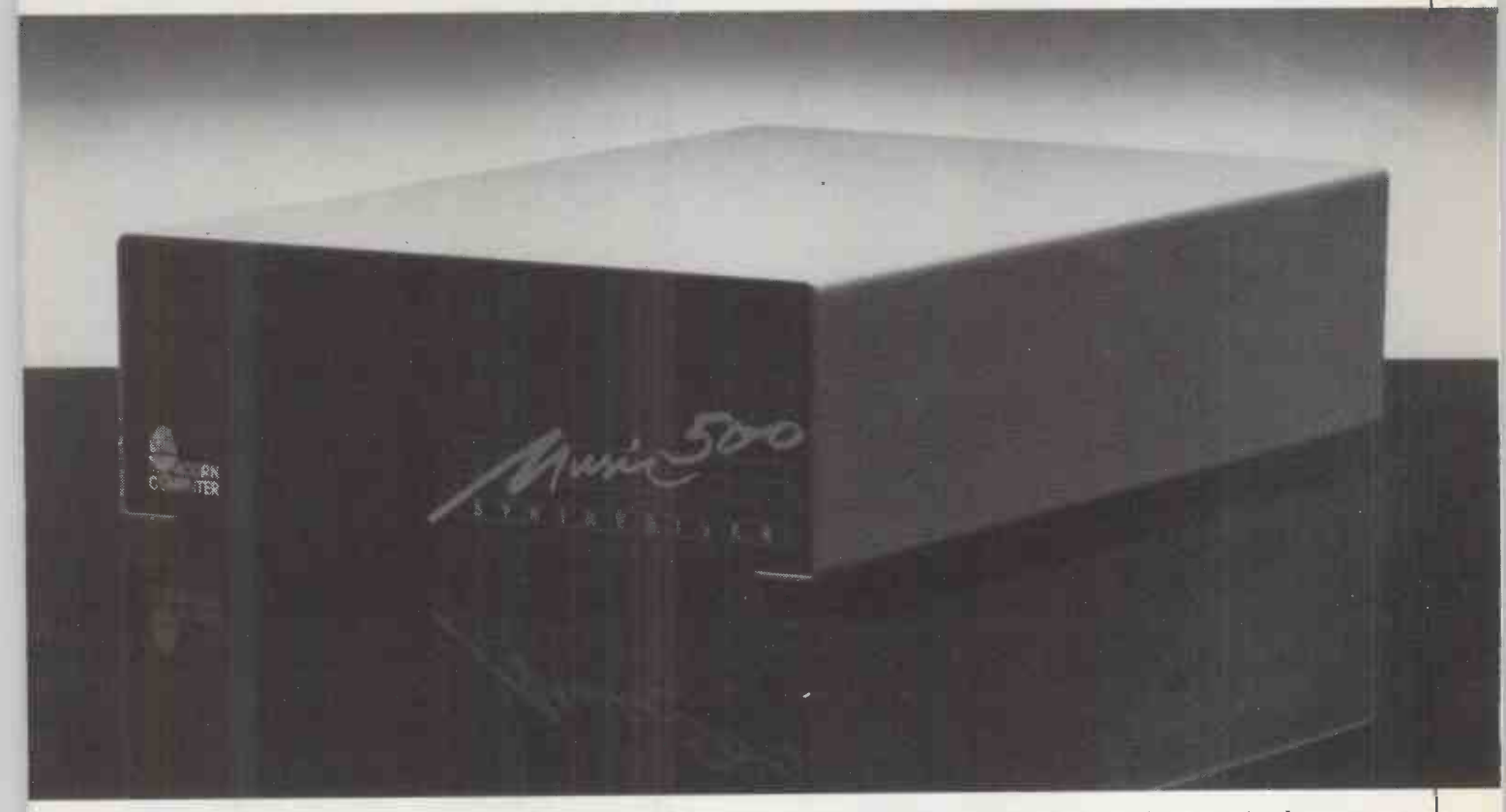

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from left to right – a bit like the ones you see on games that show you how much air/fuel/time/alcohol you have left before the Earth is destroyed by an alien life force or an *Electronic Soundmaker* reader.

