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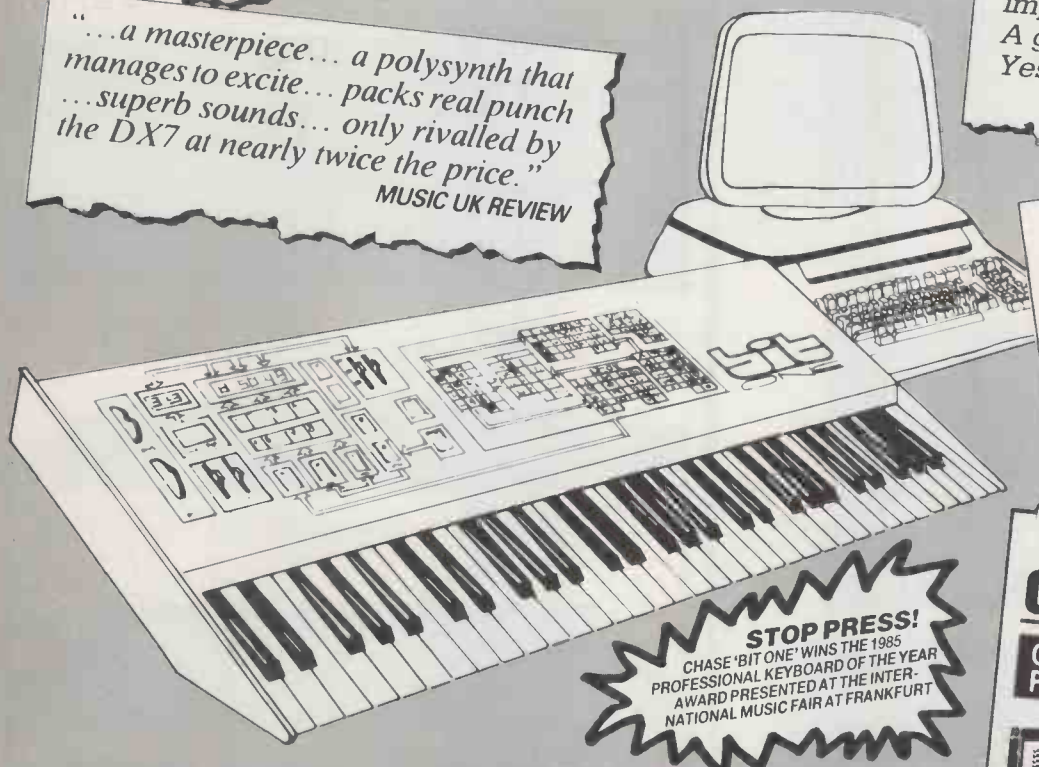

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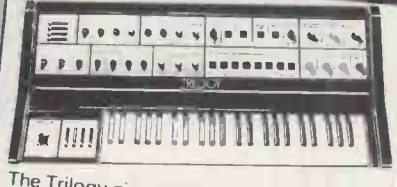

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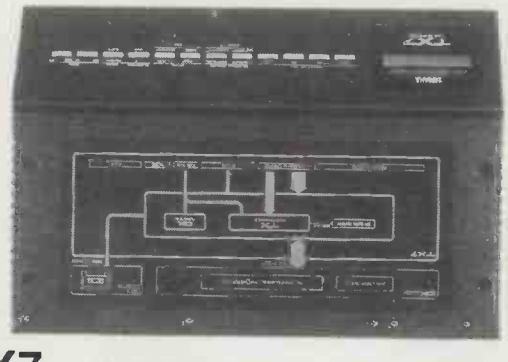

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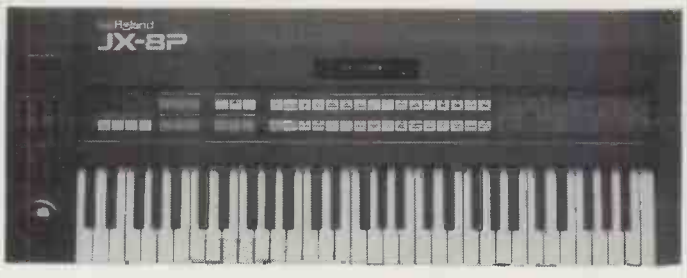

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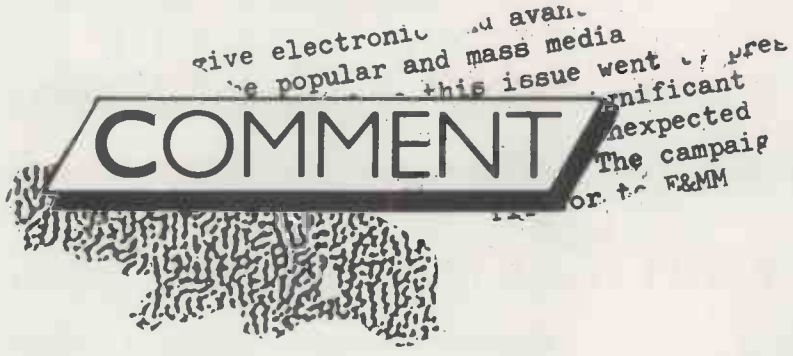

Production Samples

After much eager anticipation on the part of the modern music fraternity, it now seems that affordable sound-sampling is becoming a reality. The idea that all sorts of new musical avenues open up before you whenever you record a sound and store it in digital memory is hardly a new one, but for the first time, sound-sampling of decent quality is available at a reasonable price level to the average musician in the street, whoever he is.

Within a matter of months, the black art of sampling will no longer be the province of advance-laden musicians and residential studio owners. It'll be a technique that almost anybody with a sufficient overdraft facility can become involved in, regardless of their financial, musical or professional background. At long last, the common muso will have the means to record any sound that happens to catch the ear (assuming it's at a level high enough to be committed to memory), and then shape it, filter it, reverse it, loop it, layer it on top of another sample, and generally muck about with it until it's almost totally unrecognisable.

And judging from some of the exhibits at last month's Frankfurt Musik Messe, there's going to be more than one route open to people seeking this sort of manipulative musical mangle. If you fancy a keyboard that has sound-sampling built into it as the centrepiece of its operation, the American Ensoniq Mirage will probably fit the bill at under £2000.

If you prefer the idea of adding a sampling machine to an existing MIDI-based music system, so that you can play samples from a MIDI keyboard and mix them with synth sounds, the Japanese – in the shape of Korg and Akai – will be happy to oblige. Korg's SDD2000 digital delay uses its Hold facility to store sampled sound data in memory, whence it can be triggered monophonically from the controlling keyboard. The Akai S612, on the other hand, is a custom-designed polyphonic sampler with everything except the pitch-controlling keyboard onboard. You get what you pay for in the music world but, in this particular instance, the amount you pay isn't really all that much – £700 for the Korg, £1100 for the Akai when they arrive in the UK this summer.

The third option is to go for a product that incorporates sampling as part of an existing computer music system, and it's here that your choice remains at its widest, from the Synclavier's polyphonic sampling update (about £100,000 for a complete new system) to Music Sales' sampling package for the Commodore 64 (less than £50 when it becomes available in a few months' time). Bringing samples under the direct control of a computer is still the most versatile way of going about the whole business, but it isn't necessarily the most cost-effective, or the most user-friendly.

So, within little more than a year or two, E&MM's offices will be full of demo cassettes from young hopefuls experimenting with sampled sounds. The only problem is trying to foresee what sort of music those musicians will be creating. Will its composition become dependent on the wonders of sound-sampling, or will it remain a reflection of the composer's personal taste, with the samples performing no greater function than varying tone colours in a spectacular and (we hope) inventive fashion?

It's arguable that, so far, the process of sound-sampling has done little to change the way music is written. It's certainly altered the way music is *produced*, but even as far as arrangement is concerned, the furthest most composers and producers have got is using sampling as a means to create orchestral sounds without an orchestra, percussion noises without a drummer, and so on *ad infinitum*. More a few steps sideways than any positive move forward.

Our hope is that the increased availability of sampling technology will lead to a genuine expansion of the sonic vocabulary, and that the many musicians who take the plunge and invest in a sampling system of one sort or another derive real satisfaction and fulfilment from their purchase. Sampling isn't the gateway to instant musical nirvana, but it is a technique of great inherent flexibility whose artistic potential really is limited only by your own imagination. Let's hope the samplers of tomorrow prove that to be the case. ■

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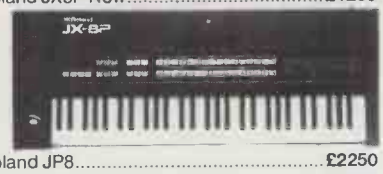

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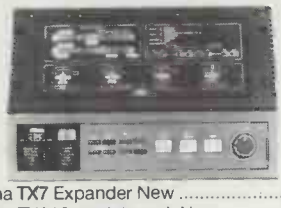

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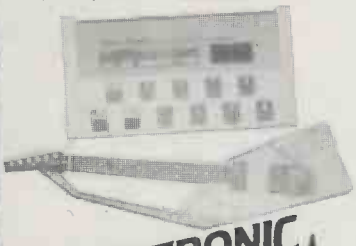

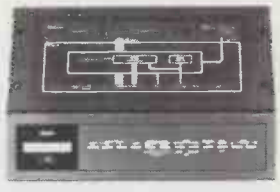

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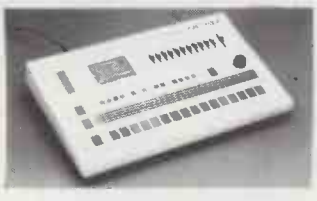

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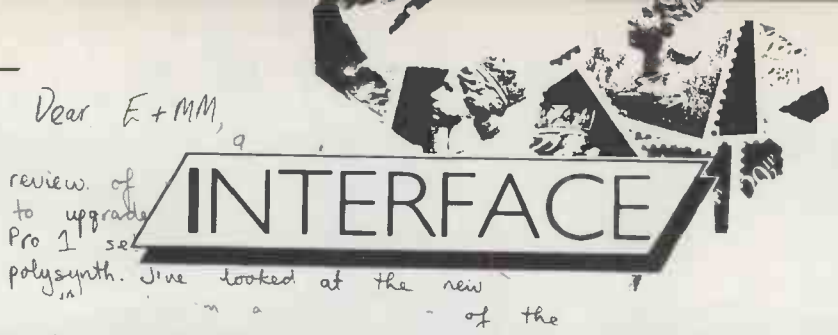

Write to: Interface, E&MM, Alexander House, 1 Milton Road, Cambridge CB4 1UY

If you've a view, query or problem, write to E&MM at the above address. We will endeavour to answer every letter regardless of whether there is sufficient space for its inclusion in the magazine, so please include your full address and phone number.

In Harmony

Dear E&MM,

Basically, I would want to know how a harmoniser works. More precisely, how is it possible to get a higher or lower pitch from a sampled sound? One obvious solution is to send it out faster or slower than the speed at which it was sampled, but the length of the sample is then automatically shortened or lengthened as the case may be. Any answers?

Ola Eklöf
Sweden

As part of The Transpozer project published in E&MM some while back, Paul Williams gave us this brief explanation of how harmonising works and what it's used for:

The basic principle of harmonising is to write digital representations of the analogue input signal at a constant rate into a store, then to read this digital data from the store at a variable rate, converting it back to its original analogue form to produce a pitch-shifted output. Thus, if the data is read at twice the write rate, then all the frequencies present in the input signal will be doubled, or in other words, raised in pitch by one octave. This process is analogous to playing a tape on a tape recorder at twice the speed the tape was originally recorded at. The big difference is that the tape recorder can't perform this process in real time, or at the same tempo.

The harmoniser is capable of changing pitch in real time since it can effectively 'record' and 'play' at the same time, and at different speeds. It works only on short sections of the input signal at any one time, storing a section, using it for reading for a while, then storing the next section in its place and so on.

Obviously, if the data is read at twice the rate it was written at, then sooner or later the data is going to run out. When this happens, each section of data is read twice. Similarly, not all the data is read during downward shifts, excess data being simply discarded. Some harmonisers incorporate a selectable delay mode, whereby the data is read at the same speed as it is written, but the reading only begins after a delay. This mode allows many delay-related effects such as echo, reverb, automatic double tracking and so on to be achieved...

Further Connections

Dear E&MM,

Is it possible to get a Yamaha RX15 to play in sync with Roland products such as the TR808/MC202? I've tried to do this but all I've managed to achieve so far is making the Yamaha run all the time (taking the sync out from the TR808 to the tape in on the RX15). Perhaps I'm using

the wrong connection pins, who knows?

I've heard I'm likely to need a 9V battery to operate the start/stop on the Roland, but I'm a bit dubious about fitting one. Perhaps you could let me have some form of circuit (an easy one, I hope) to overcome this problem.

Clive Brooks
The Sound Workshop
Southampton

To be quite honest, we've been deluged recently with queries of a similar nature, so in an effort to satisfy popular demand, Paul White, our Technical Editor, has just put the finishing touches to a handy little device that divides down clock pulses and provides start/stop signals – and all for a very small sum. Don't miss next month's E&MM for a full description, circuit, parts list, and constructional outline.

Belated Reply

Dear E&MM,

Please permit me the right of reply to Max Howarth's letter (E&MM September 84) in which he made some misleading statements about the Colchester Institute.

Although we have no 'electronic music course' in name, electronic and recording techniques are taught as part of the Composition option on both the BA and Graduate Diploma courses. Our electro-acoustic studio offers all college students eight-track recording facilities, digital and analogue synthesis, and most of the standard signal processing and *musique concrète* machinery, with the potential for computer control.

Our music courses have a proven record of success, even if they were not to Mr Howarth's liking, and offer the potential sound technician a broadly-based training within which to develop his or her electronic music interests and recording ability.

Robert Fraser
Director
Electro-Acoustic Studio
School of Music
Colchester Institute

Hi-Tech Syncing

Dear E&MM,

I have recently bought a Yamaha CX5M (complete this well-known phrase – a fool and his....are soon....!), and I need to sync my trusty old Roland CR8000 to MIDI. Are you planning any projects in the near future to solve this problem, or should I buy the Korg MIDI Synchroniser? Do you know what the MIDI In is for on the CX5M? It would be so much nicer to use my CR8000 as master clock.

Oh and while I'm at it, is there any simple way of using the CX5M on stage

for lots of short sequences without having to risk loading from tape during the performance? I'd prefer to keep the flexibility of being able to start and stop when I feel like it, so I don't want the whole thing as a series of 'repeat bar 1-8 255 times then 255 bars of silence' commands...

Paul Nagle
Longridge
Lancs

We have no plans to produce a device similar in concept to the Korg MIDI Synchroniser in the near future, though as you should know by now, anything is possible at E&MM. In the meantime, the Korg unit should fulfil your requirements and is readily available from all Korg stockists.

See this month's CX5M Revisited *feature for more commonly-asked questions about Yamaha's music computer, with a few answers thrown in for good measure.*

Boredom

Dear E&MM,

This is the first time I've been moved to put pen to paper as a result of reading ▷

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your magazine, but you've got to admit the *Interface* page is getting more boring by the issue. OK, so there are a lot of guys out there needing advice on how to sync this drum machine to that MIDI synthesiser, but how about devoting more space to the people who want to make subjective comments rather than burden you with technical questions nobody else is interested in?

I'll admit that, seeing as I possess only a modicum of decent hardware, I'm unlikely to have any unsolvable interfacing problems in the near future. I'll also admit that I find very little in your magazine worth criticising seriously. But it's about time your Letters page became more the forum for reader debate it used to be, not just an electronic music Agony Aunt column.

Paul McPhee
Port Glasgow

Er, any comments?

AMPLE Opportunity

Dear E&MM,

Having read the report in E&MM December, I decided to take the plunge and order a Music 500 synth from Acorn. Having received it on Friday (today's Sunday), I must say it's great. However, the manual is a little confusing to those of us who have never seen an MPL (Music Production Language) before, so come on, you guys, how about a 'getting into AMPLE' article, or even a series? While I'm writing, I'd like to add how much I enjoy reading the *Computer Musician* section and hope you don't have any plans for this to be split off into a separate magazine in the same way as some of the other parts have gone. As an amateur my interests are widespread, and as you separate more of the sections into new magazines, so I have to either buy more of them every month (too expensive!) or lose touch with a sub-section of what I'm interested in.

Philip Jones
London E5

First off, we're actively considering the possibility of running a series on programming in AMPLE, so stay tuned. In response to your second point, we have no plans to launch Computer Musician *as a separate magazine, simply because the concept of using computers to make music and/or control a number of musical instruments is now an inherent part of just about every subject E&MM covers. So don't worry!*

ZX Control

Dear E&MM,

I'd like to go about interfacing my equipment, namely a Roland TR808 and TR606 (triggering a Simmons SDS8 module), but how can I make these trigger a Juno 106 as well? I use the 'Beebquencer' program (E&MM October 82) on a ZX Spectrum, but is it possible to modulate the sound on a Roland SH2? Finally, I'd need to synchronise the drum machines to the sequencer. Any suggestions?

Colin Drummond
Liverpool

We assume from your letter that you'd like to use a sequencer package for the Spectrum and control the Juno 106 in this manner, since you can't directly 'trigger' the 106 from a drum machine which is simply sending clock signals. What you need is some means of recording the MIDI key note data and replaying that data at a programmable tempo determined either by the computer or by the external clock of a drum machine – the 606 or 808 will do nicely.

Well, you may be interested to know that Rosetti market what's known as the JMS Multitrack Composer, a cassette package for the same company's MIDI interface that features eight monophonic tracks of over 1000 steps each (see review E&MM July 84). Of course, seeing as the Juno 106 ia six-voice polysynth, you'll only find six tracks useful and the other 2000 notes can be shared among these tracks. Alternatively, distributors Korg UK can offer EMR's MIDItrack Performer for the Spectrum (see review last month) which operates with their own interface and can record polyphonically in real time. Both interfaces will synchronise to the Roland sync format of 24 pulses per quarter note.

Regarding the Beebquencer program, the subsequent article in the Micromusic *series (E&MM Nov 82) featured a Spectrum Synth Controller circuit diagram and program listing, and this allows control over a synth with CV and Gate inputs. The relevant back issue is still available, price 80p, from our Mail Order Department.*

KMS Connections

Dear E&MM,

I recently bought a Korg DDM110 digital drum machine and would like to know if I will need a Korg KMS30 MIDI Synchroniser to sync the DDM to a Yamaha CX5M computer. If the above are 'syncable', would it also be possible to connect an MC202 and, perhaps, additional MIDI keyboards?

John Peacey
Stockton-on-Tees

In theory (we haven't actually tried it), the KMS30 would be the ideal accompaniment to your proposed arrangement. As we mentioned in last month's review, the KMS will take the MIDI data from the CX5M and convert the MIDI clock to the sync (pulses per quarter note) format. It can simultaneously send the required 48 ppqn clock to the DDM and 24 ppqn to the MC202 to trigger the previously recorded sequence (remember that only clock signal information is being sent). However, the MIDI information received by the KMS is routed unprocessed (ie. it includes key note data as well as the MIDI clock) to both its MIDI Outs to drive a couple of MIDI instruments, and the device will also sync everything to tape for good measure. The KMS retails at £155, and further information can be had from Korg UK, 32-34 Gordon House Road, Kentish House, London NW5 1NE. ☎ 01-267 5151. ■

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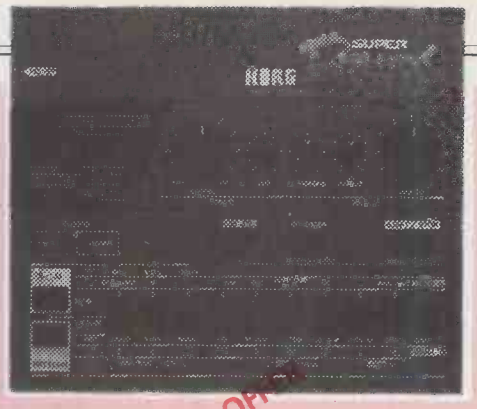

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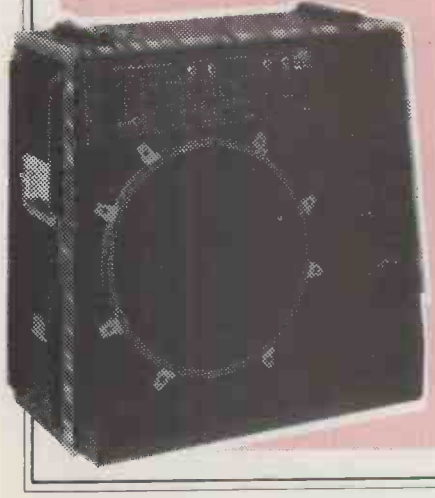

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HARDWARE

Korg DW6000

Programmable Digital Waveform Polysynth

With the 6000, Korg have aimed to create a synth that sounds good thanks to digitally-encoded waveforms, but is easy to program thanks to analogue control. Is their combination of technologies a success?

Dan Goldstein

Flushed with the success of their budget Poly 800 polysynth, which has now achieved best-selling status in spite of having only one filter to share between all its oscillators, Korg have decided to revamp their image a little further up the financial scale by introducing a less compromised synth design, the DW6000. It's a sleek, attractive instrument that should be making its way into music shops for the first time as you read this, and it employs a new sound-generation principle (yes, another one) by the name of the Digital Waveform Generator System, DWGS for short.

It would seem that more than any other Oriental manufacturer, Korg have been bitten by the success of their deadly rivals, Yamaha, and their DX range of FM synthesis instruments. And up until now, they've had no synth capable of generating anything approaching DX-type sounds, particularly the delicate percussive timbres the Yamaha synths create so convincingly. Which explains why the range of preset sounds on the DW6000 includes such wonders as Celeste, Steel Drums, Helicopter and Tubular Bells. And very impressive they are too.

Oscillators

So, what precisely *is* the Digital Waveform Generator System? Well, put simply, it's a principle in which sound waveforms rich in harmonics are generated by additive harmonic synthesis, digitally-encoded and stored in ROM for future modification by the user. In the case of the DW6000, said user has eight waveforms (held in a total of 512Kbit of ROM) from which to choose, and any of these can be called up and assigned to either of the instrument's oscillators.

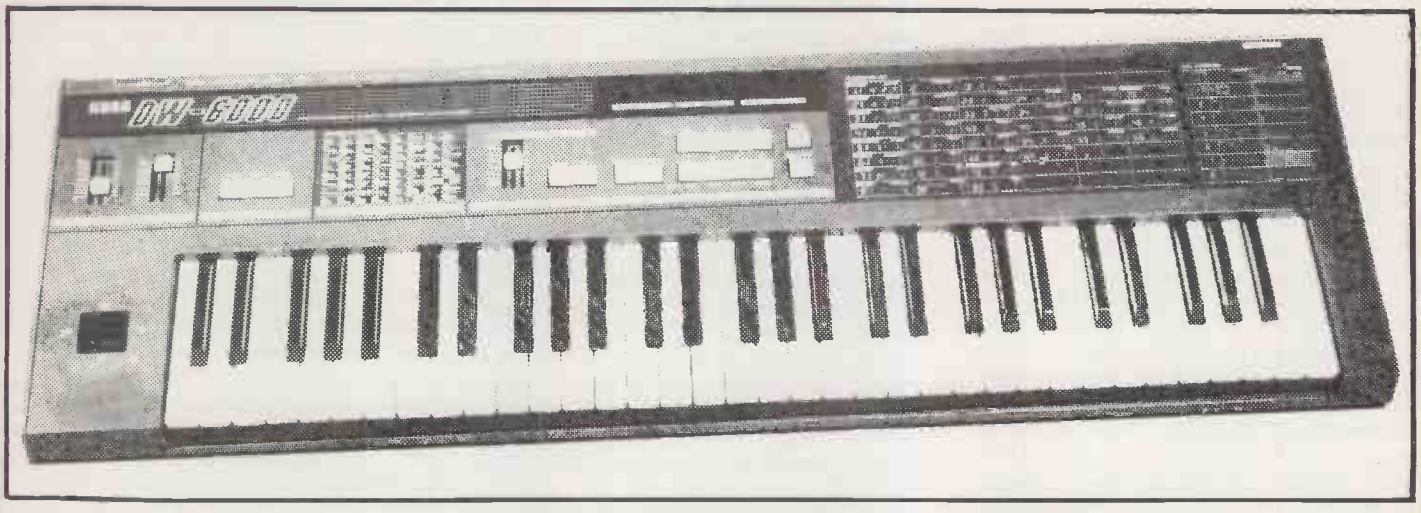
Partly because it can be useful to see them at a glance during programming, but mostly because they lend the 6000's front panel an air of technical sophistication, all eight waveforms are illustrated, along with analyses of their harmonic content, in green at the extreme right of the synth's control board. According to Korg, each of the waveforms are simulations of real musical instrument sounds: '1' is for the brass and strings families, '2' is for solo violin, '3' represents acoustic piano, and so on. And as if in acknowledgement of the fact that there's more to most acoustic sounds than a harmonically rich waveform or two, Korg have given the DW6000 a Noise Generator as well, which comes in handy surprisingly often as programming begins to get more involved. It's added to sounds as an entirely separate parameter from the two oscillators, which themselves have only waveform and octave selection and individual level controls for you to master, though OSC2 also has Interval and Detune parameters for musical transposition or mild detuning between the oscillators.

It's part of Korg's design philosophy that the DW6000 should incorporate adjustable parameters that are already familiar to the majority of modern keyboard players, and the sound modification sections of the machine are certainly far from foreign. To begin with, the filter and amplifier stages are both analogue, and there's little within them in the way of potentially confusing control possibilities.

The VCF (one for each voice this time) has standard Cutoff and Resonance functions, plus Keyboard Track (determines how the cutoff frequency changes as you play up the keyboard), Polarity (determines how the cutoff frequency is affected by the VCF's Envelope Generator), and EG Intensity (determines the reverse relationship).

The VCF and VCA have their own individual digital envelope generators, but the fact that they're digital is entirely incidental. What's of more significance is that they're both six-stage designs, with Korg's favoured Break Point level and Slope time parameters being introduced between the AD and SR portions of a conventional envelope. For those unfamiliar with this 'ADBSSR' system, Break Point level refers to the level at which cutoff frequency (VCF) or volume (VCA) *stop* dropping after the decay portion, while the Slope rate governs the rate of change in volume or cutoff frequency from the Break Point level to the Sustain level.

Once you've got round the idea that MG in this context does not refer to an old British sports car manufacturer but is in fact Korg's way of saying LFO (it stands for Modulation Generator), that section becomes almost entirely self-explanatory. That leaves the only remaining parameters as the bend wheel assignment section and switches for portamento, the 6000's built-in stereo chorus unit, and MIDI functions, more of which anon.



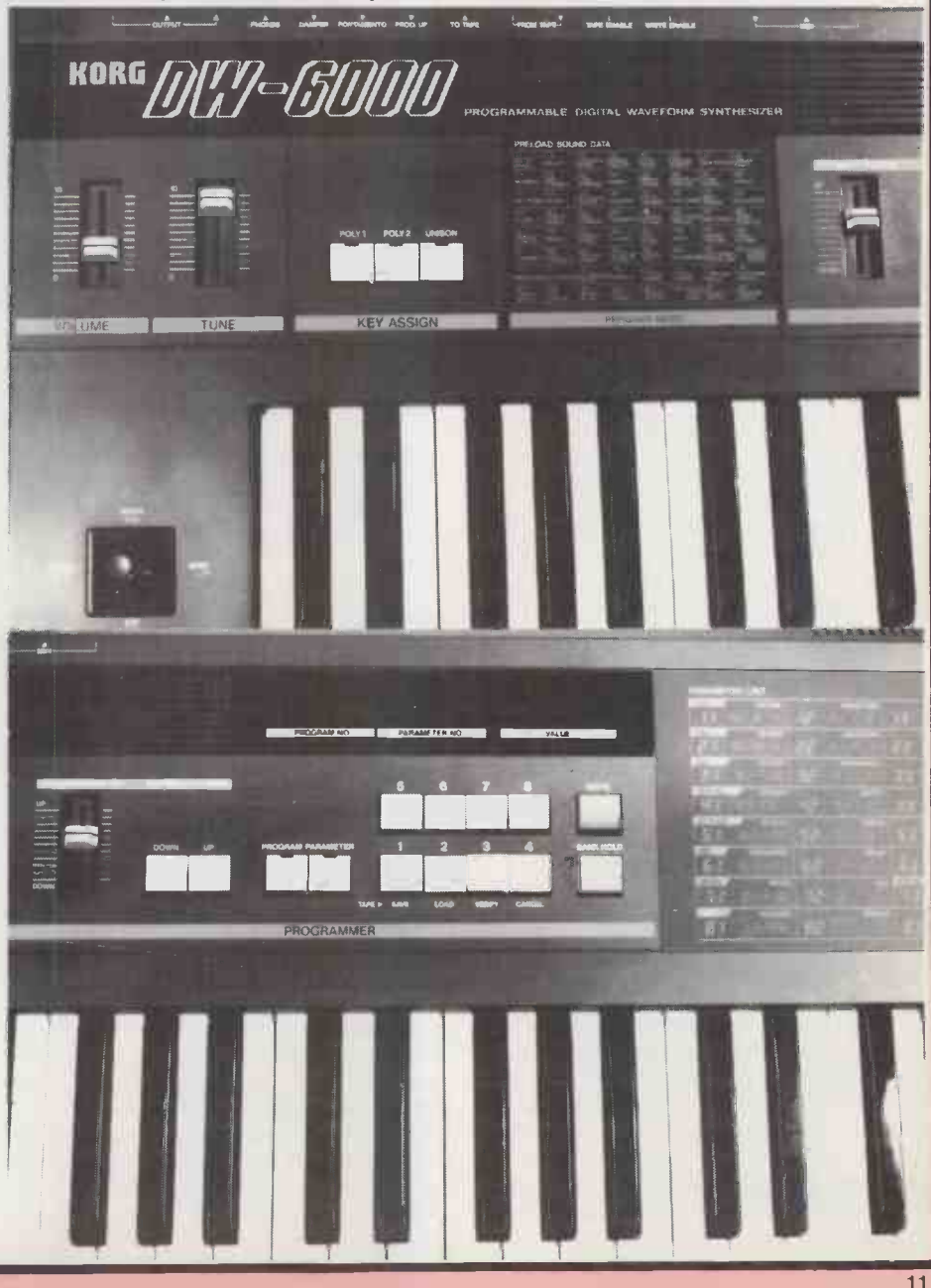
In Use

As a quick glance at the accompanying photographs has probably already told you, the DW6000 employs digital parameter selection and control, a system Korg pioneered with their Poly 61 (now 61M, of course) and continued to use on the Poly 800. Frankly, I think we've now got to the stage in synth development when we'd be foolish to expect anything better, especially in this category. Mind you, I was disappointed to find that Korg had not investigated any means of letting the poor programmer see all current parameter values at a glance, as Akai have managed so successfully on their AX80. A simple array of six numeric LEDs is all that's provided to show program and parameter numbers and the current value of the latter. That value can be incremented or decremented using either a pair of suitably-labelled switches or a rather flimsy slider control, and the only redeeming features of this section (which is in many respects the instrument's nerve centre, remember) are both carried over from the Poly 800, namely the large red Write button that replaces the original program with that incorporating all current values at the touch of a switch, and the Bank Hold selector that prevents you having to key in both digits of a program number when the first digit is remaining constant for a certain period of time.

True enough, the fact that the DW's control section has little in the way of programming surprises does make it easier to get to grips with than many, but it's still a shame that Korg couldn't have matched their desire to make the machine's internal workings more externally accessible as well as comprehensible.

The selection of 64 factory programs brings me back to the point I made earlier about digital sounds. Not content with giving the DW6000 a sound-generation system that's more conducive to the idea of recreating acoustic-type sounds, the synth's designers have given the machine a 'memo pad' of ROM-based voices that illustrate that point in about as blatant a way as I can think of. That means a proliferation of (well-executed) tuned percussion imitations and noise-assisted sound effects, and an all-too-obvious withdrawal into the background for what I might as well term as traditional analogue synth sounds.

This is where the factory selection starts to get misleading, however, because as its inclusion of analogue sound-modification stages would suggest, the DW6000 is perfectly good at producing decent 'non-digital' voices as well, especially in the areas of key-click organs and solo bass sounds. What it won't do is provide a range of immensely raunchy and unsophisticated brass sounds at the flick of a switch, nor is its VCF stage really strong enough to make filter sweeps as powerful and convincing as the best of the competition manage in this area. It's the return of the ol' Japanese disease, I'm afraid.



Mind you, the creation of strong lead-line sounds is greatly aided by the inclusion of a Unison mode that locks all six of the synth's two-oscillator voices onto one note (and detunes them automatically as well), while a further key assignment mode – Poly 2 – lets you implement polyphonic portamento effects.

The keyboard itself is a decent five octaves of width but, horror of musical horrors, doesn't respond to either initial velocity or after-touch. Now this really is a sad omission, because with more and more keyboard players serving their performing apprenticeship on synths that do have dynamic keyboards, gravitating down to the DW6000's performance level is going to be one hell of a retrograde step. The keys have a spongey, imprecise feel to them that doesn't really inspire confidence (maybe Korg reckoned fitting pressure-sensitivity would have been a waste of time), while the joystick's wide range of controlling options can't make up for the fact that it's one of the flimsiest attempts at a performance device since Korg fitted it to the Poly 800 a little over a year ago.

This sort of thing bothers me. After all, if the 6000's designers can do so much to make their new darling respond to the needs of programmers, why can't they make it respond to players, too?

Conclusions

It strikes me that the middle-ground of the synth market is rapidly polarising between instruments that offer a sparkling library of instantly available sounds but whose programming versatility doesn't quite live up to their promise, and those whose inherent synthetic flexibility is so inaccessible, it might as well not be there in the first place. The Korg DW6000 seems to occupy a position somewhere between the two. And whereas the most a lot of people ever get from sitting on the fence is a sore bum, the Korg wears its non-aligned status remarkably well.

Any instrument that attempts such a string of compromises is going to hit problems, of course. Perhaps somebody should tell Korg about the wonders of dynamic and/or splittable keyboards, onboard sequencers (even the Poly 800 had one), multi-timbral MIDI implementation, and RAM cartridge storage (there are the usual sockets for dumping data to audio cassette, but RAMs are preferable in almost every respect except cost, so why can't we have both). But then again, I very much doubt the company's engineers are ignorant of such developments. More likely they've sacrificed the possibility of their inclusion to the Great Gods of the Balance Sheets, and perhaps it's just as well they did, otherwise the DW6000 might have become much less of a financially viable proposition.

The 6000's implementation of MIDI is useful without being anything remarkable. The keyboard can be set to transmit and receive on any of the 16 MIDI channels, and data that can be sent and received includes portamento switching, VCF and oscillator modulation and damper pedal activation as well as more everyday things such as note on/off data, program changes and pitch-bend information. Additionally, channel mode messages (omni on/off and all notes off) and volume can be received but not transmitted.

It's a mite difficult trying to envisage what sort of keyboard player Korg are aiming their new synth at. Certainly, it'll appeal to the Poly 800 owner keen on adding a range of more contemporary sounds to his or her library, not to mention getting his hands on a synth with more than one filter, and it should also find favour with musicians too impecunious to consider the 'DX7 plus MIDI expander' route to a happy digital-analogue marriage.

The DW6000 is undeniably a jack of all trades and master of only a few, yet in spite of that, I found myself rather liking it. ■

Korg MPK130 MIDI Pedal Keyboard

Introduced simultaneously with the DW6000 is the MPK, to our knowledge the first pedalboard capable of controlling a MIDI synth *via* standard five-pin DIN sockets at the rear. Neatly styled and sturdily constructed, the pedalboard has 13 foot-operated keys spanning a nominal range of one octave (C to C), but a further pedal at the extreme right of the unit can be used to select an octave down or an octave up, making a total range of three octaves.

Strangely, that's the only one of the MPK's several switchable functions that's actually controllable by foot. As for the others, MIDI send channel can be anything from 1 to 16, but this is selected using tiny DIP switches at the back of the device: not the most accessible place for them to be. I'd have thought altering the instrument to be controlled during performance would have been a major bonus, but this arrangement makes such changes well-nigh impossible to execute. Maybe Korg'll fit a pedal controller for this function on the MkII MPK...

There are two alternative modes of keyboard operation you can choose between, and these are referred to as Mono and Poly. Now, you might think that means you can play the MPK either monophonically or polyphonically – you'd be wrong. In fact, both modes can cope only with monophonic operation, the difference between the two being that Mono mode gives priority to the highest note played at any one time, while Poly mode will only allow the first note you play to be heard: any other notes you might be treading on will remain inaudible until such time as you take your foot off the first note. But alas, the Mono/Poly selector switch is tucked away at the rear of the unit, so you're not going to get the chance to alter modes on stage without looking a complete dodo, I'm afraid.

Seeing as the live performance is one scenario where a pedal controller such as this should come into its own, I can't help thinking these are serious omissions that should have been taken into consideration long before the MPK even got off the drawing board, let alone into series production. Nonetheless, the Korg is a unique machine that could make a lot of people happy. After all, every keyboard player runs out of fingers sooner or later, and there must be hundreds of guitarists

who'd like to extend their sonic vocabulary without having to sacrifice centre-stage position. Ladies and gentlemen, the MPK130 is for you. ■

RRP of the DW6000 is £1099, while the MPK130 retails at £459, both prices inclusive of VAT. Further information from Korg UK, 32-34 Gordon House Road, London NW5. ☎ 01-267 5151.

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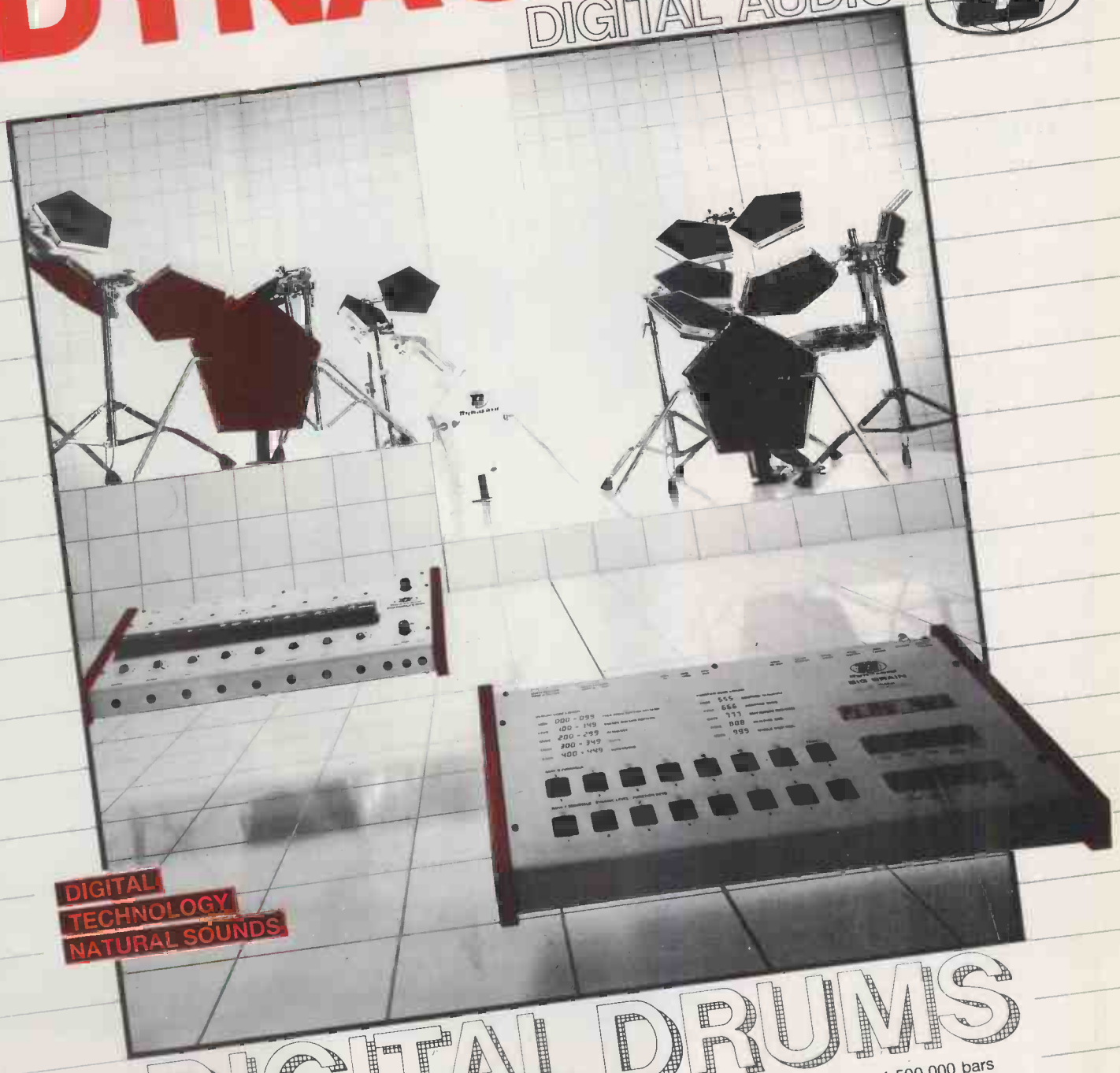

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MPC DSM32

Electronic Drum Module and Super Pads

As if they hadn't already done enough, MPC have now come up with a programmable analogue drum module and a set of 'professional' triggering pads. *Nigel Lord*

You know, I can't help feeling some degree of sympathy for drum pad manufacturers. The laws of geometry insist on areas being bordered by a certain number of sides, and outside of the circle (which MPC and several others have already used), practically every other convenient shape has now been adopted by somebody somewhere. The tiniest glimpse of an out-of-focus black and white photo suggests that MPC's latest designs are rather reminiscent of Sss... you know who's, and although the company are at pains to point out that we're talking octagons here, not hexagons, the relationship is difficult to ignore.

The Pads

Mind you, these new 'Super Pads' (as MPC have modestly named them) do give the appearance of depth and substance, and in the case of the black-finished kit that was the subject of this review, the pads had a definite feeling of quality about them.

They incorporate a floating head design which, though not unique, is by no means universal among electronic kits. And this feature, along with a rubberised playing surface, combines to provide an excellent stick response that should suit acoustic drummers down to the ground. Available angle adjustment is provided by a single wingnut on the underside of the pads, while 'spacing' and height are variable *via* wingnuts on the stands.

The bass pad incorporates a bracket by which the pedal is attached, and also sports a pair of the most enormous spurs I've ever seen on any bass drum, acoustic or electronic. If you're after a macho image, these are the spurs for you – they're pactically offensive weapons.

The stands for the other pads seem sturdy and rigid, and should be capable of taking all the punishment you can dish out to them. They've got good, chunky rubber feet, too, which should halt any tendency to creep that might make itself apparent. Electrical connection to the pads is by means of locking XLR plugs and sockets, with all cables fed down the hollow stems of the stands to provide a neat, uncluttered appearance.

The new pads are currently available in black or white, though I understand the range of colours will be expanded in the near future. So overall, an electronic kit that's both aesthetically pleasing and rugged enough to take the strain of some serious gigging. It's the sort of set-up you'd feel and look good behind: what more could a drummer ask for?

The Module

The DSM32 is a development of MPC's original (and still available) drum synth modules, the DSM1 and 2. If you're already familiar with these, feel free to skip the next few paragraphs. For those new to this range of units, I'll run through the facilities they offer and which they share with the new DSM32.

Running from left to right along the front panel (all the units in the DSM range are housed in 1U-high 19" rack-mounting cases), we're provided first of all with an input sensitivity control, which in conjunction with optional pad or trigger inputs on the rear panel allows a wide range of input devices to be used. Obviously, MPC's own pads are designed specifically to 'fire' the DSM units, but there's no earthly reason why other makes of pads shouldn't work equally well – adjust the sensitivity control for best results. Similarly, the trigger input can be used with most sequencers and the like capable of providing a pulse output, as well as with MPC's own Music Percussion Computer or Programmer 8 (reviewed last month). I've also successfully triggered a DSM with a short duration audio signal *via* the pad input, so it could make a useful addition to most drum machines without anybody having to worry too much about matching pulse levels. Again though, keep a watchful eye on the input sensitivity if you're keen to get optimum results.

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Next to the Sensitivity control is an LED which is rather confusingly labelled 'trigger'. Why confusing? Well, for the simple reason that it lights up to indicate a signal present at the pad input as well as the trigger input, and although it's nothing worth losing any sleep over, I feel it would have been better labelled as an indicator for both these functions.

After the LED we come to a Decay control that governs the duration of the entire generated sound, ie. the tone and noise components. Trouble with this was, I frequently found myself wishing I could control the duration of the noise and tone independently to achieve a more accurate simulation of drum sounds, and although I must confess to being ignorant as to how much more costly the addition of this facility would have made the unit, there's no doubt in my mind that it would have increased the DSM's versatility enormously.

Next in line is the Bend control, and as its name suggests, this applies a degree of pitch-bend to the tone generator in the DSM. Note that the bend available is descending only, though this omission is of little consequence in practice as I've yet to find anyone who's made good use of the facility for ascending pitch deviation found on some competing drum synths.

Moving slowly but surely along, we come to the only feature on the synth side of the DSM32 that's absent on the original DSM1 and 2 – the Modulation control. This introduces frequency modulation of the drum synth's tone component, the modulation rate increasing as the control is advanced. The result of this modulation is an intriguing range of special effects. Even during the brief time I had with the unit, I succeeded in producing some realistic chime, gong and other metallic sounds, as well as some almost timpani-like effects on low Pitch settings. The switch to the right of the Mod control provides two ranges of frequency modulation, and together these controls offer a facet of sound synthesis unique among drum modules of this kind. Circumstances alter cases, but you may find this facility hard to do without once you've heard it.

The Pitch control itself dictates the frequency of the tone generator and is self-explanatory, as is the Mix control, which balances the tone and noise components within the overall sound picture.

The Noise control is in fact a highpass filter, and offers a wide range of noise effects that becomes even more usable when you bring the Filter switch into play. This innocuous-looking switch produces on the one setting the sort of noise required for simulating a convincing snare sound, while on the other the sort of sonic component needed to make a passable approximation of the sound resonating tom-tom or bass drum skin. And as I've already implied, judicious adjustment of the Noise component in conjunction with this facility can produce some truly excellent results.

Moving along again (I'm not boring you, am I?), we encounter the Click control, which adds a very short burst of noise to the beginning of the sound. Seeing as this too is dependent on the setting of the Noise control, it can be used to simulate the sound of a stick hitting the drum skin: use this effect in moderation and it can make all the difference in accurately synthesising drum sounds.

An Output Level control is provided on the far right of the unit, and two LEDs indicate power to the module, which may come either from a separate power supply made by MPC specifically for the DSM, or from a DSM1 module if you already have one. It's worth mentioning at this point that the five-pin DIN connecting leads used for the power supply also carry individual DSM output signals, and again, if you have the DSM1, this will sum these outputs to provide a Master Level control.

The Memory

The way in which the DSM32 differs from its elder but cheaper brethren lies for the most part in the facilities offered on the left-hand side of the unit. What we have here is a memory section capable of storing some 128 sounds derived from individual settings of the parameters available on the DSM. The programming unit consists of four main memories, each with four banks of eight locations (4 x 4 x 8 = 128), into which each new sound may be stored. A pushbutton is provided for each of the memory, bank and location sections, and this advances the relevant row of LEDs so that they indicate the precise memory position.

Storing sounds in the memory really couldn't be simpler: as soon as the manual pushbutton and its associated LED are switched to 'on', you can adjust all the controls in the synth section in the sure and certain knowledge that once you've created a sound you're happy with, you simply have to select a suitable memory location, press 'Store' and that's it. The new sound has been entered into the memory, erasing any sound previously stored in that location.

Pressing the manual button once again (and extinguishing the LED) puts 'playback' of the DSM under the control of the memory section and disables the synth controls. All memory, bank and location positions may be quickly stepped through using the front panel buttons, or with momentary-make footswitches courtesy of the relevant rear panel sockets. And in the case of location, stepping may also be achieved by hitting one of the live pads – so you don't even have to leave your seat.

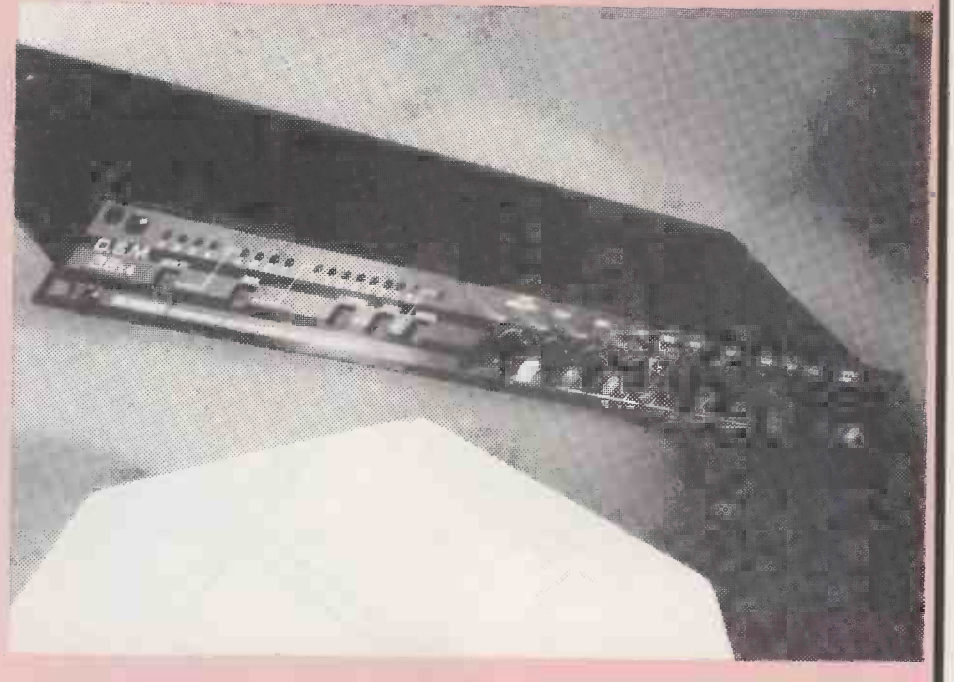
Conclusions

As an overall system, MPC's latest goodies work well,The sound-generating capability of the DSM32 really has to be heard to be believed, the onboard memory section is not only extremely useful but also a piece of cake to use, and the introduction of the new Super Pads ensures that a fine means of triggering those stored sounds is also available.

It would be nice to have the output level brought under the control of the memory section (some means of storing dynamics is a real help when you're playing with live pads), but apart from this omission and the single Decay control, I can't really fault the DSM32's design.

If you need any further proof that Britain still leads the world in the field of electronic percussion, this is it. I'd urge you to seek out your nearest MPC dealer as soon as possible and check this new system out for yourself, as there's a limit to how much musical information the printed page can convey. You won't regret it. ■

RRPs are £299 for a set of Super Pads with stand (£215 without), and £299.95 for the DSM32 module. Both prices include VAT, and further information can be had from MPC Electronics, The Gables, Station Road, Willingham, Cambs CB4 5HG. ☎ (0954) 60264.



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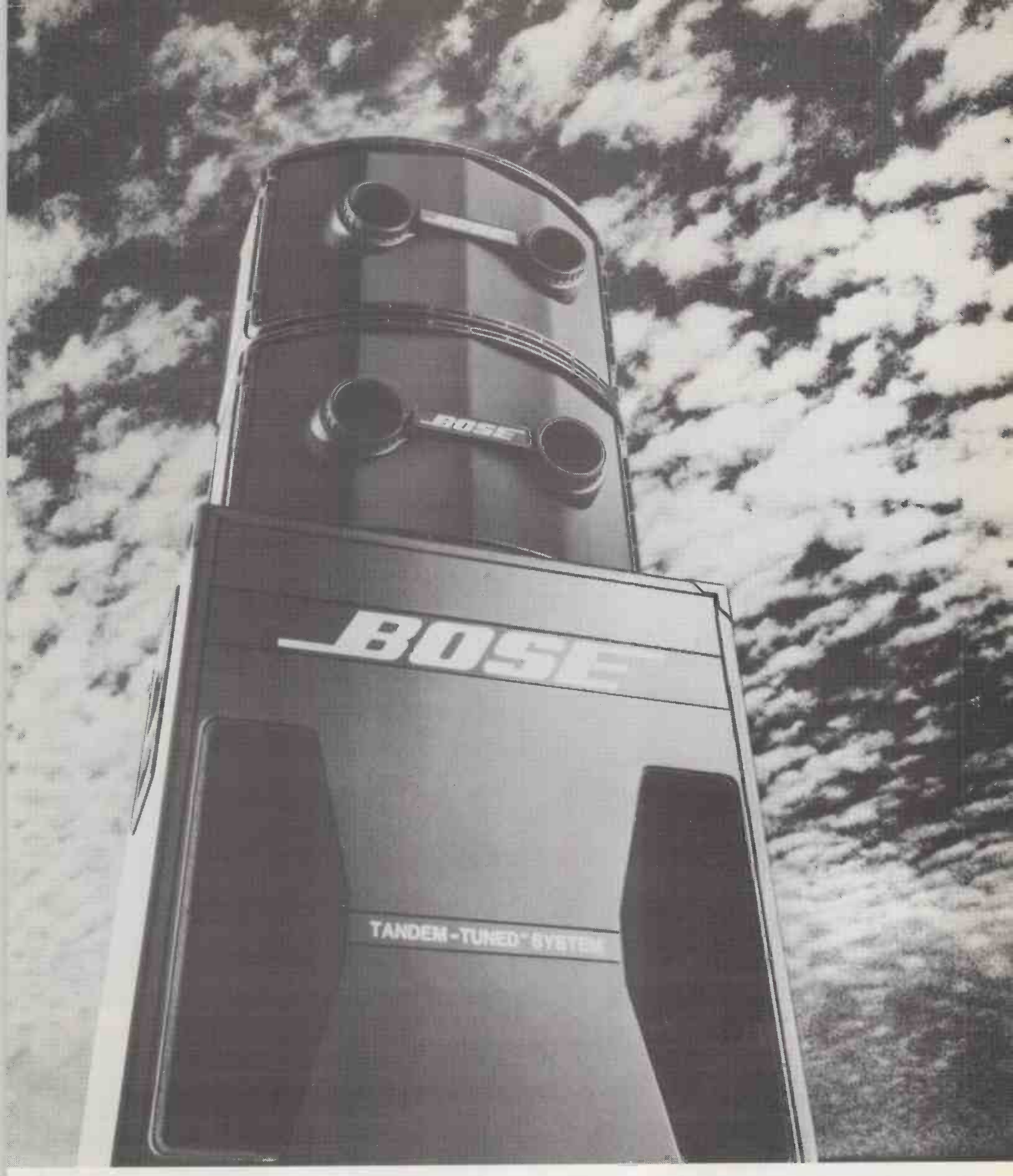

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Synclavier

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For several years now, it's seemed as if the Synclavier's playability has been lowest on the list of New England Digital's priorities. We've seen increases in the machine's voicing capability, in the number of harmonics which can be used to synthesise a sound, in sampling fidelity and power of available analysis, and in the capabilities of the built-in digital sequencer. But throughout all these upgrades and add-ons, the basic keyboard unit has remained unchanged. This has led to two distinct problems, each of which, unfortunately, has been getting more and more obvious with each software or hardware release.

The first is that the Synclavier has been falling further and further behind the competition when it comes to satisfying the needs of the professional keyboard player, because while much has been done to endear the instrument to engineers, synthesists and record producers, the poor guy whose job it is to sit down and play the thing has been struggling with an unresponsive, short-scale keyboard that has no performance features worth talking about.

In addition to this, the Synclavier's front panel, which was designed to cope with the programming of the original synthesiser, has become increasingly overworked as it attempts to give access to the increasing amount of software control each successive update has made possible. In an effort to deal with this, a pernicious 'second page' (referred to as the 'blinking mode', because controls whose LEDs are blinking take on entirely different functions from those with which they are labelled) has begun to creep into the proceedings. And as is the case with the rest of the hi-tech music world, the more functions the designers tried to cram in, the more confusing things became for the harrassed operator.

But now, NED have solved both these problems in a single stroke. By replacing the original teak keyboard unit with a much larger ivory one (a procedure not entirely unlike trading in an upright piano for a grand), they've made the job of both player and programmer a great deal easier. And besides the new longer, touch-responsive keyboard and the introduction of performance controls (it's now quite easy to be spoilt for choice), there's a much larger programming display to provide more detail about the parameter being altered, and a *much* more comprehensive panel that allocates one separate button to each function. So although the blinking mode has not entirely disappeared, its use is now restricted to related functions such as the selection of upper rather than lower harmonics. ▷

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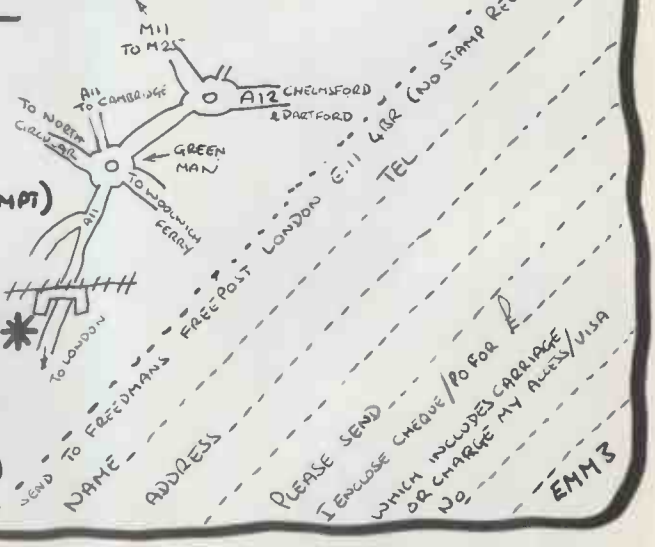


Performance Options

It seems that waiting until now to release this particular hardware update could actually prove a blessing in disguise for NED, because it's enabled them to scan the keyboard market of the moment, find out what's popular in their rivals' products and 'synthesise' all these popular elements to form one master control unit.