You can play back your composition from any point (default is bar 1), which is handy, and you can also loop a piece simply by entering the number of plays you want at the required loop point.

Entering Playback mode is achieved simply by pressing P followed by Enter if you're using the machine's internal clock, or by starting your rhythm unit if you're clocking from that. The machine will stop automatically when the piece has finished, or you can take the laws of computing into your own hands and stop it at any time by pressing the Break/Space key.

In Use

The program takes about four minutes to load, but this is accomplished easily enough, and if you want to hear the MIDI Performer go through its paces before making any creative decisions of your own, there are two demonstration pieces – a Bach Fugue and a composition entitled 'Demo' – which can be loaded off cassette. The latter piece incorporated voice changes on track 4, but try as we might, we couldn't coax the software into accepting voice changes from our DX7, though all other MIDI information was handled without complaint.

One major drawback with the example of the program we tried was its tendency to crash whenever a typing error was made on the Sinclair, or go into a world of its own in which it would not accept any commands and the only solution was to turn off and reload the program. Whether this fault was unique to our copy of the tape or something common to all MIDI Performer packages is open to debate (the root of the problem might even have been a dodgy Spectrum), but it was certainly a nuisance – we ended up loading the program about 15 times during the review period.

You want more gripes, you got 'em. There's no drop-in facility on the Performer, and although you can playback from any bar in the composition, you can't record from any point other than the start. This makes life difficult if a complicated part is to be played manually, as it places the onus on you to get it right for the whole length of the composition. Still, there's always the option of recording at a slow tempo and playing back at the right speed if you harbour doubts as to your own performing prowess.

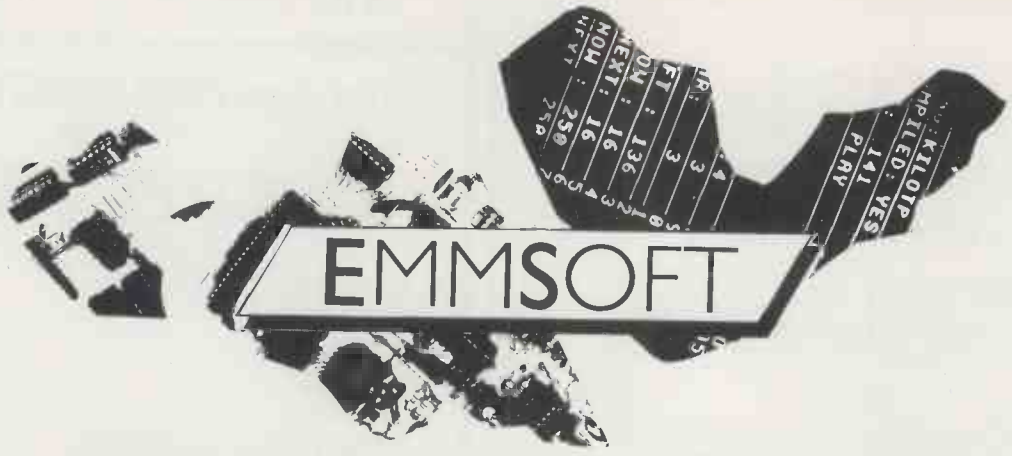
Conclusions

When everything is working properly, the MIDItrack Performer is a reasonably versatile, thoughtfully-written and generally user-friendly package that should make a lot of people happy. It has its idiosyncracies and its fair share of important omissions, but then there are very few MIDI software packages about which the same cannot be said.

The system's biggest single failing lies in the fact that the software can't be run in conjunction with any Spectrum MIDI interface other than EMR's own, which strikes us as being short-sighted in the extreme. After all, if you've already splashed out on someone else's interface box because you wanted to run, say, that company's step time program, why should you be forced to cough up for what's effectively an unnecessary duplication of some fairly basic electronics hardware?