This process begins, most importantly, with the keyboard. After negotiations last year with the analogue purists at Sequential Circuits, NED were able to sample (no pun intended) the fruits of the long and costly labours that went into the Prophet T8 keyboard, with its light-beam velocity-sensing and pressure-sensing independent for each key. By way of a bonus, the keyboard also increases the playing range to six and a quarter octaves (A-to-C). Described by this reviewer as the Rolls-Royce of controlling keyboards (see review E&MM Dec 83), Sequential's product still stands as the most playable of current synth ivory sets, despite the fact that the sound creation facilities of the T8 have been surpassed by the advent of digital techniques.

So much, then, for the framework on which the Synclavier's new performance system rests. But it so happens that the frame has been gilded by the addition of a more flexible array of performance controllers, as we'll see.

First off, the previous, rather clumsy system of using the panel-mounted rotary control to introduce pitch-bend and vibrato has been replaced by the more conventional (and eminently more usable) method of moving two wheels located at the left-hand end of the keyboard. The left-hand one (most likely to be used as the bend wheel) is centre-sprung or, to be more accurate, slightly off-centre-sprung, as it's moderately forward of centre in the 'no effect' position. Despite this fact, the wheel has the same amount of effect in the maximum positive and negative positions, and is reasonably standard in its feel. The right-hand wheel is not sprung, and so conforms to the norm of controls used to introduce LFO effects. Of course, there's nothing in the slightest bit revolutionary about having two wheels at the left-hand end of a keyboard, but what's pleasantly different about the way the Synclavier does things is that routings to the two wheels are totally flexible. This means you can introduce vibrato with a centre-sprung wheel and perform pitch-bend with an unsprung wheel, if the mood grabs you. Indeed, such niceties can even be programmed with each patch, to cope with the modulation requirements of different sounds as well as different players.

> 'As for the routing of control functions, the Synclavier is one of the few keyboards that leaves the choice to the performer rather than deciding that certain possibilities are redundant.'

The larger display and expanded timbre creation section.

The newly-modified Memory Recorder section.

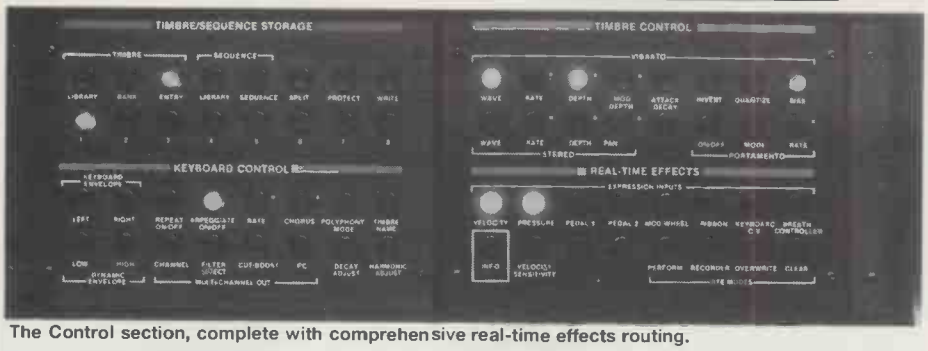
NED have availed themselves of a number of other popular performance controllers, past and present. Many keyboard players must have mourned the demise of the ribbon controller, last fitted – as far as I'm aware – to the Yamaha CS80 and a few Moog designs. Well fear not, ribbon fans: NED have resurrected it as part of their desire to be all things to all men.

And not content to provide for the synthesist of yesteryear, the Synclavier's update committee have also endowed the new system with the ability to interface with one of the most popular of recently-developed performance devices, the Yamaha BC1 Breath Controller. As Dave Bristow has demonstrated so brilliantly in his performances with the CS01 and DX7, the possibilities of expression this little device offers (to those who take the time to learn how to use it, of course) are simply enormous. NED can't actually supply the BC1 themselves, but the price of one (around £25) dwindles into insignificance when compared to the cost of a Synclavier system.

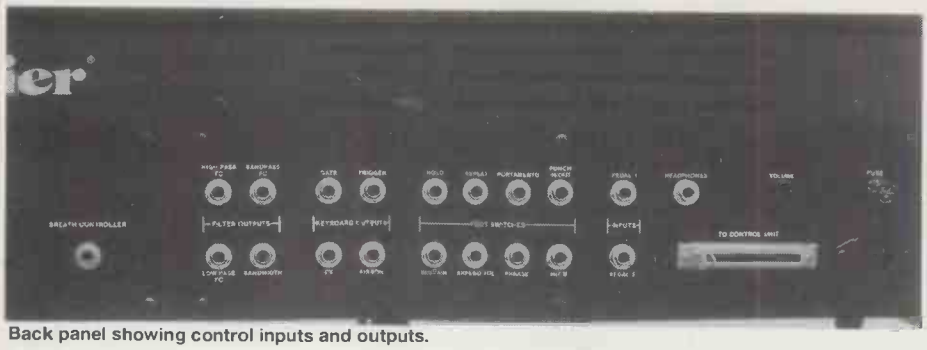
Sockets on the back panel include two inputs for footpedals, of which a couple of the good, solid Morley variety are supplied as standard if you buy the 32-voice version. And these too can be routed to the keyboard, wheel, ribbon and breath controllers, so there's certainly no shortage of performance possibilities.

Control Routings

The real beauty of the Synclavier system is that all these controllers can be routed to a whole host of different parameters. On the Real-Time Effects Panel (bottom far left of the main panel) lies a button for each controller, and when you press one of these buttons, all the LEDs



The Control section, complete with comprehensive real-time effects routing.



Back panel showing control inputs and outputs.

assigned to controllable parameters flash so that routings can easily be selected by pushing a flashing button. In all, eight controllers (see relevant panel photo) can be assigned to one or more of 24 parameters, and these range from Portamento rate, Chorus and FM amounts to all six elements of both the volume and harmonic envelopes (the envelopes on the Synclavier aren't just standard ADSRs – they also allow delays and peak levels to be programmed).

There isn't really enough room to go into all the routing possibilities here (even on a one controller to one destination basis, I make it that there are 192 alternatives – but that's before you get into multiple combinations), so I'll just mention a few. You could, for example, use keyboard pressure to bend the tuning, breath control to increase the peak of the harmonic envelope, a pedal to increase the vibrato rate, the ribbon controller to change pitch and so on. It must be the most complex system of expressive control available, but it's also, of course, extremely versatile.

Moving on, we find that the system's built-in Memory Recorder has now been expanded to a width of 32 tracks, and such things as SMPTE and external sync now have their own buttons to call up functions. Basically, the Memory Recorder acts as if it were a multitrack tape machine that's also capable of justifying to whatever resolution is required and transposing without speed changes.

But perhaps the greatest programming aid the new keyboard unit adds is a large display to replace the four-digit, seven-segment readout of the earlier model. On the new version, you get a considerably more comprehensive information service on the parameter, its value and related routings, no matter which button you press. It certainly makes the business of setting up sounds a lot easier.

Future Developments

This is where things start getting really clever. At the time of writing, the Synclavier can only replay sound samples monophonically (albeit at a 50kHz sampling rate with 16-bit analysis), but in a couple of months' time, an upgrade will be made available to allow things to go up to 60kHz, polyphonically. Putting all this into practice can't have been an easy task, and in the event, NED have made use of multiplexing software, so that different samples can be read back at different rates (ie. pitches) at the same time. As things stand, all real-time effects can be applied to all sound samples at the moment, but it doesn't take a Degree in the musical applications of microprocessors to realise that the range of additional possibilities afforded by polyphony and the increased-capacity Memory Recorder will be immense.

As for what's to come after polyphonic sampling, there is guarded talk of longer sample times (longer, that is, than the 300 seconds currently available from the Winchester disks) for each track of the recorder, so that the system can begin to perform the role of a tapeless recording studio. However, it would appear that new hardware has still to be researched and developed by NED, because their specifications can no longer be matched by standard computer industry hardware, so it may be several years before the company is in a position to realise this particular goal.

There's still some cause for complaint, however. As things stand, monophonic multi-timbral samples (bass lines, trumpets, flutes and so on) can be transferred to tape line by line using SMPTE to synchronise everything, but it's still very limiting not to be able to play samples such as piano polyphonically. The day is now very near when this restriction will be ended, but personally I doubt if there will be much change from £100,000 by the time you have your recorder playing back lots of samples simultaneously in real time.

The state of the current user manual is also disappointing for such an expensive system. Continuous updates have led to multiple supplements that aren't properly cross-referenced, and anyone who hasn't grown with the system might well find themselves not only with a hernia (from having to carry all the relevant documentation) but also severe brain-ache (from having to read it). Mind you, NED are at least promising an overhaul of the manual when the polyphonic sampling arrives, because once the system has been stabilised (the polysampling will be the last upgrade for a while), a comprehensive manual for the Synclavier as it is now (as opposed to the Synclavier as it was plus what it has become in serialised episodes) can be prepared without too much trouble.

The only hardware update I'd still like to see is the addition of some internal filtering. I know that remote control of modular analogue filters is possible *via* CV and audio patching, but this seems an extraordinarily clumsy way of doing things in 1985. All the digital control is there, and there's no doubt the system is powerful enough – I should think it could control a few dozen filters without even so much as noticing it.

Conclusions

All in all, the new keyboard brings the performance aspect of the Synclavier up to the comprehensive level its price dictates it should occupy. The keyboard player now has a state-of-the-art keyboard to match the state-of-the-art electronics inside, and I suspect this is why such well-known performers as Oscar Peterson are now getting into the system, in addition to the star producers such as Messrs Horn, Millar and so on.

As far as the routing of control functions is concerned, the Synclavier is one of the few keyboards that leaves the choice to the performer rather than deciding that certain possibilities are redundant in the normal course of events. I'd like to think other manufacturers will take note of NED's attitude in this area, but...

For clarification's sake, I should point out that the new keyboard is now being supplied as standard with all Synclavier systems. These start with an eight-voice synthesiser set-up for about £20,000, and lead up to a 32-voice system with sampling for around £60,000. Owners of earlier systems can expect a bill for about $11,000 if they decide to upgrade to the new keyboard and an extra half-megabyte of memory to go with it. Complain to your local Prime Minister about how much (or how little) this represents in Pounds Sterling at the time this issue of E&MM appears on the bookshelves. ■

For further information on the Synclavier system in the UK, contact Turnkey at Brent View Road, London NW9 7EL. ☎ 01-202 4366.

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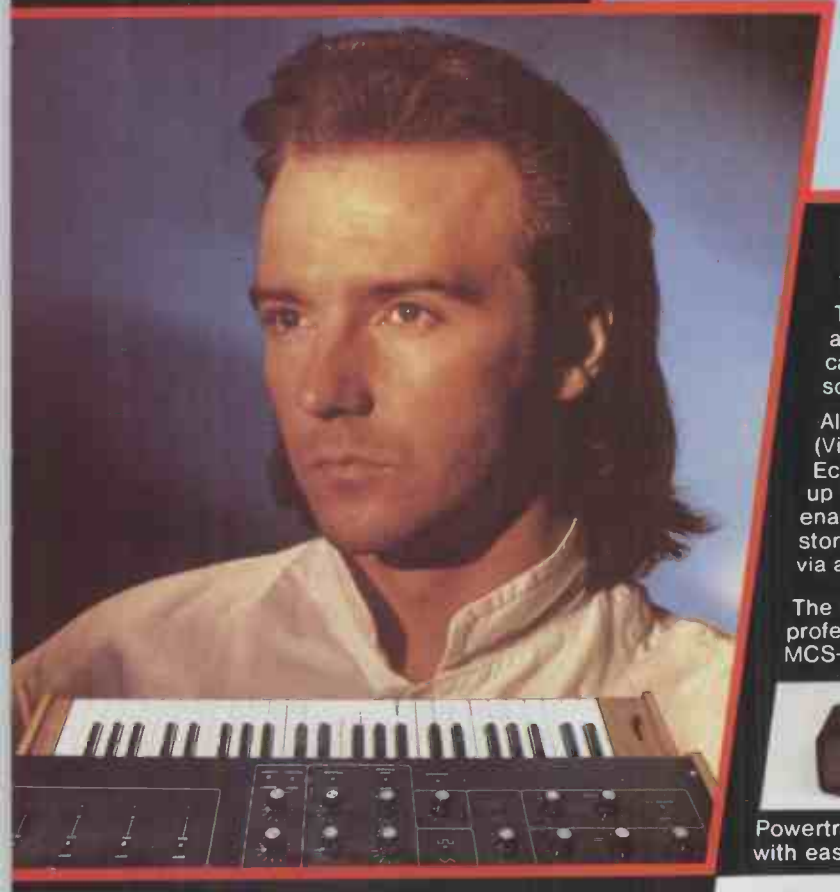

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Longest replay time (for special effects): 32 seconds.
Converters. ADC & DAC: 8-bit companding.
Dynamic range: 72 dB.
Audio Bandwidth: Variable from 12 KHz to 300 Hz.
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MIDI control range: 5 octaves.
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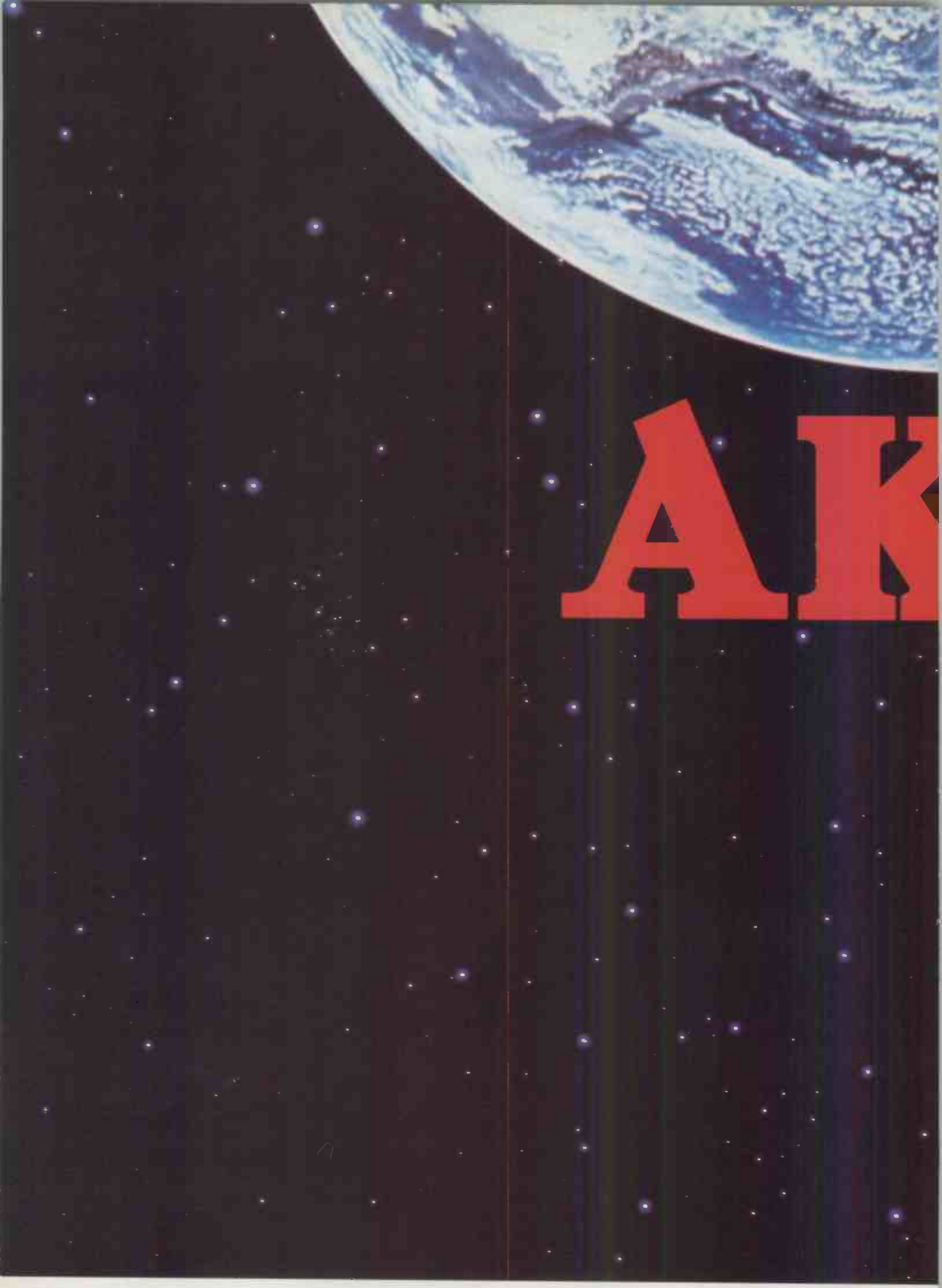

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Simmons SDS1

Musicians yearning for some means of triggering sampled drum sounds percussively have now had their wish granted, courtesy of the people that started it all. *Paul White*

I suppose it's probably stating the obvious to say that although digital percussion has been with us for a relatively short time, it's already taken for granted in most modern musical circles. And as a consequence of this, it's both refreshing and surprising to find that the SDS1 reviewed here is more than just another 'beat and repeat' machine, and that some of the niceties of analogue systems – such as pitch-bend and touch-responsiveness – have been incorporated into its design.

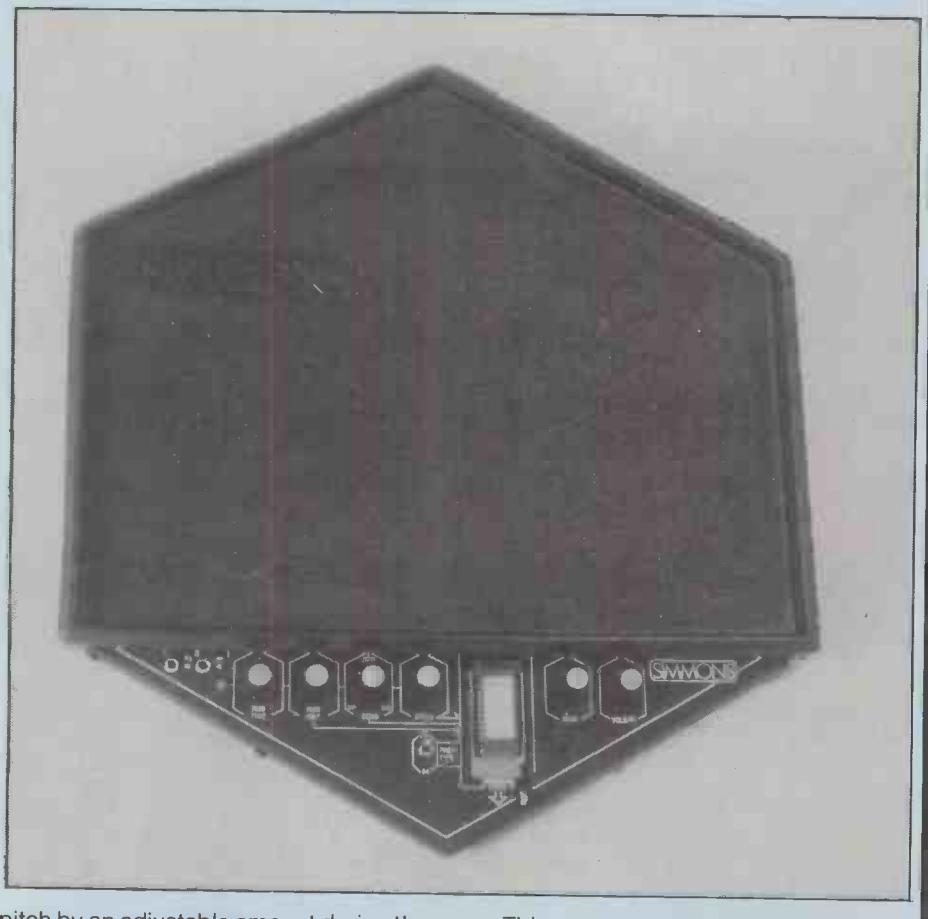
In terms of physical construction, the SDS1 is built into a standard Simmons pad and uses the same method of mounting. The now famous hexagonal shell is vacuum moulded from an attractive but tough plastic, and this complements the rubber playing surface, which is itself bonded to a plywood backplate. A piezo-electric transducer translates the stick impact into a trigger signal, the amplitude of which is roughly proportional to playing intensity, and this serves the dual purpose of initiating the sound and controlling its level.

As you'll no doubt infer from the accompanying photo, the simple, elegant Simmons lines are broken in this instance by the addition of a miniature control panel, and this is used both to modify the basic sound of the sample and to house the EPROM currently in use. It's to their credit that Simmons have seen fit to provide a snug-fitting and drummer-proof cover to protect this otherwise vulnerable area during playing, and another nice design touch is an additional panel overlay containing upside-down graphics, for anyone wishing to mount the pad with its controls furthest away.

The unit can be powered either by four AA-type batteries or by means of an optional AC adaptor, and it's testimony to Simmons' appreciation of the finer points of the average drummer's character that they supply a spare battery compartment cap for when said drummer loses the first one.

Facilities

In the control department, we find only six knobs and one switch, the latter being to select 64K or 128K to match the EPROM in use. There is no internal sound generator as such in the SDS1 because the basic sound is stored in the EPROM, but this may be changed in pitch and given pitch-bend in either direction, which represents quite a flexible approach. Additionally, there's a 'run' function that automatically sweeps the pitch by an adjustable amount during the course of a fill or roll. The run time is fully variable, and this feature can give the impression of several differently-tuned drums being played in sequence or even rototom effects, depending on how it's set up.



All sounds played *via* the SDS1 are touch-responsive, so that the harder you hit the pad, the louder the sound (and the more the bend if it's being used), but an external pulse from a drum machine or sequencer may also be used to trigger the sound *via* a mini jack connector if required. A red LED lights up whenever the pad is struck, and this feature alone would keep some drummers I know happy for hours.

What of the EPROMs themselves? Well, Simmons can of course supply a selection of pre-programmed sound chips, and this includes some excellent acoustic and electronic drum samples. However, you can also 'blow' your own sounds using a Simmons EPB (reviewed E&MM Jan 85), and it's surely only a matter of time before many companies start offering custom samples made from your own tapes if you can't afford to buy an EPROM Blower outright.

This opens up a wide range of possibilities for creating really off-the-wall samples, such as the sound of grass growing or the subtle nuances of a tax rebate dropping through the letter box, and the maximum sample storage time is long enough to capture conventional drum sounds with their attendent ambience, be it natural or artificial.

In Use

Further evidence that the SDS1 has been designed very much with drummers in mind lies in the fact that it's incredibly easy to use: in fact, Simmons have such confidence in this that they even let me take one away without a manual. Total familiarisation takes a matter of minutes, a far cry from the same process on the company's SDS7, which demands an awful lot of your time if you ever want to stand a chance of getting the best out of it.

Anyway, I was given an acoustic tom and an electronic tom to try out for review purposes, and both sounded excellent, the electronic tom being a typical Simmons analogue sound.

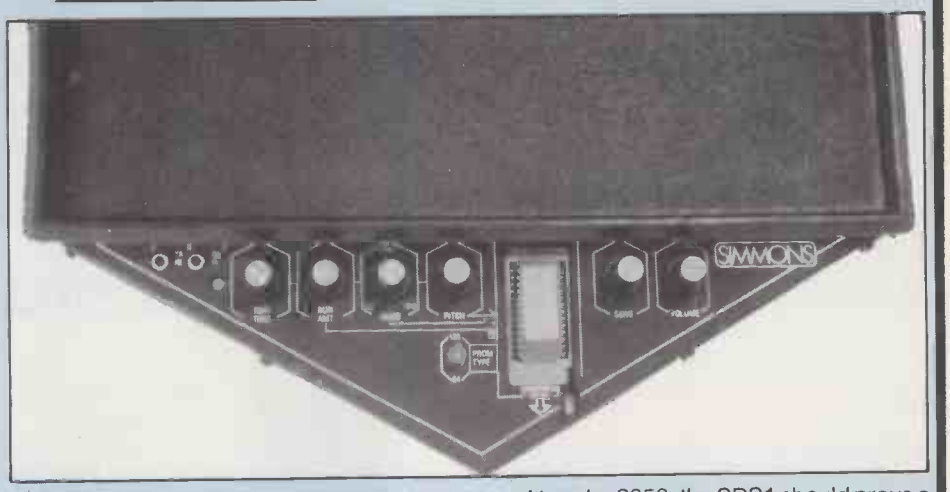
The pitch control offers around an

octave of useful range but if you set said control a little lower than about halfway, the sound starts to break up due to the onset of aliasing and quantisation noise. This additional and *apparently* unnecessary range is probably designed to accommodate other library sounds that are sampled at a faster rate, because the quality of samples played back over their natural range is very good.

Pitch-bend down adds a further hint of Simmons analogue feel to the tom sounds, whilst bending up is useful for creating tabla-like effects, in which the skin is stretched after playing a beat to produce a drum sound familiar to visitors to Indian restaurants from Delhi to Wolverhampton.

Using the SDS1 to play sampled analogue drum sounds seems a bit of a daft idea at first, as its undeniably cheaper to build an analogue unit from scratch than to follow this rather convoluted path. So it wouldn't make sense to buy an SDS1 just to gain a 'Simmons' tom, right? Wrong. Because if you intend to build up a library of sounds, then this particular sound is surely well worth including.

EPROMs can be changed in seconds, and the zero insertion force socket makes this procedure very simple, though those not familiar with ICs must take care not to bend the legs, if you see what I mean. Manufacturers are forever advising you and me to store EPROMs in conductive plastic foam to prevent static damage, and also to switch off the power when we're inserting or removing EPROMs. There's no denying these rules are well worth sticking to, but 99 times out of 100, no harm will come to your chips if you forget to take them out before powering-down, so don't panic.



Conclusions

For me, the blend of digitally-recorded sounds with the facility to add pitch-bend and playing dynamics really works. The 'run' feature is a useful addition for special effects and fills, though I suspect overuse of this could get well up your olifactory organ.

At under £250, the SDS1 should prove a valuable asset to the acoustic drummer who wants the occasional unusual sound but equally, it'll also be just the job for the SDS5 or 8 owner who wants to add a couple of acoustic sounds to the electronic ones. I can't help thinking that a bass drum version would be a handy addition to the range (come on, Simmons, let's have some nice punchy samples) and I can also foresee a demand for an analogue unit following the same self-contained format. ■

Further information from Simmons Electronics, Abbey Mill, Abbey Mill Lane, St Albans, Hertfordshire AL3 4HG. ☎(0727) 54601.

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OSC Advanced Sound Generator

Computer Music System

Shown for the first time at Frankfurt, the ASG is Britain's first attempt at a custom-designed synthesiser and sampling system. What follows is an exclusive preview of what it is now and what plans OSC have for developing it in the future. *Gerry Queen*

Ever since the OSCar was first released back in 1983, the principal criticism levelled at it is that it's monophonic. At the time of its release, this simple adjective was rapidly becoming pejorative. That was the era during which the blinkered mentality of a few synth manufacturers led to a sacrifice of sound quality, programmability and versatility to the great ideal of polyphony. In the mad rush to pander to a particular group of keyboard players who judged a synthesiser by the number of notes that could be played on it, first oscillators (down to one VCO), then envelopes (down to one ADSR) and finally filters (down to one VCF between eight voices) gradually disappeared from the control panels, unnoticed except by those who understood that a synthesiser could be more than a glorified 16-voice organ.

As this process continued unabated, the OSCar remained aloof from all of it, partly because its designer, Chris Huggett, saw little logic in the way things were going, and partly because his company were in no position to finance the development of a polyphonic variant, though he himself was well aware of the limitations his synth's one-note capability imposed on the musician.

Development

So, logically enough, work was started on a new, upmarket machine that would be fully polyphonic but which would sacrifice none of the OSCar's programming versatility. In fact, it was Huggett's intention from the word go to build even more in the way of synthesiser functions into the polysynth. For example, there would be three oscillators for each voice, three envelopes (more complex than the conventional ADSR format) to go with them, and a more versatile filter section. And advances in sampling quality didn't go unnoticed, either, as OSC decided to add a sampling capability to the analogue waveform and additive harmonic sound-generation methods already present on the OSCar.

As things turned out, advances in music technology gradually made Huggett's originally awesome task easier and easier. The advent of MIDI meant that his company could get away with designing and building a stand-alone sound module, leaving the Japanese and the Americans to come up with controlling keyboards of sufficient quality to do the system justice. Huggett admits that MIDI leaves something to be desired and that his company is looking into the possibility of designing its own controlling keyboard complete with a faster, parallel interface, but had it been undertaken before now, that work would have held the poly project up by months if not years. Which is why OSC are perfectly content to leave the manufacture of weighted wooden-key controllers to the Big Boys, and concentrate instead on doing what they do best – designing versatile sound generators and flexible control systems to go with them.

A further aid to the development of the Advanced Sound Generator, as it had by this time been named, was the reduction in cost of large, custom-built liquid crystal displays. The availability of just such a display enabled Huggett to surround the ASG's main information source with an array of knobs and switches that relate directly to what's visible. In other words, a system that's both more useful and more user-friendly than either the mass of pots and LEDs favoured by the big synth makers, or the monitor-and-QWERTY-keyboard approach so beloved of the designers of custom computer music systems.

And so it was that the ASG took pride of place on OSC's Frankfurt stand (which ▷

	Tune	Octave	Interval	Sync	Wave	PWM speed	PWM depth	LFO speed	LFO depth	Bend wheel LFO	Mod wheel pitch	Mod wheel	Glide	Press	Vel	Vol
Master																
Osc 1																
Osc 2																
Osc 3																
Filter																
Env 1																
Env 2																
Env 3																
	Freq	Mode	Q	Sep	Env mode	Attack rate 1	Peak level 1	Decay rate 2	Sustain level 2	Release rate 3	Final level 3	Delay rate 4	Repeat rate 4	Press	Vel	

Figure 1. How the advanced Sound Generator's unique liquid crystal display shows parameters and their programmed values.

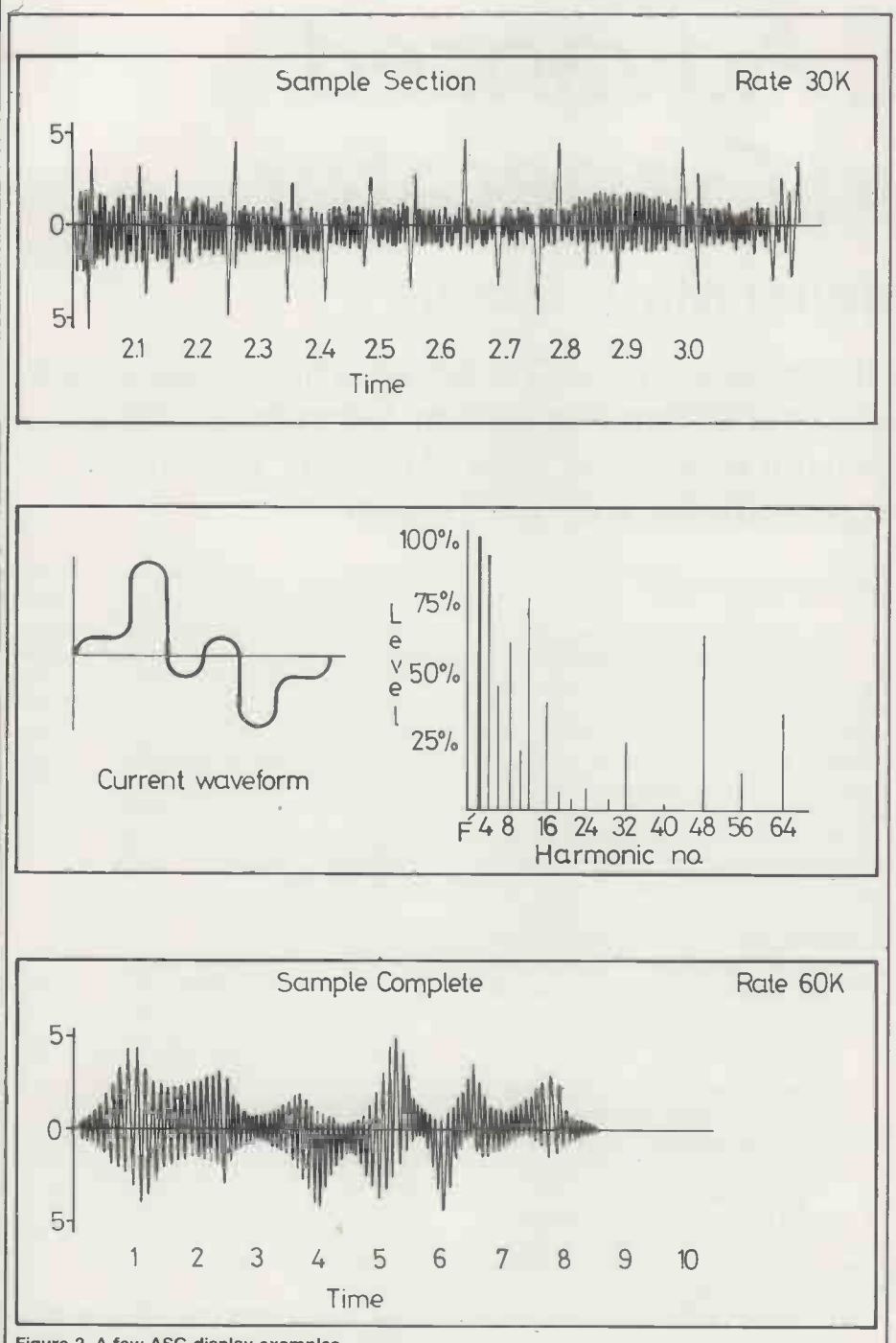

Figure 2. A few ASG display examples.

they shared with forward-looking Italian software company LEMI) as a 5U-high 19" rack-mounted box, the centrepiece of which was an LCD programming screen with a high resolution of 600 x 240 dots. It's on this that parameters, waveforms and music displays appear.

To the right of the screen are the eight main Function buttons. These select principle modes of operation such as Synthesiser, Sequencing, Waveform Building and so on. When one of these buttons is pushed, it calls up the main screen for that mode, though this may have one or more subscreens. This means that at any time you can 'jump' between, say, Synthesiser and Sequencing modes without having to enter and exit different routines. And as all current ASG software is ROM-based (as opposed to being on disk), all command actions can be instantly accessed without any delay caused by different lots of software having to be loaded or overwritten.

To the left of the screen are a further eight buttons whose functions aren't labelled for the simple reason that they change according to the screen display selected: they work in conjunction with 16 continuously-rotating knobs located along the bottom of the screen. To alter any one of the parameters that are shown on the screen (and there can be as many as 128 of these at any one time), all you have to do is hold down the button level with the parameter you wish to alter and turn the knob directly below it. To give you some idea of how flexible yet economical this system is in practice, let's say you want to alter the Filter Decay time. In this particular mode, you can see the settings for Filter Mode, Filter Cutoff Frequency and Filter Envelope Amount as well as the other components of the envelope, merely by glancing at the appropriate areas of the LCD.

Waveforms

As is the case with the OSCar, the waveforms offered by the ASG comprise both standard analogue ones (triangle, sawtooth, square, variable pulse), while the extra-beefy PWM (Pulse Width Modulation automatically set up with independent LFOs for each oscillator) has extra control over speed and depth of effect, *and* there's a digital construction facility. This also has similarities with the set-up on the OSCar, in that there is a range of preset digital waveforms which offer things like basic organ, plucked and bell-like waveforms as well as provision for you to construct and define your own waveforms. The three improvements to this area of performance are first, a greater range of preset waveforms, secondly, visualisation of the waveshape as it's being built up, and thirdly, the fact that 64 harmonics are now definable, their levels being more easily programmed by use of the knobs as individual level controls for groups of 16. This means you can set the basic sound of the waveform with the first 16 harmonics, then alter the most obvious overtones (17-32) and then proceed to the more subtle ones (33-48). The last set are really only available on very low bass notes (elsewhere, such harmonics can only be heard by dogs and bats), but it's in the context of these low fundamental notes that they give a degree of high harmonic control unequalled by any other commercially available system.

> 'The idea behind the display is to develop a better relationship in the user's mind between the sound and the way it's made up.'

Visualisation of the waveform takes place in one of two ways. On the left-hand side of the screen is a graphical display of the waveshape as it is built up (preset waveforms can also be represented in this manner), while to the right lies a bar chart display showing the level of each of the 64 component harmonics. You can of course listen to the waveform as you're changing its constituent parts, and these changes are shown on-screen in real time (ie. as they happen sonically). The idea behind this is to help develop a better relationship in the user's mind between the sound and how it's made up – and there's little doubt in my mind that it works.

It's also possible to change waveforms while a note is actually sounding. By using an envelope or an LFO to sweep behind two or more pre-defined waveforms, an effect such as pulse width modulation can be applied to any basic waveshape, not just that of a pulse wave. Using an envelope means that simple one-way transitions can be achieved, whilst the LFO will, of course, give a cyclic effect at both low and high speeds. The inclusion of this facility means that precise control of harmonic content is possible in real time, and the effects of that aren't just confined to the crude (if rather satisfying) effect obtainable from a conventional analogue filter.

What we've looked at thus far is merely the framework within which each ASG oscillator operates. Beyond that framework, the OSC design makes it possible for you to mix the actions of each of the three oscillators, either statically or in real time, using one of the three envelopes for each oscillator. Each envelope can be used either in an expanded ADSR mode (with peak and two sustain levels programmable) or in an eight-stage string of modes. The resultant mix of both overall and individual envelope volumes can then be fed into the unique OSC filter design at either low (clear) or high (overdrive) level.

Filters

Each of these comprises two 12dB/octave filters which can be used in a multitude of combinations, including lowpass (24dB), highpass (24dB) and bandpass (12dB) as well as for more *recherché* purposes such as band reject (notch) and comb filtering. It's also possible to split the two filters so that each can work separately on different oscillators. And you don't need a Mensa IQ to realise that this feature, in conjunction with the different oscillator envelopes, enables you to undertake a myriad of weird and wonderful synthetic tasks, such as the layering of totally different patches within one sound program. Good stuff. It almost goes without saying that the filters can also be controlled by expanded ADSR or Rate/Level envelopes, separately if required.

> 'The OSC design makes it possible for you to mix the actions of the three oscillators, either statically or in real time.'

All voice channel components that can be affected by an LFO (ie. pulse width, oscillator pitch and filter frequency) can have different rate and depth settings to achieve real independence between vibrato, tremolo and PWM effects. Again, the sort of programming potential rarely afforded by today's dedicated polysynth designs.

Future Updates

So much for the Advanced Sound Generator (it may or may not eventually be marketed under that name) as it was demonstrated at the Frankfurt Musik Messe. That's far from being the end of the story, however, because as I intimated earlier on, it's OSC's intention to produce a complete computer music system equal in capacity and versatility to the best that current technology can offer. As the system evolves, developments on both the software and hardware sides of the musical fence will be fitted as options to all production ASGs, with retrofit packages being made available to those already in possession of the OSC flagship.

Let's look at the software first. Shortly after the release of the basic unit, a comprehensive update will be available to cope with what OSC envisage as being just about every conceivable sequencing requirement. The program will be able to control not only the ASG's 16 internal voices multi-timbrally but also those of up to 16 external synths (*via* MIDI) to the full extent of their individual polyphony and multi-timbral capability. It's also more than likely that, thanks to the speed with which the 16-bit master processor controls the system, it'll be possible to incorporate a real-time music display of both recording and playback into the sequencing package. In effect, this means that notes will appear on the screen as you play them, their time value in relation to the audible metronome click being filled in when you release the notes. Input to the software will be possible in real time using the controlling keyboard(s) or step time *via* the controls on the ASG's front panel.

Turning now to the subject of hardware updates, these are all designed to fit within the current unit, the idea being to avoid the problems inherent in systems in which several modules have to be plugged together correctly in order for anything to work as it should do.

The first – and for many people, most significant – of these introductions will be a polyphonic sampling facility. This will allow storage of up to 10 seconds of sampled sound within the machine at 50kHz, with faster playback possible. Plans are also afoot to keep the samples backed up by a battery-powered memory, so that they don't need to be reloaded whenever the machine is switched off or suffers a momentary power drop. Sample libraries can then be built up using the onboard 3.5" disk drive.

The second hardware update will locate a Winchester drive within the rack unit, and this will allow monophonic samples of rather longer duration (perhaps four or five minutes) to be stored and accessed with something approaching lightning speed. This should find a lot of favour with the 12" single production fraternity, who are currently stretching present-day technology to its limits in an effort to record the most creative 20-minute dance mix in history. Well, you know what I mean.

Finally, work is already in hand on the development of a printer interface to the ASG, so you'll be able to dedicate programming screen displays, voice data, harmonic-structure graphs and music scores to the printed page courtesy of a dot-matrix printer, should your interest demand it.

Conclusions

One thing that becomes pretty clear just from a quick glance at the ASG's specification is that it's an immensely ambitious project. As a small company endeavouring to take on the might of multi-million pound organisations single-handed, OSC are obviously going to have the dice loaded against them in the battle to capture a sizeable slice of this end of the hi-tech music market.

Yet the Advanced Sound Generator is good enough to enable them to do just that. Its own particular collection of facilities and the way they've been implemented have been given careful consideration by the OSC design team, and the result is an instrument of great logic whose inherent versatility is more instantly usable than that of almost any other competing product.

The company themselves would be the first to admit that all is not presently as it should be: the chosen LCD isn't the clearest of its kind in the marketplace (as well as being tricky to read, it's also well-nigh impossible to photograph, hence the proliferation of artist's impressions illustrating this feature), the front panel aesthetics leave a little to be desired, and the separation of keyboard from sound generator means that there are still a couple of connecting cables involved in setting the whole thing up – that's a couple too many in my opinion, because the DIN plug isn't the most reliable form of hardware interface currently available.

You're probably wondering by now (if you aren't, there's something seriously wrong with your powers of discrimination) how much the ASG system – in any of its forms – is eventually going to retail for. Well, the answer is that final asking prices have yet to be decided upon, but suffice to say for the moment that nobody expects them to be anything but ultra-competitive, which, when you consider the circumstances under which the machine is to be produced, is a mighty creditable achievement. ■

Further information on the Advanced Sound Generator system can be had from the Oxford Synthesiser Company, 5 Gladstone Court, Gladstone Road, Headington, Oxford. ☎ (08675) 5277.

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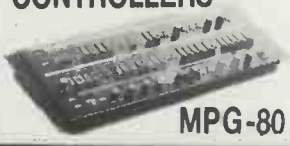

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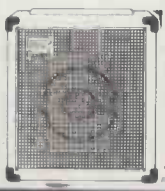

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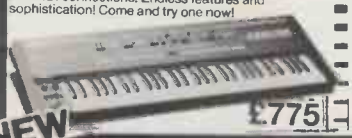

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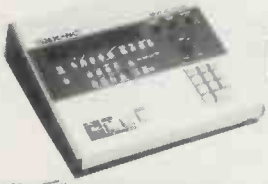

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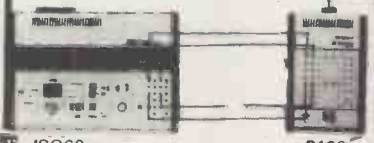

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YRM102 FM Voicing Program

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's 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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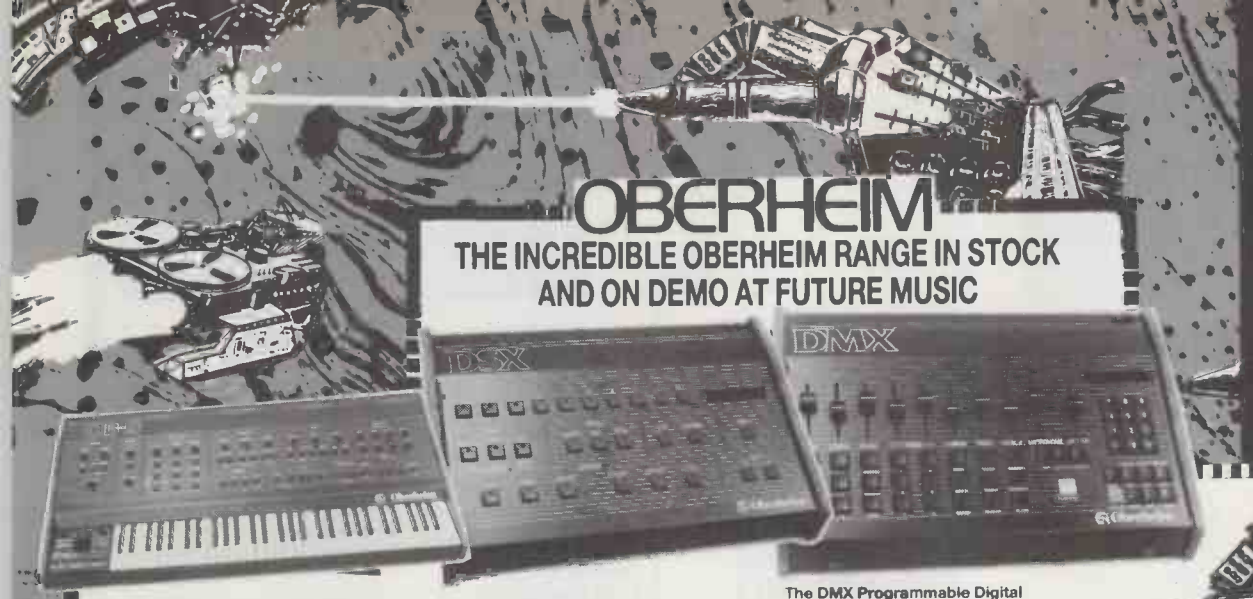

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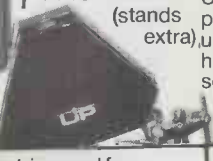

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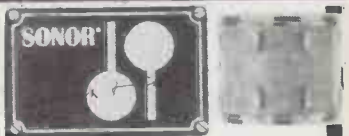

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Sycologic MI4

MIDI Connection Matrix

As the average MIDI system continues to expand, the range of available units to aid quick and easy connections follows suit. We take a look at one of the most ingenious. *Trish McGrath*

It seems that Sycologic, the designing and manufacturing wing of prestigious London synth emporium Syco Systems, are about to confirm the old adage that the simplest ideas are usually the best. When MIDI became the new standard for interfacing common or garden synths, sequencers and drum machines, the practice of linking them in a chain brought to light a number of shortcomings. First, having to chain synths together necessitates at least some if not all of them having a MIDI Thru socket, as those without can only be used as either the master or the end-of-chain keyboard. To add to the logistic difficulties, linking a number of synths in this way can lead to slight time delays due to the serial nature of the MIDI standard, while the chain system can itself be too inflexible for comfort in many cases, as redefining the master and slaves can result in endless and inconvenient lead-swapping.

What keyboard players (or at least, those with three or four MIDI instruments) need is a convenient way of linking them all to a central musical 'switchboard', whereby any extension can call up any other extension for a MIDI chat at the flick of a switch, and in which the transmitter can copy the MIDI message to more than one receiver simultaneously. This is more or less what the Sycologic MI4 has been designed to do, managing as it does to link up to four MIDI units in a star network which allows master and slaves to be selected easily and redefinitions carried out painlessly – and even remotely.

Construction

Although the MI4 delivered to E&MM's doorstep was a prototype, it's clear that its grey metal casing is sturdy enough to handle all but the clumsiest of *Guitarist* readers. The built-in power supply receives the necessary juice *via* a standard europlug mains lead, and the range of rear panel sockets is completed by four MIDI In and four MIDI Out sockets, all on standard five-pin DIN connectors. It's on this panel that the newly-available colour-coded MIDI cables (complete with their fool-proof 'In' and 'Out' labels) are worth their weight in gold, as they go no small way towards identifying the jungle of leads that can be connected to the unit at any one time.

The MI4's top panel is laid out simply and neatly, and features a four-by-four matrix of red LEDs, along with four of both Source and Destination selectors. **Source**, logically enough, signifies the data being received from the MIDI Outs of connected instruments and defines the master(s), while **Destination** denotes the routing to the MIDI Ins of connected units (ie. the slaves). White-painted squares are also included opposite each Source and Destination option, the idea behind these being that you can label each instrument connected on the top panel. The upper echelons of the modern music world will have no difficulty inserting the appropriate 'Fairlight', 'DX1' and 'Xpander' legends, but the less financially fortunate will have a job getting 'Pro One via new Boss MI10 MIDI-to-CV Interface' onto the entire row, let alone one square.

In Use

Residents of Surbiton and outlying regions would no doubt describe operating the MI4 as 'a segment of gateaux', as it entails merely connecting a combination of three or four MIDI synths, drum machines or sequencers (remembering to designate each one a number between 1 and 4) to the appropriate MIDI Ins and Outs on the rear panel.

The left-hand Source selectors allow the master keyboard to be selected, so let's say for argument's sake that it's synth #1 – simultaneously pressing Destinations 2, 3 and 4 effectively means that the other three units will come to life as soon as the master is activated, in which case the Source button's built-in LED will flash to indicate that MIDI data is issuing forth.

The MI4 also incorporates a feature known as 'switch lock-out', which prevents selections being made while MIDI data is flowing through the unit (the circuitry will wait for a gap in transmission). The intention is to prevent corruption of MIDI events (note-off commands not getting through, for example), but I still succeeded in confusing a Korg Poly 800 into a state of endless droning, poor thing. However, so long as you don't try messing with the matrix while the master is playing, you really shouldn't encounter any problems. One further point is that the Source LED pertaining to data being received by a synth that features Active Sensing (eg. DX7, JX8P) flickers to show that the MIDI connection is OK, while any Roland MIDI clock lights the LED continuously in a similar fashion.

Switching out any destination routing can be done by pressing the Destination button twice in quick (too quick for comfort) succession. I'm left wondering just why the required time interval is so short, because even with the benefit of practice, the switching-out process can be more than a little hit and miss.

To save brain fatigue, it makes sense to set each connected unit to MIDI Channel 1, unless the Source is a MIDI multitrack sequencer on which different MIDI channels have been assigned to different tracks. Of course, connecting a dedicated MIDI sequencer to a star network like this allows you to switch effortlessly from one synth to another when recording and playing back tracks, and a MIDI drum machine can contribute on playback as and when required. In fact, the only real problem I encountered was trying to tune all the synths to the same pitch. Sycologic can't solve that one yet, I'm afraid. If you're wondering how the MI4 can be applied to your particular set-up, simply keep in mind that whereas any one Source can be routed to up to three destinations, any destination can naturally have only one Source. In other words, you can't have a synth expecting MIDI data from more than one master.

For a moderate further outlay, Sycologic will supply a hand-held remote control unit that'll allow you to switch between any of the combinations made possible by the MI4. However, since the relevant infra-red detector is located at the front of the MI4, said unit was generally unco-operative whenever I attempted to trigger it from the rear or sides.

RRPs: MI4, £189, Remote £49, both prices exclusive of VAT. Further details from Sycologic Ltd, 20 Conduit Place, London, W2 1HS. ☎ 01-724 2451.

HARDWARE OVERLOAD

THE GOOD, THE BAD AND THE UGLY AT FRANKFURT'S MUSICAL FIESTA

Advance product information may have robbed this year's Musik Messe of some of its vitality, but there were still plenty of surprises in store for those that made their way through the enormous maze of exhibits.

Dan Goldstein

Recent trends in popular music have brought about a decline in the number of all-electronic acts breaking into the public consciousness, but in spite of this, new technology is playing a bigger part than ever in shaping the way modern music is written, performed and produced. That the world's musical instrument manufacturers are well aware of this fact was illustrated by the prominence afforded to hi-tech gear at last month's Frankfurt Musik Messe, the annual gathering of MI developers, manufacturers, distributors and general hangers-on.

The Messe is big. A mighty exhibition complex covering a huge acreage not far from Frankfurt's centre that finds use as the setting for all manner of international events from fashion shows to toy fairs. Of its ten gargantuan halls, only two are ever taken up by the music fair, but that doesn't prevent the February show from being the most important of its kind anywhere in the world, bar none.

This year, we found the Germans had built a new Press Centre where the assembled hacks could drink, eat, relax and drink, but it was a goodly walk from the centre of Music Fair activity, and many journalists succumbed to the pleasures of Pils and bratwurst sausage, remaining in the Press Bar for the duration whilst occasionally venturing as far as the trayloads of press releases located conveniently in the reception area next-door.

For the rest of us, it was the usual story of trying to crawl round the show, trying to look as unflurried as possible while carrying a load of exhibitors' promotional material in one hand and copies of our own magazines in the other. Two days of just such endeavour proved exhausting in the extreme, but it was worth it.

Of all the companies that took space at this year's event, **Yamaha** probably occupied the most. Seeing as the Japanese conglomerate make everything from full-size grand pianos to MIDI interface units no bigger than a box of Milk Tray, they need every inch of it. UK Pressmen had already seen the company's new hi-tech offerings during a whistle-stop trip to Yamaha's Euro HQ in Hamburg a couple of weeks before, which is why E&MM were able to report on them last month, but one or two further snippets of information have come to light as a result of the Frankfurt showing.

First off, Yamaha's new DX5 FM polysynth (you remember, DX7 keyboard mechanics but DX1 electronics) looks like it's going to retail at rather less than the £5000 we were originally quoted: £3000 now seems a more likely figure, which is probably just as well, as it increases the model's competitiveness considerably. Mind you, there are plenty of other routes to FM happiness offered by the remainder of Yamaha's hi-tech product range. For only a little more than DX5 money, you could have a TX216 rack (basically, the electronics of two DX7s, but with the advantage that you can upgrade the system easily and economically by investing in a TF1 module – RRP, £449 – as and when finances allow), coupled with a KX88 master keyboard. It seemed at first as if the latter device would be similar in concept to Roland's MKB1000 mother keyboard, and indeed it is. But what makes the KX88 an altogether superior beast is that (a) it allows you to control parameters and overall levels (*via* MIDI) of connected instruments and (b) those instruments don't have to be from the Yamaha FM stable, since some clever software-writing has given the 88 the ability to decode MIDI System Exclusive data belonging to other machines in the MIDI macrocosm. What Yamaha have done to assist in the latter process is give the KX88 user-assignable parameter controls so that, for instance, you can manipulate the filter of a connected analogue synth with any of the 88's performance controllers, of which there are many. An undeniably sophisticated animal, then, though there will still be many musicians (mostly, I suspect, the less technically proficient), who will shudder at the thought of spending £1400 on a musical instrument that doesn't actually make any noise.

Once you've got all the sound-generating equipment you require (the TX816 is still the ultimate, at least as far as FM is concerned), you can then progress (?) to controlling it automatically with some sort of sequencing device, and Yamaha will be pleased to help you out in this area too, as they now offer both the height of dedicated MIDI sequencing versatility in the shape of the QX1 (about £2400), and a scaled-down version designed specifically with DX owners in mind and logically titled QX7. This is due to weigh in at a competitive £500 when it hits the shops in the very near future, and although it incorporates only two audio tracks (so that you're only ever recording/overdubbing on two adjacent channels), it's nonetheless capable of storing and distributing data on all 16 MIDI channels, so it can still act as the triggering force behind a complex MIDI system. Another newly-introduced goody, the TX7 voice expander, also looks decent value at £700, and if you put all three 7s (DX, TX and QX) together, you've got a mighty versatile synth system for a shade under £2500. No, I can't afford it either, but it's still a more realistic possibility than a lot of the gear being touted at the show.

If Yamaha are now the accepted leaders in the race to provide a complete range of hardware and software for the modern musician, their opponents are doing their darndest to make sure they don't get too far in front. **Roland** are continuing their policy of trying to *appear* to be in first spot by releasing as many

There's no need to sit there like a dummy – Wersi's MK1 polysynth is a real advance for the build-it-yourself keyboard company.

A suitably arrid setting for Ensoniq's Mirage sound-sampling keyboard. It's an odd name, though – the instrument is a reality.

new products as possible during each hi-tech model year. And like Yamaha, Roland UK decided they'd make sure nobody missed any of the new gear by laying on a special unveiling at a West London hotel a couple of days before the Musik Messe got underway. The JX8P polysynth (reviewed in E&MM February) was there in all its not inconsiderable sonic glory, as was the Synth Plus 60, basically the guts of a Juno 106 polysynth in a more domestically-acceptable casing and with built-in amplification and speakers. Nobody batted an eyelid, but ironically, one of Roland's other new home-orientated machines, the Piano Plus 100, could be of more interest to the pro user. Essentially, the 100 has four reasonable preset sounds and a similar built-in amp system, but it also has a 76-key dynamic keyboard along with MIDI In, Out and Thru sockets. In other words, it'd make a fine keyboard controller for a stack of MIDI voicing modules, particularly when you bear its expected RRP (a modest £625) in mind.

Of more immediate significance is Roland's apparent determination to corner the electronic percussion market. Their excellent TR707 digital drum machine has already been a runaway success only weeks after its release, and the company are now following it up with the 727, a machine identical in all respects except voicing, the newcomer's sounds being of the latin percussion (as opposed to the rock drum kit) variety. Sound quality of the 727 is as high as that of its stablemate, and the price is the same at £525 – the only problem is that deliveries of the latin wonder aren't expected to start until July, when the weather should be more conducive to carnivals and the like. As if that wasn't already enough, 1985 will also be the year of Roland's entry into the electronic drum market. Basis of their system is the DDR30 digital drum module, which contains six PCM drum voices with four variations of each, making a total of 24 preset drum sounds. These can be altered by implementing values of 13 user-adjustable parameters including pitch, attack, EQ and so on, and 32 memory locations are available onboard for the storing of voices resulting from such editing. The DDR is MIDI-compatible, too, so you can play its voices from a MIDI keyboard or control them from a similarly-equipped sequencer, but their true purpose in life is to serve as the voice generator for Roland's custom-designed drum pads, which come in two sizes. The system looks, feels and sounds as good as anybody's, but at around £2000 for a basic kit, anybody buying Roland's offering is going to have to be pretty convinced of the merits of PCM sampling to want to choose it in preference to the (cheaper) competition.