Still, what can't be denied is that this package is a *vast* improvement over EMR's previous endeavour, written for the BBC B and reviewed in E&MM August 84. Like an awful lot of MIDI software companies, EMR seem to be getting their act together bit by bit (no pun intended), and the MIDItrack Performer is a significant step in the right direction, even if it's still got a number of inherent weaknesses that really should have been ironed out at the development stage. It'll do. ■

RRP of the EMR package reviewed is £169 inclusive of VAT. Further details from Korg (UK), 32-34 Gordon House Road, Kentish Town, London NW5 1NE. ☎ 01-267 5151.



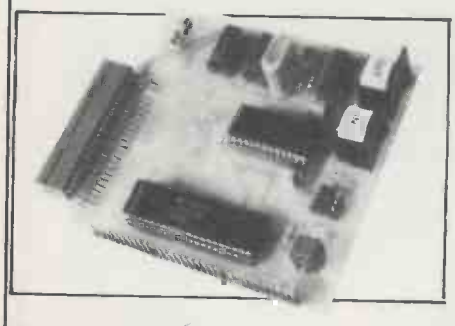
The latest from EmmSoft, the hardware/software marketing division of Electronics & Music Maker.

EmmSoft has taken under its wing both past micro-based projects and will include future E&MM software developments. The following guide summarises the EmmSoft projects for which printed circuit boards and software packages are available, and this will be updated every other month. All prices quoted are inclusive of VAT and postage and packing – please allow 28 days for delivery. Send your order, with payment in sterling cheque, postal order or bankers' draft payable to Music Maker Publications, to ***EmmSoft*, E&MM, Alexander House, 1 Milton Road, Cambridge, CB4 1UY.**

MicroMIDI *May 83*

A single-board serial interface that will link any MIDI synth to the Sinclair Spectrum microcomputer. Features include three parallel I/O ports, crystal-controlled data transfer, and opto-coupled output.

The PCB is available from EmmSoft at £4.25.



MicroMIDI II *July 84*

A revised, simpler version of MicroMIDI was published subsequently which incorporated the same facilities with the exception of the three parallel I/O ports.

The PCB is available from EmmSoft at £4.25.

As part of the 'Spectrum MIDI' article in E&MM July 84, two software programs were published – a SixTrak Patch Dump and DX7 MIDI Dump – both of which will run on either version of MicroMIDI.

A cassette containing an expanded version of Steve Parr's DX7 MIDI Dump program (including a short sequencing routine) can be obtained from SDS, 18 Cambalt Road, London, SW15 6EW, for £5.95 including postage and VAT.

OMDAC *June 83*

The OMDAC, when used in conjunction with a Z80-based microprocessor, will provide eight sets of gate, trigger and control voltages compatible with most one-volt-per-octave synthesisers.

A 'Patch Change' program for the Spectrum was published in E&MM September 84, while the second OMDAC Update (E&MM October 84) enables the hardware to be modified to run on the BBC microcomputer. Further OMDAC software is in the pipeline (see also 'Drum Sequencer', E&MM November 84).

BeeBMIDI *June & July 84*

A MIDI interface for the BBC Model B microcomputer, Part 1 of BeeBMIDI contained the technological and constructional details, while Part 2 continued with a full parts list and some MIDI software routines. The PCB is available from EmmSoft at £4.95.

BeeBMIDI Software *August 84*

A full listing of a comprehensive dump program written in BBC BASIC and 6502 Assembler for the Yamaha DX7, with the software also available on cassette (for the sore-fingered) from EmmSoft, price £3.95 (reduced from £7.95).

January 85

BeeBMIDI Part 6 features a program that allows you to dump Roland Juno 106 voices onto disk or tape, and which can be adapted to suit other micros and MIDI synths. The program is available on cassette from EmmSoft, price £3.95.

Further software for BeeBMIDI is currently under development.

Please note that the opto-isolator with the right specification is available from EmmSoft at £2.75. The Maplin component was quoted in the BeeBMIDI parts list in order to ease the problem of purchasing the correct opto-isolator, but this subsequently proved to be unsuitable.

Drum Sequencer *November 84*

Some new software for the BBC Micro that allows E&MM's electronic percussion modules to be sequenced using either the OMDAC or the user port of the BBC B.

Available on 40- or 80-track disk (please state preference) from EmmSoft at £8.95.

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