There were if anything even more electronic drum kits at this year's Musik Messe than there were a year before, and that's saying something. Among the most recent entrants into this particular musical fray are such unexpected names as RSF (the French company responsible for the Kobol and Polykobol synth systems), Pearl (the second acoustic drum company to become involved in electronics), Hohner (it certainly makes a change from Clavinets and mouth organs), Dr Bohm and **Wersi**. It was the last-mentioned company that had the biggest surprises up its sleeve. Because quite apart from their electronic drum system (unremarkable save that it boasts a built-in sequencer and the ugliest pad design you have ever seen), they also unveiled a programmable polysynth by the name of MK1. Unfortunately, technical details on the instrument have so far been difficult to get hold of, but we do know that it's a 16-note polyphonic device that features Wersi's own DMS digital voicing system, a five-octave touch- and velocity-sensitive keyboard and full MIDI compatibility. The MK1 also features an ingenious switching matrix that enables its sound modulation stages to be routed in different orders, and a 16-slider panel that lets you alter the amplitude of 16 harmonics within each sound's basic waveform. ROM cartridges housing some rather impressive factory voices are available as optional extras, as are RAM packs that let you save your own sonic creations. But the most impressive thing about the MK1 is its price – less than £700 in Germany if you do what Wersi encourage you to do and build it yourself. I hope it gets to the UK without much further ado, and that its manufacturers get to grips with the idea of giving the buying public sufficient technical data.

In fact, the lack of in-depth technical blurb for the information-hungry reporter was something we encountered all too often in the Messe's cacophonous exhibition halls. Whenever stand personnel found themselves up against a barrage of technical queries, the usual response was something along the lines of 'Listen, it looks good, it sounds good, and it's cheap. Just don't ask me what's going on inside.'

The **Ensoniq** stand was a case in point. News of the US company's Mirage sound-sampling keyboard had reached most parts of the globe before the Musik Messe opened its doors, but most of us were expecting to see one half-finished prototype keyboard with a black box underneath containing all the hardware that hadn't been fully worked out yet. How wrong we were. The Mirage is a fully-working, saleable product with a maximum sample time of eight seconds (at which the bandwidth is 4kHz), amplitude and filter envelopes through which any sample can be routed, an onboard sequencer that can store modulation and velocity data, a five-octave velocity-sensitive keyboard, full MIDI compatibility, and a 3.5" disk drive for storage of both voice and sequence data. But there was nobody on hand to shed any light on the subject of just how all this has been achieved at the mildly laughable Stateside price of $1700. Guess we'll just have to wait and see.

Affordable sound-sampling turned out to be another of this year's many musical themes. But whereas the Americans and the Europeans seem to take the view that a sampling facility should be incorporated as an integral feature of a keyboard instrument, the Japanese see it as something that can be added to the facilities of a conventional synthesiser in the form of an outboard unit. Both **Korg** and **Akai** had such external devices on show. Korg's offering, the SDD2000 digital delay, is capable of storing samples of up to 4.3 seconds in length, and allows those samples to be triggered from a footpedal or external trigger and pitch-controlled from a MIDI keyboard: you can step through the delay's 64 memories *via* MIDI too, so the machine is well thought-out, and should be a hot seller if the UK price prediction of £700 turns out to be accurate.

Akai's S612 is more a custom-designed sampling machine than a DDL whose Hold facility has been used to provide a sampling option. It's capable of taking an analogue sound source of any kind (through a choice of mic and line inputs), converting it into a digital signal and outputting it in six-voice polyphony to any MIDI keyboard. Looping and overdubbing facilities are also provided, and the only problem is that you need Akai's soon-to-be-released micro disk drive in order to store samples, though that's small hardship when you consider that the S612 is due to retail at just £1100 when it comes to this country in June: the Q-disk drive unit will be a further £329.

Let's stay on the subject of Akai for a moment. The company almost shook the synth world to its foundations when they launched their first range of electronic instruments just a year ago, but at the '85 Messe, they surpassed their previous achievement by introducing no fewer than 11 new music products. And they weren't all little black interface boxes, either. Aside from the sampler and disk drive already mentioned, the coming year should see the arrival of an upmarket version of the AX80 polysynth called the AX90, a MIDI mother keyboard that wouldn't be in the least bit interesting if it weren't for the fact that it's due to retail for roughly half the price of its competitors, a synth module offering all the AX90's voicing and programming possibilities, entitled VX90 and priced at around the £1100 mark, and perhaps most excitingly of all, a complete computer music system based on custom-designed hardware. Centrepiece of the system is the CPZ1000 music computer, a 19" rack-mounting unit that incorporates four sets of MIDI Ins and Outs and twin 3.5" disk drives on its front panel, but in order to use this in a musical fashion, you also need the RZ1000 Recorder Sync Operating Board (included in the CPZ selling price of £3300), which has both the hardware and software necessary to turn the system into a digital keyboard recorder. And that's not the end of the story, because there's also an option in the form of the EZ1000 Edit Operating Board, which allows comprehensive editing functions to be carried ▷

out and incidentally provides a QWERTY keyboard so that you can use the CPZ's computing power in conjunction with software that isn't necessarily of a musical nature. Again though, information on what precisely makes the Akai system tick was decidedly thin on the ground at Frankfurt, so we'll just have to wait until the gear hits these shores this summer before making any firm judgements on value for money.

Korg were also showing a music computer, though theirs is a little less technologically ambitious. A Z80-based machine that's been developed in conjunction with Epson, the MC4000 micro is already on sale in Japan, where it's accompanied by a micro disk drive, the MF1000. But most interesting of all is the specially-designed music synthesiser add-on, the MU5000. This 16-channel machine is capable of generating some mighty impressive sounds courtesy of the same Digital Waveform Generator System used in the DW6000 poly (see review elsewhere this issue), but Korg UK's problem is that all the currently-available Japanese software is of the Playalongamax home keyboard variety, and does scant justice to the synthesiser's potential. So whether Korg's British and European networks opt to bring in the whole system and write their own software, or whether they market only the MU5000 as a MIDI expander to be controlled from the DW6000 (which would be a shame) is something that probably won't be answered for some while yet.

Still on the subject of computers, the world's leading manufacturers of custom-designed computer music systems had one or two tricks up their sleeves rather than anything really earthshattering. The Series III **Fairlight** won't now be available till later in the year, but the Australians were demonstrating an ingenious little device called the Voicetracker, which is capable of receiving analogue information from the human voice, converting it into digital data, and then outputting it through MIDI and CV connections so that it can be used to control virtually any synth you care to name. The machine even has a Video Out socket as well, so that you can see your voice's sonic characteristics in glorious colour graphics on a TV monitor. Most of the effects audible on Fairlight's stand were decidedly gimmicky, but there's no denying the fact that the Voicetracker's creative potential should be enormous.

There was plenty of activity over at **E-mu Systems** as well. Not content with resting on their laurels after the superlative achievement that was the Emulator II, the Californian company have now taken things to their logical conclusion by introducing the Drumulator II. The new machine adds programmable dynamics, tuning and level, MIDI and SMPTE connections, and above all, user-sampling to the list of facilities already provided by the existing E-mu rhythm machine. That sampling is undertaken with the help of a control panel identical in composition and layout to the same section on the Emulator II, and the machine will be upgradable to incorporate more sampling (up to 17 seconds' worth) and sequencing memory when it hits the UK in the summer.

Kurzweil and **Linn** have also put the finishing touches to user-sampling options, and demonstrated them with some aplomb during the show. Kurzweil's system uses software written for the Apple Macintosh micro, and provides the means for making their 250 digital keyboard a considerably more flexible instrument than it was previously. Conversely, Linn's sampling potential seems of almost incidental significance when you bear in mind that the 9000 drum machine and digital keyboard recorder to which it's being applied is already an extremely powerful creative tool.

The first of many. Akai's S612 offers fully polyphonic, MIDI-controllable sampling for a little over £1000, but that's only the beginning...

Korg's new computer music system. Don't get too excited – it may not be coming to Britain.

The Drumulator II adds user-sampling and a whole host of other facilities to the spec of its predecessor.

Scenic surroundings for ddrums' new drum pads. They make those wonderful percussion samples playable.

Two new Sequential goodies: a digital drum machine called Tom and a velocity-sensing polysynth called MultiTrak.

German software company Jellinghaus are moving into hardware in a big way: they've got a complete editing board for the DX7, too.

Oberheim's new Matrix 12 should put them firmly back on the hi-tech music map. It's got to be the most comprehensive analogue polysynth available.

Well-endowed but surprisingly easy to use, the 9000 is now readily available after a production hiccup or two halted manufacture at the tail-end of 1984. We hope to publish a full appraisal of the unit in the near future.

Elsewhere in the upper echelons of the synth world, **PPG** have brought out an updated Waveterm with the catchy title of Waveterm B. They've added a 16-bit processor to the unit, which in practical terms means greater sample time and quality, more sequencing space, and easier-to-use software. They've put a disk drive on the Processor Keyboard, too, so you can swap samples and sequences remotely during live or studio performance.

Further details on products from two possible newcomers to this end of the market are revealed elsewhere in this issue. The Advanced Sound Generator – latest development from the **Oxford Synthesiser Company** and subject of an exclusive preview – was re-titled 'The Black Box' as the Frankfurt extravaganza wound down to its inevitable close, but quite what it'll eventually surface as remains anybody's guess. It's a good unit, though, and if all the future software updates come to fruition, nobody will be able to ignore the Oxonians with any safety.

Computer Musician Consultant Editor David Ellis mentions German company **Klangwerk** in this month's *Rumblings*, and their Audio Operator sound-sampling keyboard was drawing plenty of attention during the course of the show. Aside from some rather questionable aesthetics (*Star Trek* control panels were never quite as ugly as this), and the fact that the built-in LCD doesn't look like it's going to be all that amenable to the idea of giving all the necessary information during the editing process, the Audio Operator looks to be a well-conceived and potentially strong contender in the race to provide a reasonably cost-effective computer music system.

Moving down to Earth a bit, there was plenty of hardware innovation to be seen from those synth manufacturers who, whilst they may not turn over quite the same quantity of product as the acknowledged Big Boys, nonetheless succeed in carving out a sizeable niche for themselves in today's electronic musical instrument market.

Take **Sequential** (they've now dropped the 'Circuits' bit in an attempt to improve their electro-credibility rating) as an example. In addition to the Max preset poly reviewed in E&MM January, the company were exhibiting two new bits of music hardware. It seems Max's percussive brother is to be called Tom, as that's the name Sequential have given their new digital drum machine. Tom has eight preset digital drum voices, but programmable tuning (*à la* the Drumtraks) and a plug-in cartridge system mean that Tom users will be more than adequately served in that respect. And along with considerable programming versatility, some more up-to-the-minute styling and, naturally, full MIDI compatibility, Tom also has a unique feature called 'Human Factor', that lets you program tiny variations in level and tuning into your patterns. At last, a drum machine that makes mistakes – and all for under £900.

Sequential were also showing an upmarket analogue polysynth called the MultiTrak. Multi-timbral in the SCI tradition, the new synth has a five-octave velocity-sensing keyboard, an onboard multitrack sequencer, and a built-in stereo chorus unit to add spice to what's already a fat, healthy sound output. At least somebody's still flying the voltage-controlled flag...

Sequential's near-neighbours **Oberheim** have been having something of a quiet time of late, because although their Xpander synth module is a highly versatile beast, its prohib- ▷

itive purchase price has limited its market potential. The company's Frankfurt showing should change all that. First off, there's the XK MIDI master keyboard, a fully dynamic, weighted-key device that should be a real boon for Xpander owners wishing to take advantage of that machine's programming versatility in those areas. Then there's the Matrix 12 programmable polysynth, which is probably best described as the XK and the Xpander in combination, but whose purchase price represents a considerable saving over what Oberheim want for the modular set-up. And just to make sure nobody forgets that the company make drum machines too, they introduced a new version of the popular DX digital unit, along with an optional expander add-on called the DX Stretch, which sounds to me as though it could be mistaken for a new Elastoplast product, though clearly Oberheim themselves are perfectly happy with it.

Meanwhile, down in sunny Italy, things are also proceeding apace. **Crumar** had their Bit 01 MIDI expander on demo: six of those linked up to a Bit One poly really do sound impressive, and if UK importers Chase can keep the 01's selling price down to below the £400 mark, there'll be no shortage of takers. Mind you, the other Bit series products we were promised back in October – sequencer, sound-sampling drum machine, music computer – were nowhere to be seen, which was a pity. There's no word yet as to when these might become available, either, so I hope the R&D hitches aren't as far-reaching as some cynics might feel they have cause to suggest.

There's been no such foot-dragging over at **Siel**, however, as their tastefully hi-tech stand revealed. They've got a new budget MIDI polysynth called the DK80 (which incidentally sees the company succumbing to the economies of digital parameter selection on a synth for the first time), and an add-on expander module called, wait for it, the Expander 80. The interesting thing about the DK is that it's bitimbric, ie. it does what Sequential's multitimbral instruments do, only at a third of the power. What that means in practice is that you can split the machine's voices into two groups that can then be assigned to different halves of the dynamic keyboard (the split-point is programmable), recorded separately on the built-in two-channel sequencer, and assigned different MIDI channel numbers for improved communication to the outside world. As I've said, both the series 80 machines employ digital parameter selection, but to ease programming for synth players dissatisfied with what this system offers them, Siel's software division have come up with a couple of excellent editing programs (for Commodore 64 and Spectrum) that put all the parameters on-screen and allow all functions to be carried out using a joystick if you have one: no more menus' full of control options to memorise, in other words.

And that's not all Siel's programmers have been doing, either. If you're a Commodore owner and you're into MIDI, you'll soon be able to avail yourself of a digital delay package that does its job by applying a user-variable time

Siel have changed their livery again, from the pale blue of the earlier Operas to the grey and yellow of the new series 80 synths.

MUSIC MAKER

There's nothing funnier than seeing a load of drummers playing away to themselves on headphones, and there were people making exhibitions of themselves all over the Messe. This is the Dynacord stand.

delay between the MIDI transmit and receive signals, a MIDI database program that allows you to store voice patches from different synths under convenient family headings (a real boon for live work), and another package curiously titled 'Keyboard Multitracking', which lets you split the keyboards and vary the MIDI channel numbers of instruments that don't incorporate these facilities as part of their manufacturers' standard specification.

All in all, it would seem that the Italians are doing an excellent job in trying to prove they can produce both hardware and software to specs and prices that'll keep the Japanese on their toes. Which, when all is said and done, can only be good for the impecunious but nonetheless ambitious musician.

Don't write the nips off, though. The sleeping giant that is **Casio** may not have had all that much that was newsworthy on show at Frankfurt, but the company are making little secret of the fact that the CZ101 polysynth and its full-size keyboard variant, the CZ1000, are merely the tip of what will be a large and impressive pro music iceberg. Before 1985 is out, the company will be offering an upmarket (!) Phase Distortion poly called the CZ5000, featuring a full-size five-octave keyboard, 32 preset sounds with a similar number of memory locations for user programs, and built-in digital keyboard recorder. And if you can't manage that, Casio will be happy to supply you with a dedicated, MIDI-compatible digital sequencer by the name of SZ1, which is unremarkable in all respects except its price – under £300.

It now seems certain that the full Cosmo computer music system developed by the company for Tomita's Ars Electronica performance will never become available to the general public, but what's also certain is that the elements contained within it (music computer with sequencing and editing software, sound-sampling boards, disk drives, etc) will all be making their way into High Street music shops within a year or two. Watch out, world.

There was more, much more. Any number of interesting-looking products that may never see the light of a British day, like Kawai's new SX240 polysynth, Solton's rapidly-expanding MIDI system (it now includes polysynths, expanders, sequencers and drum machines – soon electronic drum kits, too), and a whole host of locally-brewed MIDI software packages that may not have presented anything truly revolutionary, but nevertheless had something to offer. Even more examples of that fascinating new phenomenon, the Small Black Box. Nothing whatsoever to do with OSC, this term refers to that apparently insignificant but actually rather useful MIDI-compatible unit that gives you four outputs where you previously had one/lets you change all your MIDI channel numbers/means you can control all your MIDI levels remotely. Korg have got one that provides the digital drum voices of their popular DDM series machines but leaves the controlling to an external MIDI device, thereby preventing unnecessary duplication of sequencing software; Akai have got a digital delay that introduces no signal degradation because it operates on the same MIDI principles as the Siel software package mentioned above; and Roland are about to introduce the world's first-ever MIDI-to-CV converter box, so now you can control your ageing analogue monosynth direct from a MIDI keyboard. You lucky so and so. ■

A DX Synthesizer that

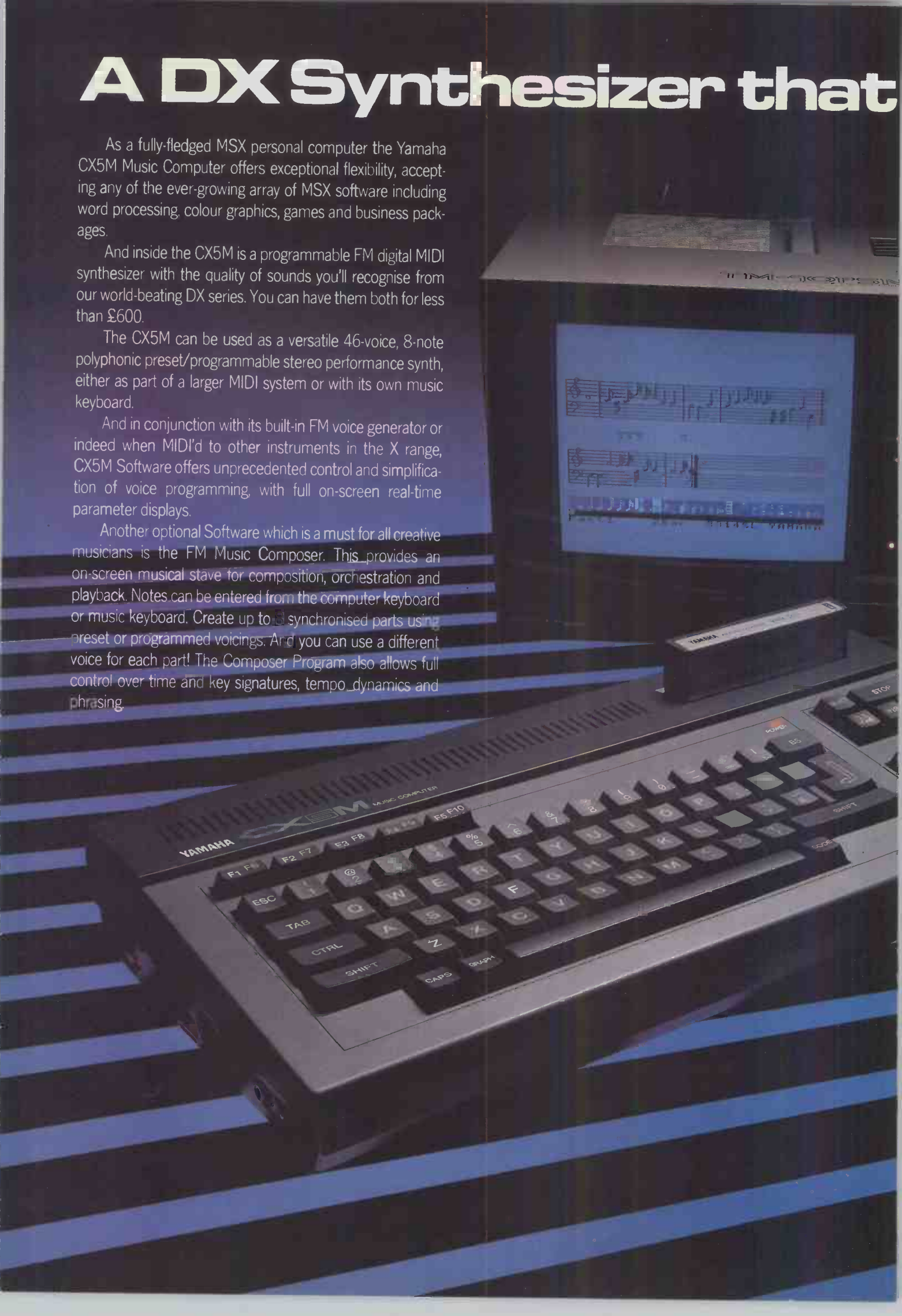
As a fully-fledged MSX personal computer the Yamaha CX5M Music Computer offers exceptional flexibility, accepting any of the ever-growing array of MSX software including word processing, colour graphics, games and business packages.

And inside the CX5M is a programmable FM digital MIDI synthesizer with the quality of sounds you'll recognise from our world-beating DX series. You can have them both for less than £600.

The CX5M can be used as a versatile 46-voice, 8-note polyphonic preset/programmable stereo performance synth, either as part of a larger MIDI system or with its own music keyboard.

And in conjunction with its built-in FM voice generator or indeed when MIDI'd to other instruments in the X range, CX5M Software offers unprecedented control and simplification of voice programming, with full on-screen real-time parameter displays.

Another optional Software which is a must for all creative musicians is the FM Music Composer. This provides an on-screen musical stave for composition, orchestration and playback. Notes can be entered from the computer keyboard or music keyboard. Create up to 8 synchronised parts using preset or programmed voicings. And you can use a different voice for each part! The Composer Program also allows full control over time and key signatures, tempo, dynamics and phrasing.

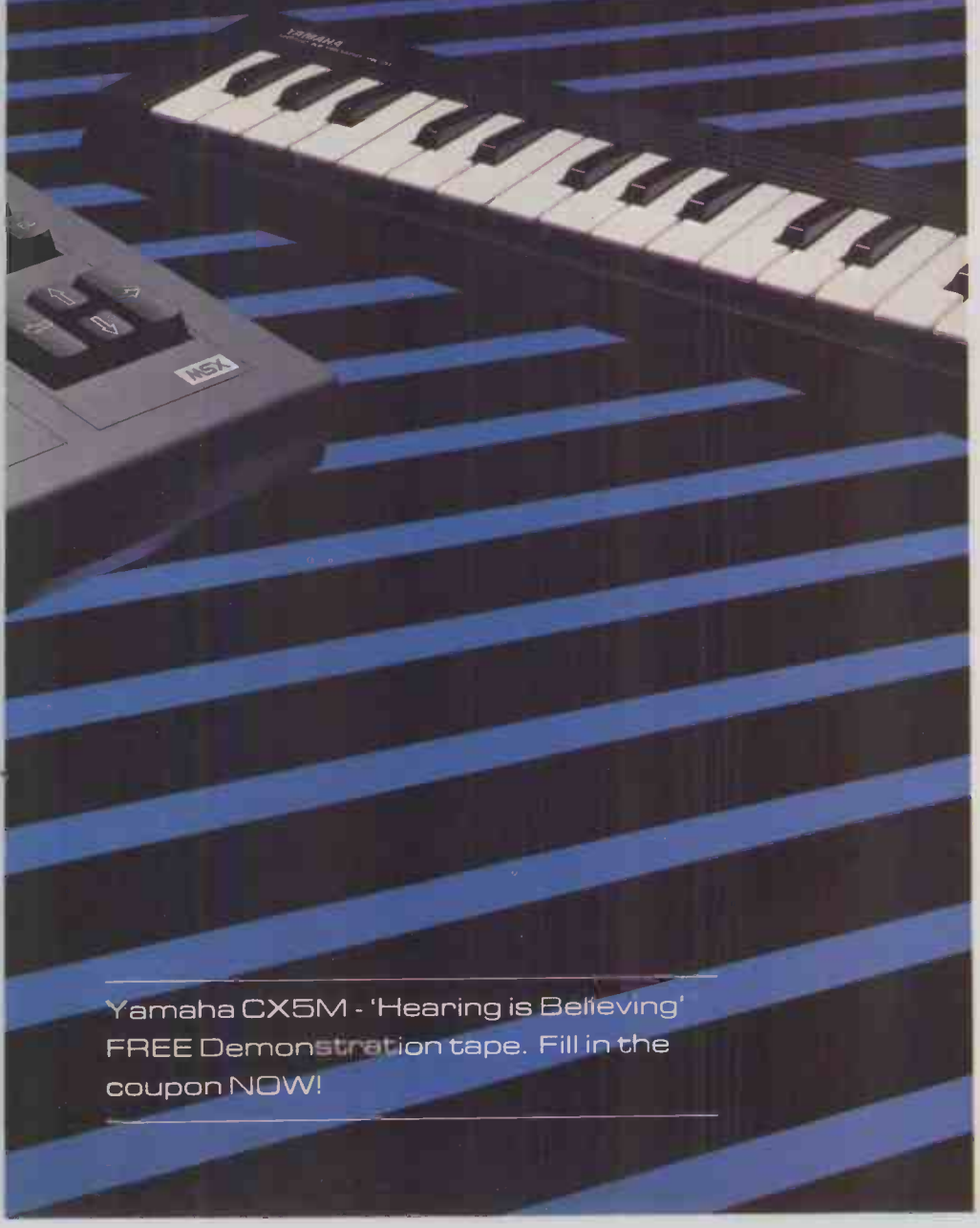


plays Aliens!

Yamaha CX5M - Outline Features

- CPU - Z80A; 32K ROM; 32K RAM; 16K VRAM
- Programmable FM voice generator (8-octave, 8-note poly)
- 8-voice multi-timbral
- Keyboard split and swap - Voice and Mono/Poly
- Real-time MIDI Sequencer
- Auto-accompaniment with rhythm
- Software ROMs - FM Music Composer
  FM Voicing Program
  DX7 Voicing Program
  FM Music Macro
  (coming soon) RX Rhythm Editor
  4-track Real Time Sequencer
- 16-colour graphics
- Price: From £534 rrp (CX5M+YK01 music keyboard*)
- YK10 music keyboard (full-size keys) also available.

Yamaha CX5M - Hearing is believing



Yamaha CX5M - 'Hearing is Believing' FREE Demonstration tape. Fill in the coupon NOW!

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Rose-Morris, 11 Denmark St, WC2
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Barnet: ESS, 230 High St.
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Bingley: JSG Music, 104 Main St.
Birmingham: Jones & Crossland, 6 Smallbrook Queensway
Musical Exchange, 89 Old Snow Hill
Blackburn: Reidy's, 9-13 Penny St.
Bournemouth: Eddie Moors Music, 679 Christchurch Rd.
Bristol: Bristol Guitar Workshop, 157 St Michael's Hill
London Rock Shop, 7 Union St.
Cambridge: Cambridge Rock, 8 Burleigh St.
Cardiff: Musicland, 148-154 North Rd.
Chelmsford: Future Music, 10 Baddow Rd.
Colchester: Axe Music, 96 High St.
Croydon: Rockbottom, 74 London Rd.
Dunfermline: Sound Control, Elgin St.
Eastbourne: Peter Bonner, 12a Grove Rd.
Edinburgh: James Grant, 53 Home St.
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Glasgow: James Grant, 404 Byres Rd, G12
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Heald Green (Cheshire): Sounds Great, 182 Wilmslow Rd.
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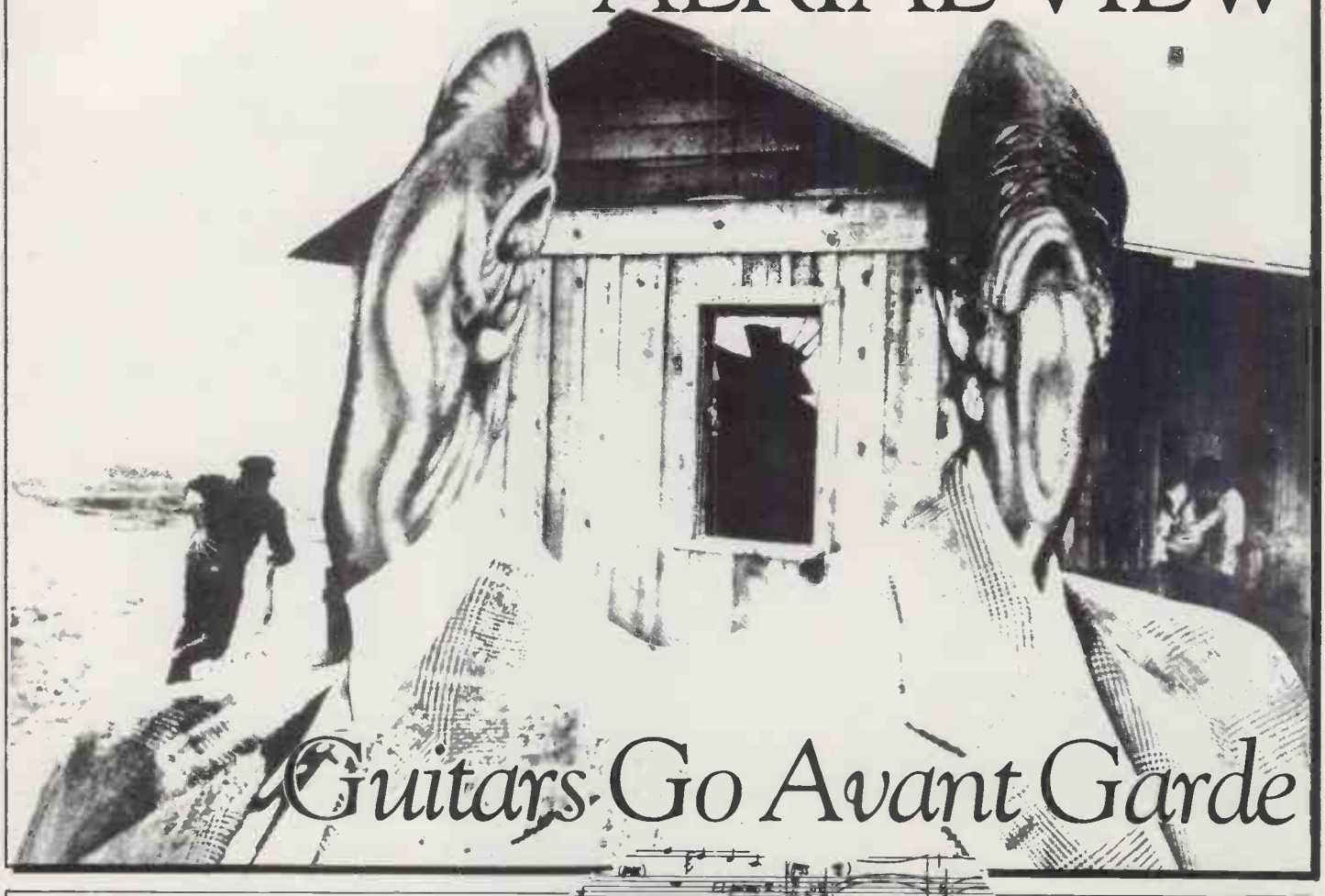
AERIAL VIEW



Guitars Go Avant Garde

Not so long ago, E&MM received an LP of avant garde guitar music from fashionable jazz label ECM. The album's title was *Safe Journey*, and the name of the guitarist, Steve Tibbetts. The recording was inventive enough to make it one of the most memorable releases of 1984, with Tibbetts' virtuoso guitar playing being augmented with liberal helpings of ethnic percussion (courtesy of one Marc Anderson) and tapes of treated acoustic and electronic sounds.

We wanted to know more about the man behind this glorious and inspiring music, and further enquiries revealed that Safe Journey is his fourth album release (two for ECM, two on his own label), that he's played a number of concerts to considerable public and critical acclaim, and that although his is far from being a household name, Tibbetts commands a healthy and loyal cult following.

In an attempt to glean yet more information, we sent a blank tape and a set of rough questions to Tibbetts at his Minneapolis home.

This is what came back.

HISTORY

'I became involved with music, as opposed to any other particular art form, because it moved me so much emotionally when I was young. I remember my father playing his guitar in the living room, and he played an E minor chord. It was really an E minor chord that brought home to me the power and intensity of acoustic guitar playing. Later on, he taught me a song by the Kingston Trio called 'Green Back Dollar', which starts out with a somewhat menacing E minor chord. I played that song, and especially its E minor introduction, over and over again in my room, until my father wanted to forcibly remove the guitar.

'When everybody started buying electric guitars, I had to have one, of course, so I badgered my father until he bought me one. Then a friend of mine sat on it so I had to buy one for myself. Now I have a twelve-string that used to be my father's, a Martin D12S. And I have a Strat that a friend of mine gave me because he thought I'd be able to make better use of it than him, plus a kalimba that I use a lot. I'm very interested in the sound of an amplifier in the throes of agony, and what happens when you jam a Stratocaster right into the speaker. I used to do that to my Music Man but the circuit boards started to fall out and the amp exploded.

'I also have a Tascam 48-8 multitrack machine, which is the nerve centre of all the apparatus, and there's a Lexicon Super Prime Time which I'll discuss later. I use that to retrieve sounds from tape or from my voice: I can then adapt them electronically by altering rhythm or pitch, and that's how I get my musical ideas.

'As for what motivated me to write music, I couldn't stop listening to the Beatles' 'Tomorrow Never Knows' at one stage, but aside from that there was a guitarist from Chicago called Harvey Mandell who used to come up to Madison and play at one stage. Basically he was the leader of a blues band, but some of his solos were absolutely mesmerising. The audience would be waiting for his lead solo during each song.

'These days, it's sounds that inspire me to write music, particularly rhythmic sounds such as windscreen wipers, lorries, heartbeats, running.

'My first record was rather an accident. I had just finished studying Art at McAllister College and was left with nothing to do for eight months except take silly courses in Economics. I heard from a friend that the Music Department had just invested in a four-track studio: I then attached myself like a leech to that particular friend, and forced him to get me into the studio. From that day onwards I spent almost all my time there – it was only a tiny cubicle, but it was Heaven

to me at the time. After about six months, I realised I was making a record. When the recording was finished, I pressed 200 copies and mutilated a few photos of American newsreaders for the cover. (See article artwork for an idea of what this looks like.) I gave one to a friend who went to San Francisco, and the next thing I heard about it was that a radio station manager there wanted me to send him some copies. There had just been too many people phoning in to ask who I was.

EVOLUTION

'The main changes that have taken place since those days are that now I work with eight tracks instead of four, and I also now work with a record company, ECM. It was extremely important to start by myself, because I could see the music gradually start to materialise on tape, and because I had to edit it, do the cover artwork, and press and distribute it myself. More musicians would benefit from doing all these things themselves instead of taking their demo tape straight to a major record company. That way, all the criticism, as well as every bit of praise, can be directed only at you. If I hadn't produced two records entirely by myself, it would have been impossible for me to work with ECM or their engineer, Manfred Eicher. I still find it enjoyable now to collaborate with other people and see how the finished product comes out 'with a midwife', as it were.

'I've done some live concerts as well as albums: I think live and recorded music have their own individual set of merits, though I do find myself wondering how on Earth I'm going to be able to reproduce my music live when so much of it depends on multitrack recording. With an audience of 500, however, you effectively have a 500-track tape recorder in front of you. There are certain things you can do live that you would never dream of doing in a studio. For instance, the sound of the nails of my thumb and forefinger clicking together sounds like a bonfire if you multiply it in volume many times: we use that to start one song on stage, but we couldn't do it in the studio. Another thing we do is to make everybody choose a pitch and start singing. You find that the crowd seems to have a mind of its own and sings at one single pitch, so that from an original 500 different pitches, everything eventually dovetails into one. There is a certain group mentality in live gigs that is impossible to reproduce in the studio.

'I do need a lot of apparatus to do it successfully, however, particularly my Prime Time. A lot of my music is based upon cyclical phrases played on the guitar that are either repeated or faded out. I mic up my acoustic guitar, feed it into a volume pedal and then into a digital delay which is set up for the middle section of 'Aerial View' from my third album, *Northern Song*. The signal is then fed into the Lexicon, and as soon as the Lexicon is repeating it correctly, I turn the Repeat Hold on.

'The usual function electronic instruments play in my music is that of adapting acoustic sounds. At the moment I'm looking after a neighbour's cat which growls at me in an extremely musical way. Having tormented this cat a little, I entered the resulting sound into the Lexicon, and every time the cat reached a certain pitch, I'd Hold it and then complete the song.

'I have a program that increases the pitch by whole tones. I always start composing by playing a riff and then building on it. Eventually I realise that the song is taking on some sort of story and I do my best to complete it, using that to hang the rest of the track onto. Afterwards, the story either dissolves or remains in the track.

'Another technique that I intend to explore is putting myself in a certain situation and discovering what music

> 'I recorded a tape loop of some lorries passing on a motorway and used it with another of some monks singing – a bizarre combination.'

results from that. I spent a month in the Grand Canyon 18 months ago: the only noises I heard during that month were the sounds of rock, water and animals. Some of the music inspired by that was wonderful. In fact, a lot of the songs on *Safe Journey* such as 'Climbing', 'Test', 'Running' and 'Vision' came out of it, so I'm now thinking of taking Marc Anderson skydiving in a few days. He doesn't know that yet, but it should be interesting to do some music about fear or skydiving.

'Going back to technology, I suppose one day I'd like to be able to step on stage without two 12-strings, an electric guitar and an acoustic six-string. It would be nice to have just one six-string controller unit that runs into something like an

> 'I'm interested in what computers can do with animation. I've seen some exciting examples of music accompanying animated images.'

Emulator and will put out 12-string, six-string and electric guitar sounds at the touch of a button. I'm sure that it will happen, but then I'm also sure that it will be too expensive for me to afford right now. I tend to get bogged down with the sheer physical work of moving my equipment, so anything that cuts down that would be welcome. On the other hand, I'm sure there must be a lot of synthesiser players with aching backs who dream about setting up a harmonica band.

'I'm very interested in what computers can do with animation. I know it takes a long time to put together, but I've seen some examples of music accompanying animated images that were very exciting. I can't wait to find out what will happen to computer imaging in a few years.

COLLABORATION

'I've worked with a number of other people, though the major collaborator has been Marc Anderson. He brings a more sexual, earthy element into our work: he pounds congas as if he's trying ▷

to put his hands through them, and I like that sort of sound. Mind you, it takes a lot of effort to transfer a sound from the instrument in the studio to somebody's speakers at home. That's why we pound twice as hard!

'The people or animals around me have a great effect on my work, like the cat I've already mentioned. And my girlfriend is another example. Not long ago she brought this nose flute into the studio and played it into the delay. She started laughing about it, so I put that laugh through the Lexicon and repeated it for about three days. It was such a manic, demonic laugh: it actually formed the basis for 'Going Somewhere' from *Safe Journey*.

'I don't think anybody composes music purely as a solo artist. It would be interesting to put somebody in a room at birth with a musical instrument and see what kind of music that person eventually writes.

'Generally speaking, I mic up my Marshall amplifier and run it through a mixer, a volume pedal, a delay and finally to a stereo amp. I'm able to take sounds generated by the amplifier and feed them into the delay, which is stereo. When I was writing 'Test' (also from *Safe Journey*), I held a high note and fed it into the delay, because once I've held the repeat, I can play over it easily. I'm able to take any acoustic instrument and alter its sound electronically, and that's basically how 'Test' came about. It was called 'Test' because air raid sirens went off during the recording, and ended up on the tape.

THE NEW ALBUM

'Climbing' is basically about the sensation of climbing for a long time and the changing scenery of the mountain around you as you ascend and eventually reach the top. I asked Marc to provide a moral to this story through playing his drums, and the way he makes the drums speak is incredible. I don't know exactly what they say, but they certainly provide a fitting close to the song. That's the sort of thing that would be really difficult to achieve on a synthesiser, I feel. 'Night Again' is a bit of fun. You hear the drone from about 300 sitars with acoustic guitars played over the top. My girlfriend bought a dog, and when she went out, she put the dog in the bathroom (it wasn't house-trained), and when I came home the dog was making absolutely pathetic noises. However, as they were also quite musical, I taped them and made a tape loop of them. That resulted in a sound which, although quite strange, was still a bit too close to the original for my liking: it was too dog-like, for want of a better expression, so I put it on to all eight tracks of my tape recorder, starting the tape at a different place on each of the tracks, which produced an absolutely unearthly sound.

'Running' took less than a day to record. Marc and I went out to a place where there were four buildings facing each other around a sort of courtyard. Marc played various percussion instruments there for the whole day, and he also brought his son Justin with him, who ran in front of my microphones on one occasion. At the time this incident passed unnoticed, but when I played back, what greeted me was a most plaintive sound of this little boy running across the grass from left to right in the stereo picture towards his father. I made a loop of this which turned out to be rather sad, because all you heard was this boy running and running without ever getting to his father. Marc was playing some woodblocks at the same time, and we used their rhythm, combined with that of the running, to form the basis of the track we wrote there and then.

'As I've said, my girlfriend's laugh formed the basis of 'Going Somewhere', but another sound I used on that track was a recording of lorries as they pass on a motorway. I've always found it terrifying when a juggernaut comes up behind you on the road and overtakes at 70 miles per hour, causing your car to be almost sucked in underneath the wheels. I found that trucks make an almost musical noise, and this I added to a tape loop of some monks singing. That's obviously a bizarre combination, and actually I think it would be nice to have a versatile overdub program written into a computer to perform just such combinations of sound samples. Sometimes I like to take a simple sound, like that of myself reading aloud or the sound of a wine glass when you rub a wet finger around the rim, and record it onto eight tracks of a tape recorder. What happens then is that I mix it down to two tracks before mixing it back up eight times to give a total of 64, and then repeat the process until I have about 250,000 tracks of the same sound over and over again. The result is that the sounds tend to reinforce or cancel themselves in very interesting patterns. It's as though you were looking at a newspaper photograph from very close to. All you can see are dots, but when you stand back, the picture resolves itself, just as when you hear only one track of speech. If I had a computer instrument and a suitable program, it would be a lot easier to go through the process I've just outlined, and probably more accurate, too.'

So who knows? Perhaps in a couple of years' time, Steve Tibbetts will be adding a music computer or two to his instrumental armoury. It would certainly be no surprise to find him dabbling on the brink of musical technology in much the same way as he's already taken the conventions of the musical avant garde and thrown them in the creative waste bin.

Not everybody will be appreciative of the precious and introspective view he has of his work, but there's no doubting his ability to create music of invention, vitality, and above all humanity, which is something few avant garde composers seem capable of at the time of writing.

If those are the sort of qualities that help you decide whether or not a particular style of music is appealing, you owe it to yourself to check Steve Tibbetts out. ■

BE A TRAK STAR!

Keep your music on the "right track" with the new Multi-Trak, TOM and MAX from Sequential!

THE AMAZING NEW MULTI-TRAK!

Take a look at Sequential's new Multi-Trak! Features include a 5 octave velocity-sensitive keyboard for controlling loudness, brightness or modulation. A powerful built-in digital recorder lets you record up to 1600 notes and provides 4 independent sequence locations, an audible metronome, 5 different resolutions of auto-correction, sequence appending and the ability to erase your recorded music by track or by single note. To facilitate your recording needs, each sequence track has its own audio output.

Unique to the Multi-Trak is its polyphonic "SuperStack" mode. "SuperStack" lets you layer two, three, or six sounds and play them "live" from the keyboard! Also featured are a stereo chorus with programmable On/Off and adjustable rate and depth, a cassette interface for program and sequence storage, and a latching arpeggiator with transposition at the touch of a key.

MAX: THE ULTIMATE MIDI EXPANDER!

MAX is a 6-voice, polyphonic synthesizer designed to let you play six completely different instrument sounds at one time. And MAX's comprehensive MIDI implementation makes it the ultimate MIDI expander!

TOM: A UNIQUE NEW DRUM MACHINE

Like all Sequential drum machines, TOM features programmable tuning *and* volume. TOM adds to these features unique new capabilities like programmable stereo pan for each instrument and the ability to play sounds in reverse! Other features include a programmable "Human Factor" to add subtle variances to instrument tuning and volume levels during playback. And there's a new feature called "Improv", that subtly alters your rhythm patterns with the automatic introduction of occassional "fills". These exciting features let TOM more exactly mimic a "live" drummer! TOM comes with 8 digitally recorded percussion instrument sounds. A cartridge port is provided for easy sound expansion!

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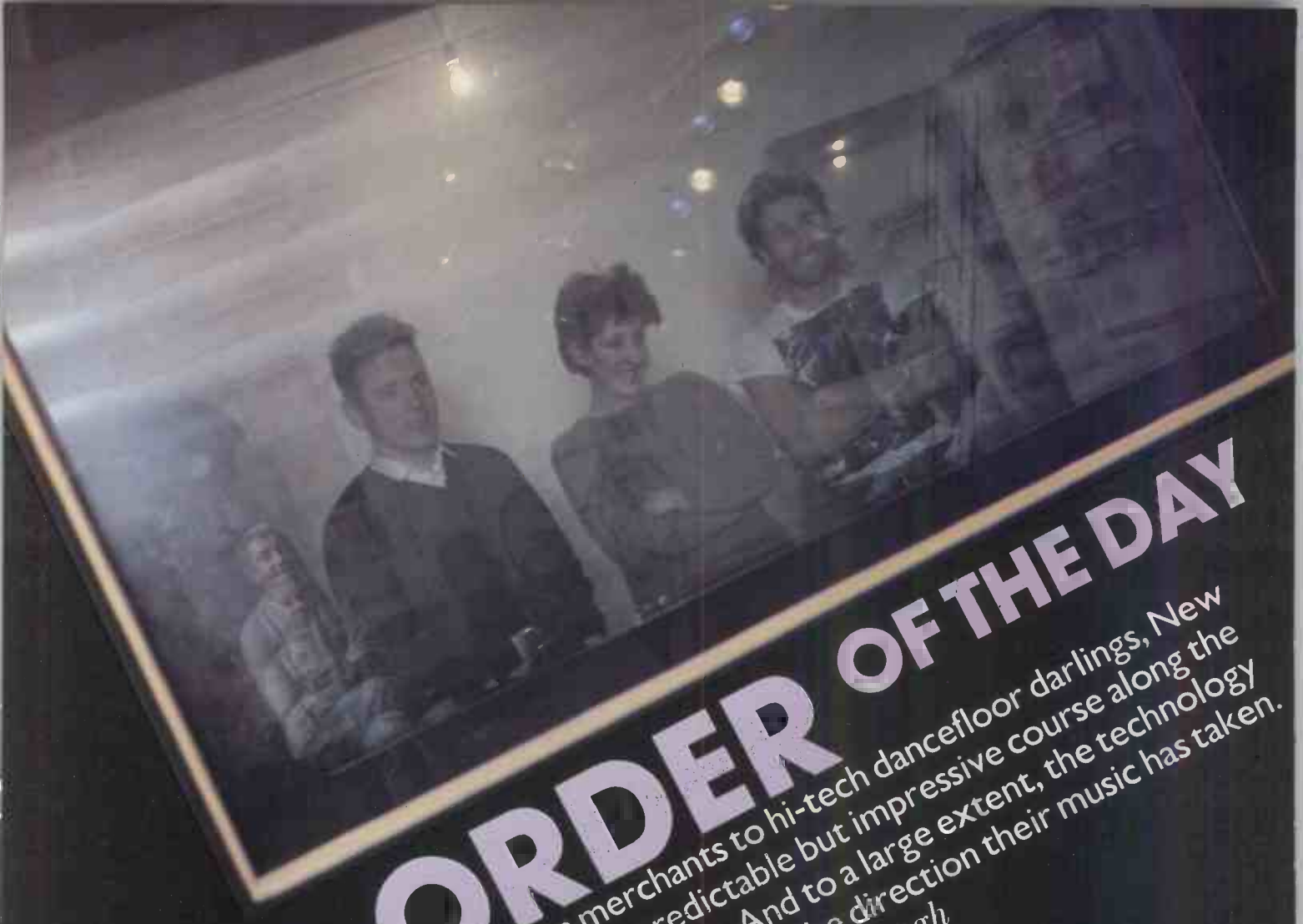

ORDER OF THE DAY

From post-punk doom merchants to hi-tech dancefloor darlings, New Order have charted an unpredictable but impressive course along the fringes of recent popular music. And to a large extent, the technology available to the band has influenced the direction their music has taken.

Matthew Vosburgh

Whenever I'm asked to leave my photographic ivory tower and actually *write* an interview, it's normally due to a major international disaster incapacitating the rest of the staff, such as a World War being declared or a Music Fair being allowed to take place in deepest Germany. Propelled by the latter eventuality, I set off for Manchester in search of one of the most gifted and inventive bands making music today.

To stand a chance of really getting to grips with New Order, you've first got to look at the band they evolved from – Joy Division. Now they were something: a group of little compromise whose music was bleak without ever running the risk of becoming colourless. Theirs was certainly an unusual sound for the time (1978/9), but it was also an influential one. Hundreds have since sought to imitate the mixture of Steve Morris' dynamic but always competently-played drums, Peter Hook's compelling bass playing (often on a six-string bass), and Barney Albrecht's imaginatively-treated guitar and keyboards. But it was singer Ian Curtis' warm yet forbidding vocal delivery that really made the band. It was the sort of voice you either loved or hated: the sort that could make you want to hurl the record through a window or, in extreme cases, hurl yourself along with it.

Their first album, *Unknown Pleasure* (on Factory, the Manchester independent label the band are still with), firmly established Joy Division's reputation. It was an album that somehow managed to channel the aggression of the time into music of dark and sinister beauty, music that has stood the test of time better than almost anything else from that period. Their second album, *Closer*, released in the Spring of 1980, saw the band trying to vary that beauty by blending in an increased electronics content. The policy undoubtedly worked, so it came as something of a surprise to learn that it was all done with relatively unsophisticated equipment.

Barney – 'The keyboards on *Closer* were basically a Sequential Circuits Pro One, a Powertran Transcendent 2000 and an ARP Omni – in fact, mostly the Omni.'

(For the uninitiated, the last-mentioned was a low-priced polyphonic ensemble that allowed the sounds from its synth and strings sections to be mixed and layered.)

'The Omni was good, but you had to process it, like we used to put it through a graphic equaliser and then split the bands up. We used to put it through a Marshall Time Modulator as well, to get that '78 record' effect: you know, sort of speeding up and slowing down the way a Mellotron does.'

That album also featured quite a lot of electronic percussion. Barney again – 'On parts of *Closer*, on 'Decades' for instance, there are percussion sounds from an ARP 2600 being run from an ARP sequencer – electronic bass drum sounds and stuff. In those days, you couldn't get any sort of programmable drum machine.'

Steve – 'Yes you could. You could get that Roland CR78 Compurhythm. You had to hit this tiny pad when the little red light came on. It was *supposed* to be programmable, even though you'd have no idea what the results would turn out like.'

And it seems *Closer* also featured an early product from someone who's now rather better known, as Steve reveals. 'I used a Simmons SDS2 on that album, for things like the snare sound on 'Isolation'. That's also what I used for the explosion sound on 'In A Lonely Place' (B-side to the first New Order single, 'Ceremony', released the following year). It was a great unit that, really well built. I think the more technically advanced Dave Simmons becomes, the worse his products get. We once left that SDS2 in a car park overnight and it still worked! I remember once when two knobs broke off it, and still it carried on working. With so much gear nowadays, you've only got to have one little thing go wrong and the whole lot breaks down. Maybe we should go back to the old days, when all you needed was a PP9 and you were it.'

Production

Yet no matter how much the individual musicians within Joy Division strove to improve and vary their sound, the role played by

house producer Martin Hannet remained crucial. His style revolved around liberal and uninhibited use of outboard effects – analogue and digital delays, compressor/limiters, and above all, real and artificial reverb. The net result was a moody, atmospheric sound that has ended up influencing an awful lot of people (listen to any John Peel show). The band's manager, Rob Gretton, agrees with that sentiment: 'I think a lot of people ripped off Martin Hannet's sound, because it was certainly the forerunner of a lot of what production is about today.

'Most people in those days were recording drums as if they were being played with a wet fish. When he was working with us, Martin Hannet began to realise that it was possible to give a *modern* band a highly-produced sound, and it made all the difference.'

Even so, the band maintain that their relationship with Hannet was two-way: they might have learnt from him, but they gave him plenty of their own ideas in return. And it's certainly true that it was the Joy Division albums that launched Hannet's lucrative production career.

Sadly, and as the world and his wife are probably already aware, Ian Curtis committed suicide shortly after finishing *Closer*, and suddenly Joy Division were no more. Albrecht, Hook and Morris eventually added keyboard player and guitarist Gillian and reformed as New Order, Barney Albrecht taking over the vocals. After a not unexpected period of uncertainty, they proved the value of this line-up with 'Ceremony', a stunning record that had everything latter-day Joy Division possessed but succeeded in packaging it in a more accessible fashion. Things were looking up once more, but the band suffered a further setback during their first visit to New York...

Hook – 'We had to go through a strange metamorphosis because we had all our gear stolen, every single piece of it. We weren't insured either. We just had to go out and buy new stuff, and all the stuff we bought was a lot more expensive and a lot more technically advanced.' Barney – 'To replace the Omni we bought an ARP Quadra. That had four sections: a lead synth, a string synth, a bass synth and a so-called polyphonic synth. Basically though, the string synth was good, the lead synth was reasonable, and the other two were shit. One thing we used to do with that was to pulse the different sections with a Boss Dr Rhythm, so that you could have a pulsing sequencer-type pattern going and then mix in the strings underneath it. We used that effect on the two subsequent singles, 'Everything's Gone Green' and 'Temptation'.

> 'We used to pulse the different sections of the ARP Quadra with a Boss Dr Rhythm, so that you could set up sequencer-type pattterns and mix the strings section in underneath.'

'About the same time we got a Moog Source, a programmable monophonic that's good for bass lines. We stayed with that keyboard set-up for quite a while until we decided that we wanted a proper sequencer, and when that happened, I built a Powertran 1024 from a kit. This boffin we know, Martin Usher, showed me how to modify it so we could put a drum machine clock into it. He also showed me how to triple the memory to over 3000 notes by adding extra RAM chips and a bank selector: he designed the circuit and I built it – it was quite easy really. It was a good sequencer to use, that, really easy to program, but it became unreliable live, breaking down and going out of tune. But we carried on doing a lot of recording with it, using it to drive the Source – that's how the bass line on 'Blue Monday' was done.'

Hardware

Ah, 'Blue Monday'. That was the song that really put New Order on the map as far as pop music history was concerned. John Peel described it as 'Pink Floyd go disco' the first time he played it, but its driving dancefloor beat, instantly memorable melody and classic electronic arrangement made it an international hit ▷

almost overnight. Not bad for a single that received no promotion whatsoever, came only in 12" format, and didn't even have its name (or that of the band) printed anywhere on its sleeve. Produced by New Order themselves, 'Blue Monday' was a reaction against the worst excesses of Martin Hannet's production eccentricity, which is why it sounds so clean and unadulterated to many followers of the band's music.

Barney – 'On the hardware front, the Source was starting to break down a lot at that time, so we solved the whole problem by getting a Sequential Circuits PolySequencer and a Prophet Five... which broke down!

'The trouble with the PolySequencer is that it's hard to program, and it's also awkward live. You see, it uses those mini data cassettes, and we used to spend whole gigs swapping cassettes and waiting for them to load. In the end we got another PolySequencer and another Prophet – that made things a bit better.'

The Sequential set-up is on 'Blue Monday' as well, playing the quieter, background bass line, and that record also saw the debut of the band's new drum machine (an Oberheim DMX) and a prominent appearance by their recently-acquired Emulator. And yes, you've guessed it, both these hi-tech pieces of equipment have given the band problems live...

Hook – 'We did a gig in Glasgow last night where the keyboard roadie tripped up on the power lead to the DMX and it re-wrote all its programs. We didn't find out until we started playing the songs, live! In some ways it was very interesting: five songs in the set were wrong, and we had to keep stopping and starting...and improvising.

'We do have a lot of trouble with our DMXs: they seem very prone to losing their memory, especially if you're using an external sync.'

Barney – 'We've been told that there's a circuit in the DMX that's designed to work off 60Hz. Apparently in England at 240V it can just about cope, but if you take the machine to Europe and try and use 220 volts, it can't handle it. We had to transform all the power up to 240 to make it work properly.'

Steve – 'Before we got the last software update on the DMX, what was happening with the 60Hz problem was that you had to be very careful when you switched it off. If you turned it off at the wrong phase it'd scramble the memory. Since we got the new lot of software, the only problem is that it just goes mad every now and then.'

> 'The Voyetras never break down. They're the main synthesisers we actually *play* live: the Prophets are just there to run the sequences'

At this point, Peter Hook spices things up with a further comment. 'We spend half our gigs hitting the Emulator with a hammer! You see, sometimes you get it out of the case and it won't load the disk – we've found out that if you hit it on the leg with a hammer, then it *will* load.' (Note – E&MM cannot accept responsibility for the consequences if you do this to *your* Emulator. You have been warned.)

It seems that if it's hi-tech and New Order buy it, it'll pack up on them at some stage, and if it does there'll be the first ones to want to talk about it. Apparently, there have been just two notable exceptions of late.

Barney – 'We've got two of those little rack-mounted, eight-voice polyphonic synths called Voyetras – they *never* break down. They replaced the ARP Quadra (the switches started going on that), because you can pulse the

Voyetras in the same way that we used to pulse the ARP, so they're a really good replacement. They're the main synthesisers that we actually *play* live: the Prophets are just there to run sequences.'

How ironic, then, that the only equipment that hasn't let the band down should be from a small and largely unknown company, New York-based Octave-Plateau.

Computers

There was talk, not all that long ago, that the band were paying their aforementioned boffin to build them a sophisticated sequencer based around an Osborne twin disk drive portable computer, running special software he was going to write for them in FORTH. This, they said, would solve all their sequencing problems, past, present and future. Unfortunately, the system was never built.

With Usher 'brain-drained' to California where he's now working alongside most of the rest of Britain's talented computer music engineers, New Order are going to have to enter an entirely new field if they want their operational dreams to become reality.

Barney – 'We're at a turning point now where we will be updating it all. You see, the Prophets are too unreliable, the sequencers too difficult to program, and the DMX too fragile, so what we're going to do is get either a Fairlight or a Synclavier when the new models come out. In the meantime we might get a MIDI system based around a Yamaha QX1 sequencer, but eventually it's got to be a Fairlight or a Synclavier.'

Hook – 'The trouble with the gear we've got at the moment is that you've got to physically connect it all together. We think that if we get *one* instrument that does everything, then there's no reason why it shouldn't be perfectly reliable. Specially if we get two so that we've always got a spare!'

Barney – 'At the moment we can't decide which one to get. The new Fairlight's going to be 16-voice and the new Synclavier 32-voice, but that's not the whole story. I think we'll have to hire them both for a while, because we're spending a lot of money, and with instruments like that, it's only when you've had them for a couple of weeks that you begin to know where their shortfalls lie.'

Records

In addition to the crop of singles that led up to the release of 'Blue Monday', New Order have come up with two long-players entitled *Movement* and *Power, Corruption and Lies*, with a third on its way in the very near future. And perhaps not surprisingly, the biggest surface difference between the two lies in their production, as the first is the result of a group-Hannet collaboration, while the second – which came out in the summer of '83 – is an entirely group endeavour. The band have since worked with New York dancefloor king Arthur Baker, who had a huge influence over the creation of the TR808-based 'Confusion' 12" single, and a slightly smaller one on the production of its follow-up, 'Thieves Like Us'.

It seemed a good idea to ask New Order which method of working they preferred – taking orders from above or shouldering all the responsibility themselves.

Barney – 'Sometimes it's a real pain producing yourself. It's a lot more work, and as well I think you can miss the spontaneity that you get from working with someone else. I think that it works better in the end, though, purely for the reason that it's us who write the songs in the first place, and when you write a song you *know* how you want it to sound. With Joy Division sometimes, we'd listen to the record afterwards and it would sound like someone else, totally alien. If you do it all yourself, the final product is much closer to your original conception.' ■

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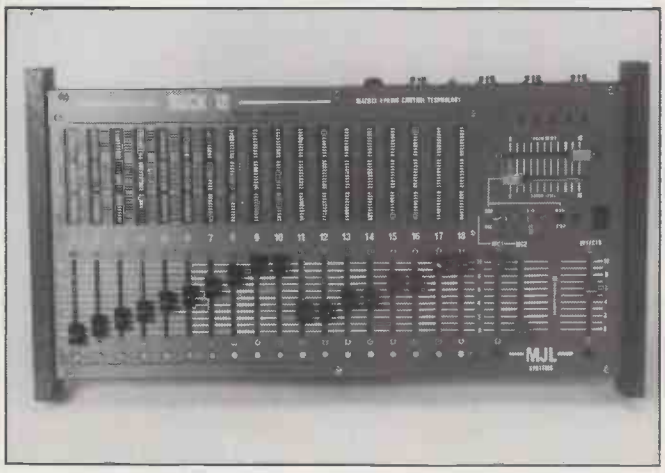

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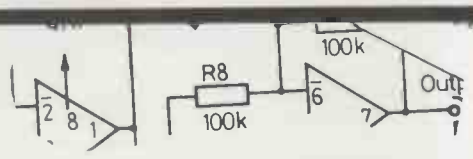


Digisound Voice Card

PART TWO

We conclude our coverage of this synth module project with some calibration details, a control voltage chart and a full parts list.

Charles Blakey, Simon Bailey & Pete Blakey

Calibration has been kept to a minimum by the use of specialised ICs, and for a design of this complexity it's a relatively straightforward procedure. Trimming of the required functions is by way of eight multiturn presets (three for each of the oscillators and two for the single low pass filter), with all other circuit blocks requiring no calibration whatsoever. In fact, the procedure for calibration can be separated into two distinct types of adjustment. The first is the adjustment of a convenient starting frequency (pitch of the VCOs and cutoff frequency of the VCF), while the second is calibration of the response of the VCOs and VCF to an incoming keyboard control voltage, ie. the relationship between control voltage and frequency.

Taking VCO1 first, RV19 has to be adjusted to provide a convenient starting pitch for the oscillator. This is to some degree a matter of personal taste, but we suggest adjusting this preset so that with no input voltages, the oscillator is tuned to the lowest frequency of a four-octave keyboard, ie. 65.406Hz (assuming yours is a C- to -C keyboard). For VCO2, it's recommended that the initial frequency is set the same as for VCO1 so that the frequency potentiometers behave in a similar manner. However, such a starting frequency is too high for modulation purposes, and you may find it desirable to wire the switch on the exponential modulation control input socket (J9) to −5V. In this way, VCO2 will operate five octaves below VCO1 until the insertion of a jack plug into this socket. Alternatively, RV22 may be set to a frequency suitable for a compromise performance as both an audio and modulation oscillator (ie. between three and five octaves below that of VCO1).

In order to perform the calibration of initial frequency it's necessary to hear (or see) the oscillators. This is achieved by selecting any waveform and allowing VCO signals to pass to the output sockets (ie. provide a constant gate, and turn VCO level, VCF frequency and ADSR sustain controls fully clockwise, while all the other controls are fully anticlockwise).

The next step is to adjust both oscillators so that they accurately track an incoming keyboard control voltage, normally one that follows a one volt per octave relationship. For this, both oscillators are calibrated identically, except that once VCO1 is calibrated, it may prove simplest to calibrate VCO2 using VCO1 as a reference oscillator. There are a number of ways of achieving this one volt per octave scaling. One is to use a previously calibrated oscillator (as above) and make the calibration using the beat frequency technique. Another approach is to employ two stable fixed-frequency oscillators and use them in conjunction with an oscilloscope to generate Lissajous figures. Whichever method is chosen, a calibrated voltage source (from a keyboard, for example) and an accurate voltmeter or oscilloscope will greatly simplify the process. You can now proceed with calibration by first grounding RV21 (RV24 for VCO2) such that pin 7 of the CEM 3340 is at 0V, and applying a positive control voltage to the keyboard CV input. This voltage is increased until a frequency of about 200Hz is produced by the oscillator. Next, increase this voltage by one volt (as accurately as you can) and adjust RV20 (RV23 for VCO2) until the frequency is exactly double that of the initial frequency. This step should be repeated several times in order to achieve an exact doubling of frequency per volt applied, and we recommend that the incoming control voltage be varied such that the calibration is carried out in the general range of between 150 and 500Hz.

This procedure should now be repeated using an initial frequency of about 5kHz (ie. increase the calibration voltage by between four and five volts) and adjusting RV21 (RV24 for VCO2) until a doubling of frequency is obtained when the applied voltage is increased by exactly one volt. This is basically the same technique as used for calibrating RV20/RV23, except that it's at a frequency four to five octaves higher. This is the previously mentioned high frequency track adjustment, and is only possible after accurate calibration of RV20/RV23. Once the RV21/RV24 calibration has been carried out, recheck the low frequency calibration and observe that the VCOs now track correctly over the entire audio range. Both adjustments of the presets should be repeated after the voice card has been powered ▷

up for several hours.

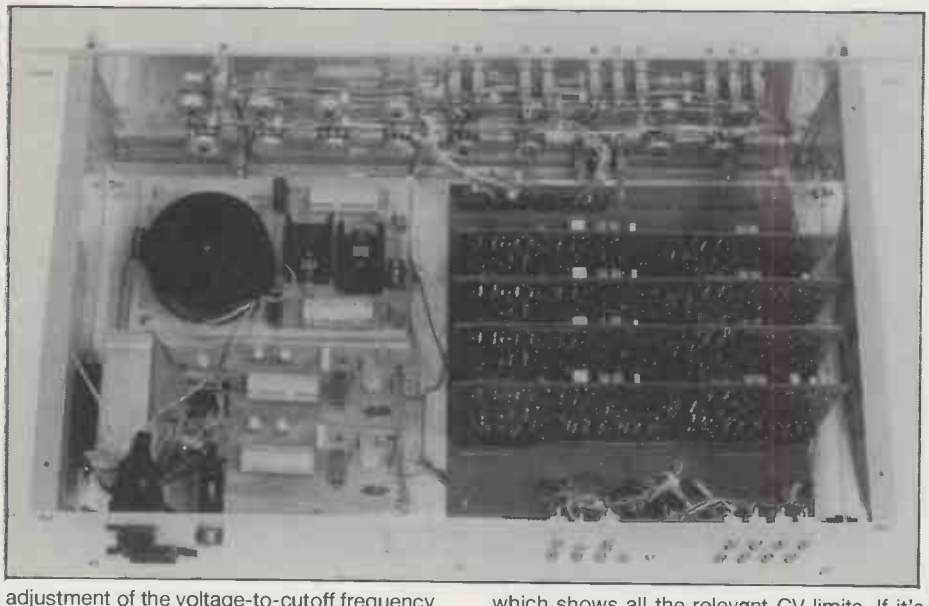
Once RV20, RV21, RV23 and RV24 have been properly adjusted, both oscillators have been accurately calibrated for an incoming keyboard control voltage. Other inputs will behave in a very similar manner, but may be less accurate due to resistor tolerances. It's now necessary to repeat the adjustment of the initial frequency (as previously described, *via* RV19 and RV22) since adjustment of the keyboard tracking presets will have altered the preset starting frequency.

The final stages of calibration involve similar techniques but relate instead to the voltage controlled filter. In this case, RV25 will set an initial cutoff frequency and RV26 allows adjustment of the voltage-to-cutoff frequency scale. Calibration is best achieved by allowing the filter to oscillate: adjustment may then be performed in a similar manner to that of a VCO. Sustained oscillation can be maintained by setting RV8 fully clockwise and adjusting RV7 so that the frequency of oscillation is within the audio range. (Note that if you want to hear the filter oscillate, both envelope generators must be constantly gated on, with ADSR sustain controls fully clockwise.)Once the sound of the oscillating filter has been identified, connect a variable voltage source or previously calibrated keyboard to J7. It should now be possible to hear the frequency of oscillation vary with a change in voltage at J7. Calibration may now proceed by adjustment of RV26 in the same way as for the VCOs, but it's recommended that for adjustment of tracking, the beat frequency method be employed using one or both of the previously calibrated VCOs. If you do follow this procedure, it's preferable to compare similar-sounding waveforms: this is possible if you use triangle wave outputs. And once the VCF has been adjusted so that the cutoff frequency changes at one volt per octave, the initial frequency can be established by adjustment of RV25.

In Use

The primary use of a synthesiser voice card is fairly obvious, as with the addition of a noise source and keyboard circuitry, it offers the user a complete analogue synthesiser system. However, it's anticipated that many users will wish to process the audio signal further using other modules with, for example, the addition of external LFOs, ADSRs, and so on. This is easily achieved with reference to Table 1, which shows all the relevant CV limits. If it's envisaged that connections to +10V outputs will be made frequently, it may be a good idea to construct a potential divider on the relevant input jack sockets. This is done using two 47K resistors joined together at one end. One free end is connected to the jack socket, the other free end to 0V, and the join of the two resistors to the PCB input. ■

External and internal views of a custom-built synth unit employing four Voice Cards in its design.



Voice Card Parts List

Resistors (5%, ¼W carbon film)

R7,11,26,30	470R
R17,34	470K
R18,36	620K
R19,22,40	10K
R20,38	270K
R21,39,55,61,62,63	47K
R35,64,65	100K
R37	130K
R42,43,54,56	1K
R52	24K
R53	27K
R57,59	30K
R58,60	20K
R69,73	5k6
R70,74	56R
R89–104 (16 off)	4K7

Resistors (1%, ¼W metal film, 100ppm)

R1,2,3,4,5,6,23,24,25	100K
R8,27	200K
R9,29	1M5
R10,12,15,28,33	1M
R13,31	5k6
R14,32	24K
R16,41	1K8
R44,45,46,47,48,49,50,66	56K
R51	910R
R75,82	27K

Other Resistors

R67,68,71,72	100K SIL, 4 individual (1 off)
R76,78,80,83,85,87	10K SIL, 7 commoned (2 off)
R77,79,81,84,86,88	470R SIL, 7 commoned (2 off)

Capacitors

C1,3,7,8,25	10n polyester
C2,5,10,32–45 (17 off)	100n polyester
C4,9	1n 1% polystyrene
C6	220p ceramic
C11	330p polycarbonate
C12,13,14,24,27	33n polycarbonate
C15,16,22	2n2 polypropylene
C17,18	1u PCB electrolytic
C19	1n polypropylene
C20,21	2u2 PCB electrolytic
C23	4n7 polyester
C26,28	22n polyester
C29,30,31	1u tantalum bead

Presets

RV19,22	100K horizontal multiturn
RV20,23	10K horizontal multiturn
RV21,24	10K min. multiturn, side adj.
RV25	50K min. multiturn, side adj.
RV26	500R min. multiturn, side adj.

Semiconductors

IC1,2	CEM3340
IC3	CEM 3372
IC4	CEM 3360
IC5,6	CEM 3310
IC7	TL 084
IC8	TL 072
IC9	LM 1458
IC10,11,12,13	4016B
TR1,2,3	BC 212L

8-pin DIL sockets	2
14-pin DIL sockets	6
16-pin DIL sockets	4
18-pin DIL sockets	1
Track Pins	200

Pots, Switches

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RV1-18	10K lin. rotary
S1-16	SPDT sub. min. toggle

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SH101 Monosynth
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JSQ60 Sequencer for Juno 60
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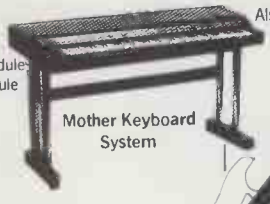
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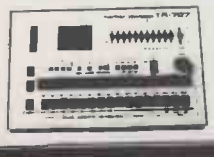

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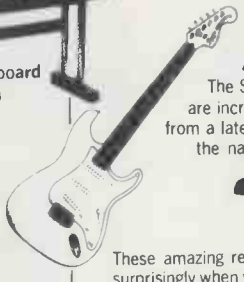

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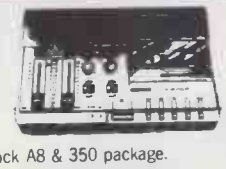

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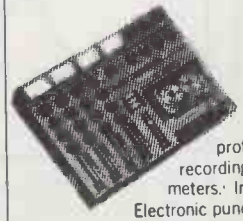

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+15V	Power supply input – to +15V rail of PSU	
J19	Noise/Audio input	
J1	VCO 1 Pitch bend/ Frequency control	(−5V – +5V)
J7	Keyboard control voltage input	(−5V – +5V)
N/C	Reserved for future expansion	
N/C		
N/C		
J20	Audio output	
0V	Ground connections – to panel and to 0V rail of PSU	
−15V	Power supply input – to −15V rail of PSU	
N/C	Reserved for future expansion	
N/C	Reserved for future expansion	
N/C	Reserved for future expansion	
J16	Gate input for ADSR 1 & 2	
N/C	Reserved for future expansion	
−5V	Power supply input – to −5V rail of PSU	
N/C	Reserved for future expansion	
N/C	Reserved for future expansion	
J14	VCF Cut-off frequency CV input	(−5V – +5V)
J4	VCO 1 Linear frequency CV input	(−5V – +5V)
J3	VCO 1 Exponential frequency CV input	(−5V – +5V)
J2	VCO 1 Frequency CV input to RV1	(0V – +5V)
J5	VCO 1 Pulse width modulation CV input to RV2	(0V – +5V)
J11	VCO 2 Pulse width modulation CV input to RV5	(0V – +5V)
RV7	VCF Cut-off frequency control potentiometer	(−5V – +5V)
J8	VCO 2 Frequency CV input to RV4	(0v – +5V)
J9	VCO 2 Exponential frequency CV input	(−5V – +5V)
J10	VCO 2 Linear frequency CV input	(−5V – +5V)
RV15	ADSR 2 Sustain CV input	(0V – +5V)
RV14	ADSR 2 Decay CV input	(0V – −5V)
RV16	ADSR 2 Release CV input	(0V – −5V)
RV13	ADSR 2 Attack CV input	(0V – −5V)
RV11	ADSR 1 Sustain CV input	(0V – +5V)
RV10	ADSR 1 Decay CV input	(0V – −5V)
RV12	ADSR 1 Release CV input	(0V – −5V)
RV9	ADSR 1 Attack CV input	(0V – −5V)
J17	ADSR Modulation (VCA 4) depth CV input	(0V – +5V)
J18	VCO 2 Modulation (VCA 3) depth CV input	(0V – +5V)
N/C		
VREF	Voltage reference for VCOs 1 & 2 – to +15V rail of PSU	
J6	VCO 1 Output level (VCA 1) CV input	(0V – +5V)
J12	VCO 2 Output level (VCA 2) CV input	(0V – +5V)
J15	VCF Resonance/"Q" CV input	(0V – +5V)
J13	VCF Cut-off frequency CV input	(−5V – +5V)
S11	Keyboard CV track VCF cut-off frequency	
S16	Keyboard CV track ADSR 2 time constants (inv. function)	
S3	ADSR 2 Output to VCO 1 frequency control input	
S12	VCO 2 Modulate VCF cut-off frequency	
S14	ADSR 2 Inverted output to VCF cut-off frequency	
S13	ADSR 2 Output to VCF cut-off frequency	
S4	Select VCO 1 sawtooth output to VCA 1	
S7	Synchronise VCO 1 to VCO 2	
S1	VCO 2 Output to exp. frequency control input of VCO 1	
S8	Select VCO 2 sawtooth output to VCA 2 & 3	
S2	VCO 2 Output to lin. frequency control input of VCO 1	
S9	Select VCO 2 pulse output to VCA 2 & 3	
S6	Select VCO 1 triangle output to VCA 1	
S10	Select VCO 2 triangle output to VCA 2 & 3	
S5	Select VCO 1 pulse output to VCA 1	
S15	Keyboard CV track ADSR 1 time constants (inv. function)	

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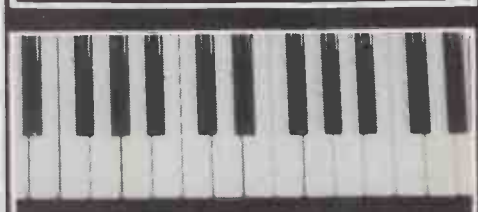

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BACK TO BASICS

Another not-to-be missed instalment in our series for the complete newcomer to synths. *Steve Howell*

Last month we saw how the Voltage Controlled Oscillators (VCOs) on an analogue synth generate a variety of waveforms at a pitch determined by the incoming voltage. Whilst this undoubtedly gives synth players a lot of tones to play around with, it's more or less essential that there's also some way of modifying the harmonics in these waveforms a bit further. Enter the Voltage Controlled Filter...

The VCF is really nothing more than a vicious tone control that lets you subtract harmonics from the 'raw' waveforms being fed into it. You'll probably remember that the reason different waveforms sound different lies in the fact that they have varying harmonic structures. For instance, a sawtooth waveform sounds bright and brassy because it has a generous helping of odd and even harmonics, while a square wave sounds hollower because it has only odd harmonics. On most analogue synthesisers, you'll find a voltage controlled lowpass filter whose job it is to subtract upper harmonics but whilst allowing the lower ones to pass through unaffected (hence the name).

Having said that, what does all this filtering actually sound like? Well, as the harmonics are removed, the sound output gradually becomes duller and more mellow. A quick glance over at Figure 1 will reveal a spectragraph: what it shows is a sawtooth wave with the response of a lowpass filter superimposed on top of it. The shaded area represents the sound that will actually be heard – all the harmonics above the cutoff point will be attenuated, or for the more sadistically-inclined, cut off. Most filters have a control by the name of Cutoff Frequency, which lets you move that point to wherever your fancy takes you which, in turn, means you can tailor the resulting sound to your exact requirements.

Cutoff Frequency

Let me explain. Figure 2 shows a block diagram of a typical VCF, and with luck, the more astute amongst you will note that this is not all that dissimilar from the block diagram of a typical VCO we printed last month. The only difference is that, because it's a processor, it has audio inputs as well as control inputs. It also has a summing amplifier to add a collection of incoming voltages: one of these is derived from a DC source, and it's this that sets the cutoff frequency shown in Figure 1. The other inputs are usually connected to controllers such as the low frequency oscillator, the keyboard and the envelope generators, a piece of operational versatility that allows for a variety of filter sweep effects.

You'll remember that last month we saw the effect a slowly rising and falling voltage has on a VCO. Apply that same voltage to the VCF, and you'll be able to sweep the cutoff point back and forth automatically in accordance with the level of the incoming voltage. What this means is that as the voltage increases, the cutoff point will do likewise, allowing more harmonics through. Similarly, the cutoff frequency will fall 'in sync' with the drop in voltage, and the sound will become gradually more mellow as the harmonics are attenuated.

Figure 1. The effect of a lowpass filter on a sawtooth waveform. The shaded area represents what we actually hear.

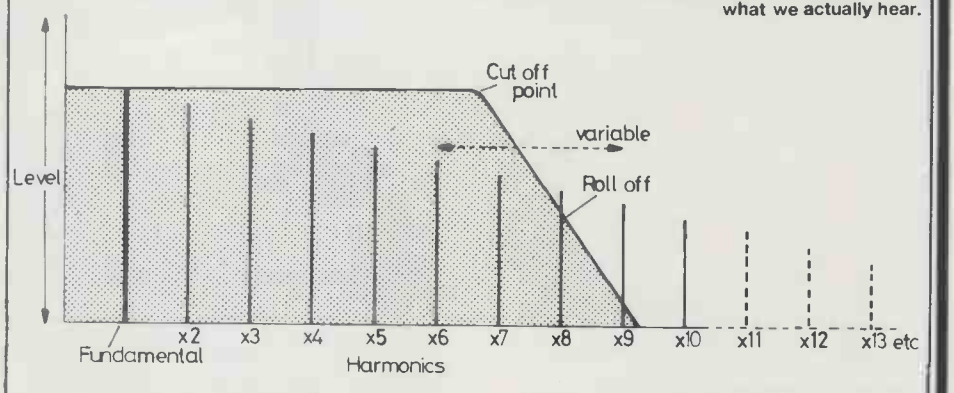


Figure 2. Block diagram of a typical VCF.

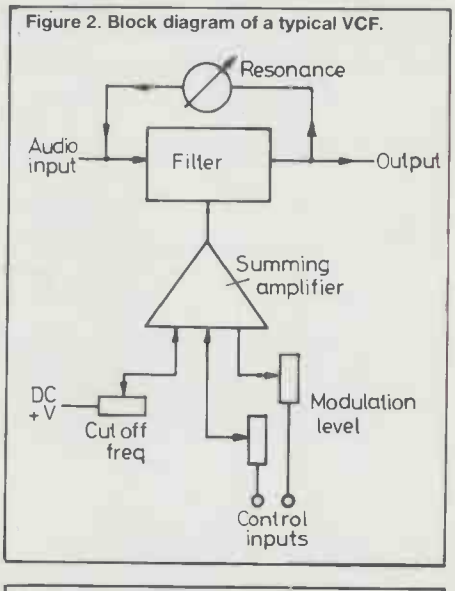
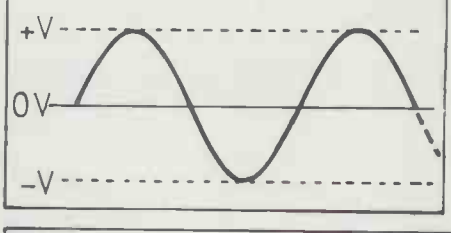


Figure 3. Typical bipolar LFO waveform.



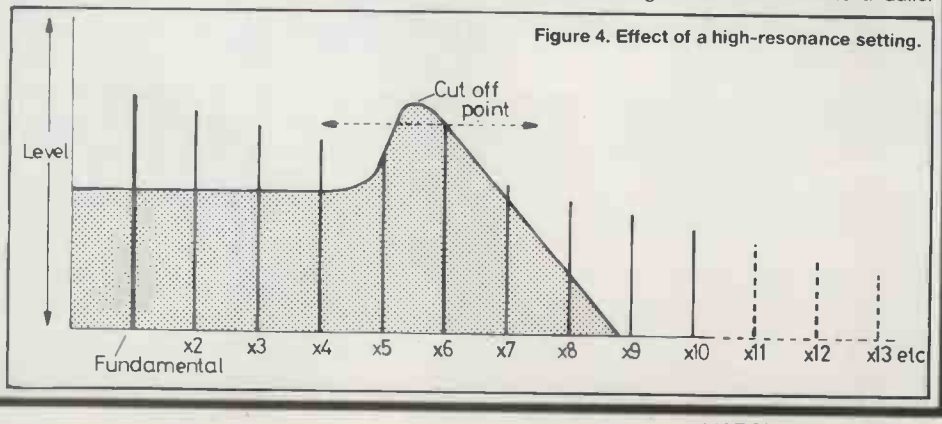
It's important that the summing amplifier adds these voltages together to form one composite voltage, so the DC source acts as the lower extreme of a sweep while the modulation level determines the upper extreme. There is, unfortunately, no easy way of explaining this phenomenon in words, so practical experimentation is really the name of the game.

Practical Pointers

Just in case you're stuck for some ideas on how to go about doing this, here are a couple of guidelines. For starters, set the cutoff frequency control to about two-thirds and all the other controls to minimum, and hold down a note. Move the cutoff frequency control to its maximum position and hear the effect of the sound getting brighter, then do the reverse and note the result of that as well. You should be hearing a characteristic wah effect – if you aren't, you're doing something wrong.

Now reset the cutoff frequency to about two-thirds and increase the modulation level of your synth's low frequency oscillator. As the control is advanced, that wah effect should begin to occur automatically. And if you try moving the cutoff frequency control upwards, the automatic wah will get brighter. This is because you're adding voltage into the summing amplifier, which results in the combined total of DC and LFO voltages increasing. If you try moving the cutoff frequency control downwards, the bright wah will become a duller ▷

Figure 4. Effect of a high-resonance setting.



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'woo-woo' sound, something not entirely unconnected with the fact that you're now subtracting the DC voltage and thereby lowering the voltage total. Note though that you haven't actually altered the modulation level at all in either of these examples, yet there's still quite a bit of sonic variation to be had from them.

All the modulation level allows you to do is set the width of the sweep, whilst the cutoff frequency control allows you to set the region in which that sweep is going to occur. The rule of thumb is that if you want an extremely wide sweep, you should set the cutoff control fairly low and modulation level high, while if only a subtle sweep will suffice, set the cutoff point to the region you want the sweep to take place over and keep the modulation level quite low.

There is one complication, however. Many LFO sweeps go negative for half their cycle (Figure 3), though this shouldn't cause you too many problems so long as you remember the summing amplifier principle. For example, if you set the cutoff frequency to halfway so that it gives about 2.5 volts, and then add a fairly extreme sweep from a bipolar LFO (that is, one whose sweep goes positive and negative in the course of one cycle) the positive voltage will be added to the DC voltage and the cutoff point will go higher as a result. As the voltage falls, the cutoff point will do likewise and the sound will become more muted. Before you know it, the voltage from the LFO will have arrived at 0 volts (halfway through its cycle), so that if you add the two voltages together at this point you'll get only the voltage set by the cutoff frequency control. As the LFO swings into its negative voltage, you can add this to the DC voltage so that, effectively, the voltage drops (ie. 2.5V + -1V = 1.5V). So in this instance, the cutoff frequency control sets the point at which the wah effect rotates. If your LFO's output fits this description, beware of setting the cutoff point too low, or you may find you lose the sound completely.

Keyboard Tracking

The other control you'll probably find at the control input of your filter is one that allows you to route the keyboard voltage through, and this is actually more important than it sounds. To explain, thus far we've been moving the cutoff point up and down but the pitch of the VCO has remained static. Imagine what would happen if that situation was reversed, so that the cutoff point remained where it was set but the pitch was varied up and down. In fact, the probable outcome is as follows. As the VCO's pitch is increased by your playing higher up the keyboard, the upper harmonics are attenuated, and as that pitch is lowered by, say, playing a scale right the way down to the bottom of the keyboard, more harmonics are allowed to pass through, resulting in a sound that's brighter at the bottom than it is at the top. If you're still feeling a little bit on the lost side, have another look at Figure 1 and imagine the fundamental and its harmonics moving to the right of the page (upwards in pitch, in other words). It follows that if the cutoff point is left where it is, then it's only a matter of time before nearly all the harmonics are removed. And not surprisingly, the same applies to the reverse of that situation.

The answer to this problem is simply to route the keyboard's voltage to the filter control inputs, so that the cutoff point follows the pitch of the VCO. Still unconvinced? Try setting the cutoff point on your synth to between two-thirds and a half, then start playing the keyboard across its full width with the VCOs set at 8' or 4'. Note that the sound will become duller at the top of the keyboard with your synth's Keyboard Track control switched off or at minimum, but that the output will be evenly toned across the entire range of the keyboard with this set at 100%.

It's often desirable to mute the top end of the keyboard a little, so most manufacturers have seen fit to provide a variable tracking control of some description, but it must be pointed out that some synths have only a switch that selects On, Half or Full. Obviously not as versatile, but it'll serve much the same purpose.

Resonance

There is in fact a further control that's associated with the VCF but is not usually voltage-controllable, though some modular synths do offer this facility. The artifice in question is the Resonance control, also known as Emphasis and 'Q' by some manufacturers. Its purpose in life is to sharpen the peak of the cutoff point so that harmonics in that are boosted (see Figure 4). What lies behind this innocent-looking control is a feedback loop in the filter that allows the sound to pass through the filter again, and it's this that creates the sharp peak around the cutoff point.

And the reason you get that characteristic dentist's drill whistle sound is quite simple. As you move the cutoff control, the harmonics at the cutoff point are boosted while those directly above and below are attenuated. Then as the cutoff point is moved, so the harmonic that was being boosted before is cut, and the harmonic that was being attenuated is boosted. With judicious adjustment of the Resonance control, you can hear each harmonic quite prominently as the cutoff frequency control is moved up and down.

My only comment on the use of high-resonance effects is the usual impassioned plea that you exercise care and taste. The sound has its place, but the Rick Wakemans of this world have done as much as they dare to flog it to death, so it can sound more than a little cliché. Not only that, your sound will lose much of its depth because the lower harmonics are cut slightly, and as you probably know as well as I do, once you've weakened your output, it can be mighty tricky trying to make yourself heard on stage, for instance.

Figure 5. Effect of differing roll-off slopes.

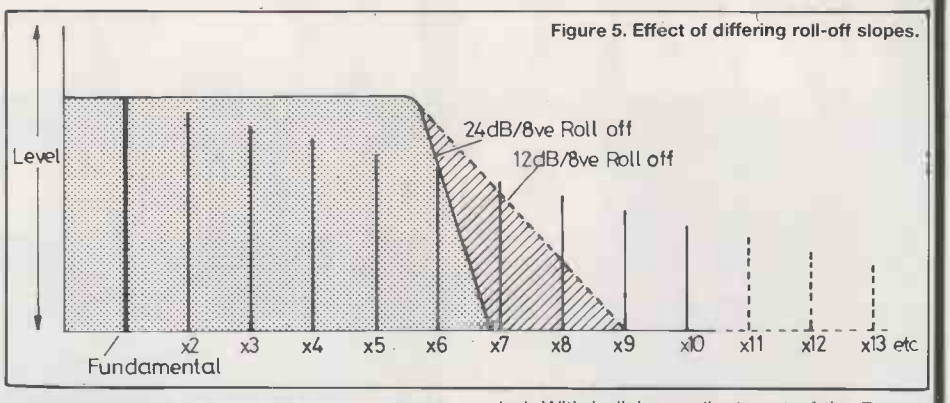


Figure 6(a). Response of a highpass filter.

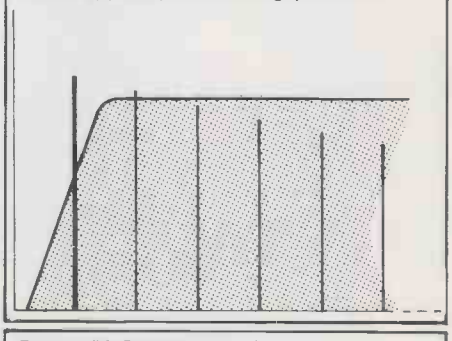
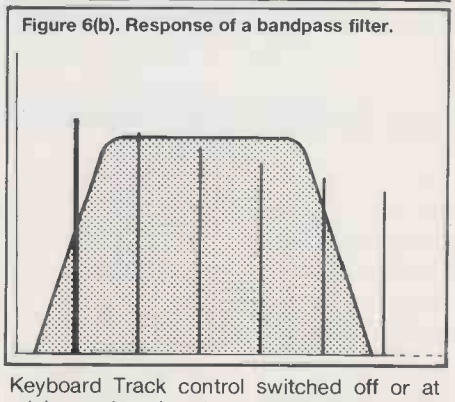


Figure 6(b). Response of a bandpass filter.



Sine Waves

Most synthesisers allow you to push the resonance up so far that the filter will begin to whistle and oscillate. What's happening is that the filter is starting to behave pretty much like a sine wave VCO, and can be used as such. In fact, it's also possible to feed your VCOs into the filter when it's oscillating to create various bell and other clangy sounds. A self-oscillating VCF can also be swept by the EG for various Simmons drum effects and other pseudo-percussive wonders, but rather than dwell on all these possibilities now, I'll leave you all sitting on the edge of your seats by saying that I'll be looking at these and other effects in more detail later on in the series.

There are, of course, many other kinds of sound filter in addition to the lowpass variety. Two more are illustrated in Figures 6(a) and (b), and they all operate in much the same way, however, and it's only the harmonic content of the filtered output that varies from type to type. A highpass filter for instance allows only upper harmonics to pass through unhindered, while a bandpass design will allow a blend of harmonics lying either side of the cutoff point to make their presence felt. Perhaps not surprisingly, use of either of these filters results in the creation of relatively thin, delicate sounds, due to the lack of bass information present.

Some of you may even be in the possession of filters with a variable response curve (usually switchable) which will allow you to select between a 12dB per octave roll-off and a 24dB one: Figure 5 shows the difference between the two. With a 24dB per octave (ie. 24 decibels of attenuation for every octave of frequency) setting, the degree of cut will be correspondingly more drastic, and it's for this reason that these filters are often referred to as being 'punchy'. A 12dB per octave filter, on the other hand, allows more of the harmonics above the cutoff point to pass through. And as a result, the sound is a bit more fizzy and trebly, though in reality, many experienced synth players and programmers maintain that the effects from either variation are much the same. ■

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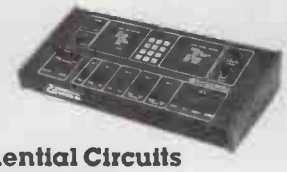

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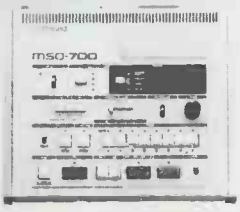

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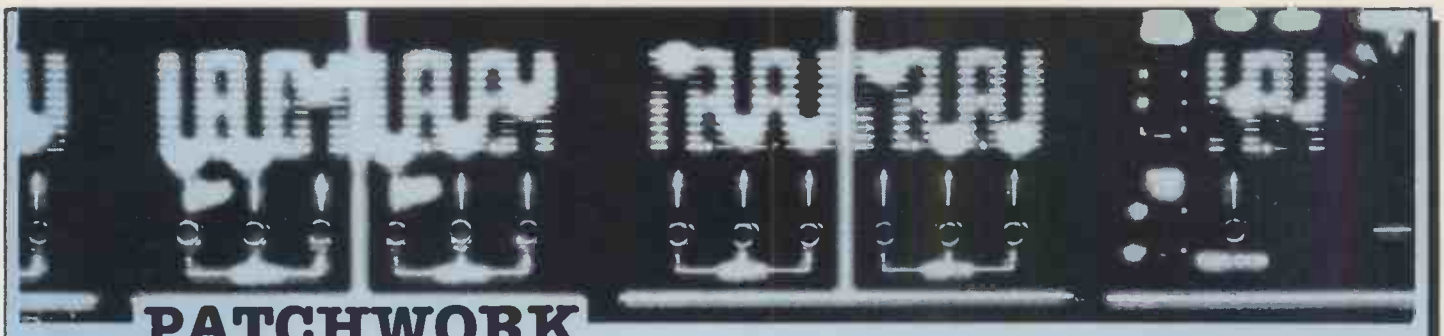


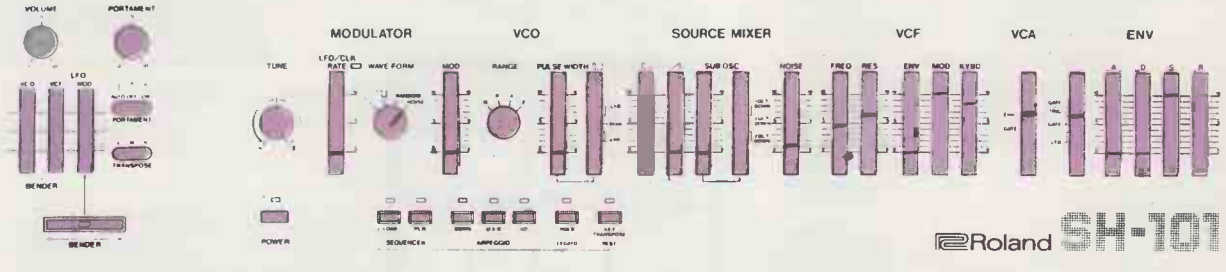
PATCHWORK

Readers send in details of their own synth patches and how they can be played...

Here's another chance to show off your latest sonic creations and share some favourite patches with fellow readers... If you feel like blowing 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.**

ROLAND SH101 — 'Monsoon' — John Gibney, Australia

This 'rainfall' patch was so realistic, our Publisher immediately grabbed a passing umbrella and launched into a tasteless Gene Kelly impersonation... Seriously though, this is a surprisingly realistic patch that varies from being a thunder-like rumble at the bottom end of the keyboard to the sound of tumbling water at the top. Additional distant thunder can be introduced by adding more Noise, while the rain tends to become heavier and closer as the filter's cutoff frequency value is raised, say, to about 7. Sceptical? Try it and see...



ROLAND JX3P — 'Mandolin' — Franklyn Heine, London SW4

This one suffers from something of a musical misnomer, as it sounds to us more like a cross between a mandolin and a lute. And like many patches that seek to imitate acoustic tones whose pitch is not controlled from a keyboard, the exact sound that results from this set of parameter values will be influenced by your playing technique to quite some degree. For instance, holding the keys down briefly to complete the short decay period to zero sustain produces short plucked sounds (use the Hold button as an alternative to this method), but playing staccato style allows the long release time to give the effect of strummed chords. And as an additional bonus, using the 3P's Chorus on/off and Env on/off for DCO2 pitch modulation adds four alternative textures to the basic sound.

		PG-200	JX3-P Edit Element	JX3-P Edit Indicator
DCO-1	Range		A-1	A
	Waveform		A-2	C
	Freq Mod: LFO		A-3	A
	Freq Mod: ENV		A-4	A
DCO-2	Range		A-5	A
	Waveform		A-6	A
	Cross Mod		A-7	B
	Tune		A-8	B
	Fine Tune		A-9	9
	Freq Mod: LFO		A-10	A
	Freq Mod: ENV		A-11	A or B
Freq Mod	LFO Depth		A-12	3
	ENV Depth		A-13	9
	ENV Polarity		A-14	B
VCF	Source Mix		A-15	7
	HPF Cutoff freq		A-16	1
	VCF Cutoff freq		B-1	2
	LFO Mod		B-2	1
	Pitch follow		B-3	9
	Resonance		B-4	5
	ENV Mod		B-5	10
	ENV Polarity		B-6	B
VCA	Mode		B-7	B
	Level		B-8	11
CHORUS			B-9	A or B
LFO	Waveform		B-10	N/A
	Delay time		B-11	N/A
	Rate		B-12	N/A
ENV	Attack		B-13	1
	Decay		B-14	6
	Sustain		B-15	1
	Release		B-16	8

KORG POLY 800 — 'Tibetan Sample' — Bill Coopland, Sheffield

Although Bill meant this patch to be a complementary sound to another synth linked *via* MIDI, we feel 'Tibetan Sample' stands up on its own as a lead sound. It comes across initially as a warm, fat voice, but the pre-programmed delayed vibrato quickly takes effect. Still, feel free to edit parameters and personalise the sound to your own particular needs and tastes, something that goes for all featured patches.

DCO 1							MODE	DCO 2								NOISE	VCF					CHORUS	DEG 1						DEG 2						DEG 3						MG				MIDI		
OCTAVE	WAVEFORM	16'	8'	4'	2'	LEVEL	DCO	OCTAVE	WAVEFORM	16'	8'	4'	2'	LEVEL	INTERVAL	DETUNE	LEVEL	CUTOFF	RESONANCE	KBD TRACK	POLARITY	EG INT	TRIGGER	ON/OFF	ATTACK	DECAY	BREAK P	SLOPE	SUSTAIN	RELEASE	ATTACK	DECAY	BREAK P	SLOPE	SUSTAIN	RELEASE	ATTACK	DECAY	BREAK P	SLOPE	SUSTAIN	RELEASE	FREQ	DELAY	DCO	VCF	RCV CH	PROG CHANGE	SEQ CLK
3	2	1	1	1	1	20	2	3	2	1	1	1	1	20	7	2	0	15	6	2	2	10	2	1	8	31	25	21	22	10	5	7	13	18	25	8	7	15	28	23	8	5	8	8	4	0	–	–	–

YAMAHA DX9 — 'French Horn (Muted)' — Steve Howell, Cardiff

Although it's still considered by many to be the poor relation of the same company's DX7, the humble 9 is still capable of providing some excellent sounds, another of which is reproduced here courtesy of E&MM contributor Steve Howell (someone really ought to break it to him that contributions to *Patchwork* are not financially remunerable). This patch utilises Operator 4 set at an odd frequency to give the gentle 'blurt' that's a characteristic element of the horn sound, but you can adjust the parameter indicated on the chart by brackets to increase or decrease this effect.

YAMAHA DX9
VOICE DATA LIST

A	F	WAVE	SPEED	DELAY	PMD	AMD	PITCH	AMP	OP
3	7	TRIANGLE	27	57	2	0	1		4
ALGORITHM /FEEDBACK		LFO					MOD SENS		3
									2
									1

1	2	3	4	5	6	7	8	9	10
	POLY/MONO	PITCH BEND RANGE	PORTAMENTO MODE	PORTAMENTO TIME					
	POLY								

OP	FREQUENCY COARSE	FREQUENCY FINE	DETUNE /SYNC	ON	EG RATE 1	EG RATE 2	EG RATE 3	EG RATE 4	EG LEVEL 1	EG LEVEL 2	EG LEVEL 3	EG LEVEL 4	KEYBOARD SCALING RATE	KEYBOARD SCALING LEVEL	OPERATOR OUTPUT LEVEL	KEY TRANSPOSE
4	2	.20	0		63	53	55	99	99	51	0	0	1	44	(67)	C2
3	1	.00	0	ON	31	44	33	36	99	99	69	0	1	55	73	
2	1	.00	0		39	38	21	33	83	92	85	0	0	25	70	
1	1	.00	0		50	15	35	60	99	94	95	0	0	0	95	
	OSCILLATOR				EG								KEYBOARD SCALING		OPERATOR	

11	12	13	14	15	16	17	18	19	20
MODULATION WHEEL				BREATH CONTROL					
RANGE	PITCH	AMPLITUDE	EG BIAS	RANGE	PITCH	AMPLITUDE	EG BIAS		
70	ON	OFF	OFF						

Corrigendum – The 'No Strings Attached' patch for the Korg Mono/Poly (E&MM Jan 85) was published minus the VCA envelope settings, which should have read Attack (2), Decay (2), Sustain (3) and Release (1¼).

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YAMAHA SG450T, White, Tremelo £315
YAMAHA SG200, Sunburst £199
YAMAHA SJ550, new model, Cherry £289
YAMAHA SE200, new model, Black £169
YAMAHA SF400, Metallic Red £179
YAMAHA SC600, 3 pick-up model, Brown £199
YAMAHA SG35, Circa 1974, Brown £85
TOKAI TST 40, Hendrix Model, Red £165
TOKAI TST 40, Hendrix Model, S/B £165
TOKAI TST 50, '58 Vintage, Red £195
TOKAI TST 50, '58 Vintage, S/B £195
TOKAI TST 50, '58 Vintage, Blue £195
TOKAI TST 50, '58 Vintage, Gold £195
TOKAI TST 50, '64 Vintage, Black £195
TOKAI TST 50, '64 Vintage, Gold £195
TOKAI TST 50, '64 Vintage, S/B £195
TOKAI TST 40, Humbucking Pick-ups, Red £199
TOKAI TST 55, L/hand Models inc. Case £249
TOKAI TST 70, Locking Trem models £299
TOKAI Flying V, inc case £245
TOKAI Les Paul 57 model, White £285
TOKAI Les Paul 58 model, Black £229
TOKAI SG Custom model, Cherry £239
TOKAI 335, Semi Acoustic, Tobacco £395
TOKAI TTE50, Townsend model, 54 Blonde £165
TOKAI TTE60, Quilted Mahogany Top £199
TOKAI TTE70, Edge Binding, Sunburst £195
TOKAI TTE70, Edge Binding, Black, S/H £149
TOKAI TTE55, Left Handed Models £249
TOKAI Talbo, Metal body, Black £245
TOKAI Talbo, Metal body, White £245
WASHBURN A-20V, Stage Series, Trem £245
WASHBURN A-5V, Stage Series, Trem £149
WASHBURN A-5, Stage Series, White £129
WASHBURN A-5, Stage Series, Red or Black £129
WASHBURN Falcon, Last one left £199
WASHBURN Force 3, Tremelo, White £149
ARIA RS Wildcat, Black inc case £199
ARIA RS Wildcat, White inc case £199
ARIA Cardinal, Black 'n' Gold £229
ARIA U60-T, Urchin, Black, inc case £145
ARIA Cardinal CS Deluxe, Black £205
ARIA Pro Deluxe, Tobacco, S/H £125
VANTAGE Quest, Atak 1, Black £139
VANTAGE Quest, Atak 2, Black £149
VANTAGE Avenger, coil taps, Trem, Black £179
VANTAGE Avenger, coil taps, Trem, Black £169
VANTAGE Avenger, coil taps, Black £155
VANTAGE X-77T, 3 pick-up, Trem, Black £215
VANTAGE X-38T, 3 pick-up, Red £215
VANTAGE X-35T, 3 pick-up, Black £189
VANTAGE Profile Vintage Series, White £149
IBANEZ RS1300, Locking Trem, Natural £289
IBANEZ RS1100, All Black Model £289
IBANEZ RS1010, 'Steve Lukather', Blue £275
IBANEZ RS530, New Model, Locking Trem £325
IBANEZ RS440, New Model, Black £269
IBANEZ RS135, Tremelo, White or Yellow £159
IBANEZ RS315, Tremelo, Blue £199
IBANEZ Cimar, 3 pick-up, Trem, White or Blue £135
WESTONE Concorde 1, Secondhand, Red £85
WESTONE Spectrum II, Tremelo, Black £165
WESTONE Thunder II, Light Oak £124
WESTONE Thunder Jet, All Black £125
WESTONE Thunder I, Active, Oak £149
WESTONE Thunder I, Active, Black £159
WESTONE Thunder I, Tremelo, Black £144
VOX White Shadow, Tremelo, Last One £115

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YAMAHA BB3000 Metallic Black, inc. case £559
YAMAHA BB1200 Cherry Sunburst £249
YAMAHA BB1000 Brown Stain £265
YAMAHA BB400S Fretless, Black £225
YAMAHA BB400S Fretless, Cherry £199
YAMAHA BB300, Jet Black £169
FENDER USA Jazz Standard, Sunburst £299
FENDER USA Jazz, M/N Sunburst, S/H £275
FENDER USA, Jazz M/N Left Handed, S/H £295
FENDER Squier Jazz, Black £225
FENDER Squier Precision, M/N, Black £189
FENDER Musicmaster, Wine Red, S/H £95
IBANEZ MC924 Active, Ivory £395
IBANEZ MC824 Passive, Walnut £319
IBANEZ Road Star RB950, Black £325
IBANEZ Road Star RB850, Black £265
IBANEZ Road Star RB750, Black £245
IBANEZ Road Star RB820, Silver £219
IBANEZ Road Star RB650, Black £175
IBANEZ Road Star RB630, Black £155
IBANEZ Blazer BL800, Red £165
WASHBURN Force 4, Black £145
WASHBURN Stage Bass, Black S/H £110
ARIA SB600, Black £245
ARIA SB11 Special Fretless, Sunburst £249
ARIA RSB Special, Black £299
ARIA RSB Standard, Tobacco Sunburst £149
ARIA RSB Deluxe £275
ARIA CSB, Black 'n' Gold £249
ARIA SB BG1 Black 'n' Gold £325
ARIA SB Elite-1 Opal Blue £345
TOKAI TJB45, Vintage Jazz, Black £185
TOKAI TJB 45, Vintage Jazz, Red £185
TOKAI TJB 45, Vintage Jazz, White £185
TOKAI TJB 45, Vintage Jazz, Sunburst £185
TOKAI TJB 45, Vintage Jazz, Powder Blue £185
TOKAI TJB 45, Vintage Jazz, Natural £185
TOKAI PB 60, Violin Finish, Edge Binding £219
VANTAGE Profile PB in Black M/N £129
VANTAGE Quest Atak 1B, Black M/N £149
VANTAGE Quest Atak 1B, White M/N £149
VOX White Shadow, Fretless, Black £149
WESTONE Quantum, Headless, Black £199
WESTONE 'The Rail', Headless, Black £169
WESTONE Thunder III Jet, Black £295
WESTONE Thunder II, Metallic Silver £195
WESTONE Thunder I, Active, Black £159
WESTONE Thunder I Active, Light Oak £149
WESTONE Thunder I, Standard, Oak £125
WESTONE Thunder, Jet, All Black £135
WESTONE Concorde-1, Natural £125
CIMAR by IBANEZ, PB Standard, White £119
CIMAR by IBANEZ, PB Standard, Blue £119
CIMAR by IBANEZ, PB Standard, Red £119
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SD CURLEE USA Model, S/H £145
KRAMER DMZ Single Pick-up S/H £225
KRAMER 450B, Walnut S/H £195
HOHNER Jazz Bass, Tobacco Sunburst £110
HOHNER PB-Model, Sunburst £99
FRAMUS, Medium Scale Model S/H £79
COLUMBUS Jazz, Sunburst, S/H £85
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HONDO, Rickenbacker, Cherry, S/H £89
HONDO, Jazz Bass, Sunburst £110
KAY P8 Model, Sunburst £79
KAY Rickenbacker copy £55
COLUMBUS Tele bass, Blonde, S/H £45

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IBANEZ AM100, Full size body, Tobacco £295
IBANEZ AM50, Small body, Tobacco £275
IBANEZ AS80, Full size Artist Series, Natural £295
IBANEZ AS80, Full size Artist Series, Cherry £295
ARIA TA30, Jet Black £185
ARIA TA60, Cherry Sunburst £285
TOKAI 335 Jazz Model, Tobacco £399
WASHBURN HB-335 Jazz Model, Tobacco £265
EPIPHONE Riviera, Dark Sunburst £245
WESTONE Rainbow-1, Natural £199
HONDO-II L6, Deep bodied model £129

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CARLSBRO Cobra 90, Bass Combo £199
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CARLSBRO Stingray 150, Keyboard Combo £385
CARLSBRO Stingray 150, Lead Combo £325
CARLSBRO Stingray 150, Pro Lead Combo £465
CARLSBRO Stingray 150, Bass Combo £312
CARLSBRO Cobra 90, Keyboard Top £159
CARLSBRO Cobra 90, Bass Top £119
CARLSBRO Cobra 90, PA Top, Reverb £169
CARLSBRO Stingray 150, Keyboard Top £237
CARLSBRO Stingray 150, Lead Top £217
CARLSBRO Stingray 150, Bass Top £179
CARLSBRO Marlin 150, PA Top £247
CARLSBRO Marlin 300, PA Top £329
CARLSBRO M150, Mono Slave £159
CARLSBRO M300, Mono Slave £229
CARLSBRO S300 Stereo Slave £289
CARLSBRO S600 Stereo Slave £445
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CARLSBRO 100 watt 1x15 Bass Cab £104
CARLSBRO 100 watt 1x15+Horn, Cab £113
All other CARLSBRO Equipment ..... Phone
MARSHALL 2203 100 watt M/V Top ..... Phone
MARSHALL 2210 100 watt Split Top ..... Phone
MARSHALL 1959 100 watt Super Lead Top ..... Phone
MARSHALL 1992 100 watt Bass Top ..... Phone
MARSHALL 2204 50 watt M/V ..... Phone
MARSHALL 1987 50 watt Super Lead Top ..... Phone
MARSHALL 2205 50 watt Split Top ..... Phone
MARSHALL 1986 50 watt Bass Top ..... Phone
MARSHALL 1984 400 watt 4x12 Bass Cab ..... Phone
MARSHALL 1935 280 watt 4x12 Lead Cab ..... Phone
MARSHALL 1982 400 watt 4x12 Lead Cab ..... Phone
MARSHALL 1960 280 watt 4x12 Lead Cab ..... Phone
MARSHALL 1936 140 watt 2x12 Lead Cab ..... Phone
MARSHALL 5005 12 watt Lead Combo ..... Phone
MARSHALL 5501 12 watt Bass Combo ..... Phone
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MARSHALL 4103 100 2x12 Valve Lead Combo ..... Phone
MARSHALL 4211 100 2x12 Valve Split Combo ..... Phone
MARSHALL 3210 Compact Stack, in Stock ..... Phone
MARSHALL 3210, 100 Transistor, Split Channel ..... Phone
MARSHALL 1965, 140w 4x10 Lead Cabinets ..... Phone
TRAYNOR 6400, 120w PA Top, Graphic, Reverb £299
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TRAYNOR TS25B, 25 watt, Bass Combo £159
TRAYNOR TS50, Lead Combo, Reverb £175
TRAYNOR TS25, Lead Combo £149
TRAYNOR TS10, Lead Combo, Overdrive £69
TRAYNOR 115-H, 1x15 PA Bins, Pair £325
TRAYNOR 112-H, 1x12, PA Cabs, Pair £169
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ROLAND JC-77, 80 watt Jazz Chorus Combo ..... Phone
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FENDER Londoner 100 watt 2x10 Combo £425
FENDER Londoner 100 watt 1x12 Combo £399
FENDER Montreux 100 watt, 1x12 Combo £345
FENDER Lead 75, 1x15 Valve Combo £299
FENDER Bassman 70, Valve Top, Secondhand £110

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LOCO CM-01 Compressor Pedal £29
LOCO OD-01 Overdrive Pedal £29
LOCO DS-01 Distortion Pedal £32
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LOCO GE-06 6-Band Graphic E.Q. £39
LOCO CH-01 Stereo Chorus Pedal £42
LOCO FL-01 Flanger Pedal £49
LOCO AD-01 Analog Echo Pedal £75
ME-30 Multi-Effects Pedal £149

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TOKAI TDL-1 Echo Delay Pedal £59
TOKAI TCH-1 Stereo Chorus Pedal £39
TOKAI TPH-1 Phaser Pedal £28
TOKAI TFL-1 Flanger Pedal £39
TOKAI TXC-1 Exciter Pedal £25
TOKAI TCO-1 Compressor Pedal £25
TOKAI TMD-1 Metal Driver Pedal £29

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BOSS CE-2 Chorus, inc. AC Adaptor £80
BOSS CE-3 Stereo Chorus, inc. AC Adaptor £81
BOSS CS-2 Compressor, inc. AC Adaptor £67
BOSS DD-2 Digital Delay, inc. AC Adaptor £159
BOSS DF-2 Distortion Feedback, inc. AC Adaptor £61
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BOSS GE-7 7 Band Graphic, inc. AC Adaptor £81
BOSS HM-2 Heavy Metal, inc. AC Adaptor £49
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BOSS OC-2 Octaver, inc. AC Adaptor £58
BOSS OD-1 Overdrive, inc. AC Adaptor £58
BOSS DH-2 Super Phaser, inc. AC Adaptor £86
BOSS PH-1R Phaser, inc AC Adaptor £81
BOSS SD-1 Super Overdrive, inc. AC Adaptor £56
BOSS TW1- Touch Wah, inc. AC Adaptor £66
BOSS VB-2 Vibrato, inc. AC Adaptor £71
BOSS TV-12 Chromatic Tuner, inc. AC Adaptor £46
BOSS BX800 8 Channel Mixer, inc. Headphones £246
BOSS BX600 6 Channel Mixer Inc. Headphones £135
BOSS BX400 4 Channel Mixer, inc. Headphones £89
BOSS DR-110 Dr Rhythm, inc. AC Adaptor £123

KORG Modular Pedal System

KORG PME-40X Pedal Board, Holds 4 Units £99
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KUDOS-251, 100 watt PA Cabs/Monitors pair £139
KUDOS-351, 200 watt PA Speakers pair £249
KUDOS-655, 320 watt PA Speakers pair £425
KUDOS-666, 600 watt PA Speakers pair £525
KUDOS-MX-6400 PA Mixer Amp inc Digital Echo £545
WEM Songbird II, 1x10 200 watt Cabs, pair £195
WEM Songbird II, 1x12, 300 watt Cabs, pair £265
WEM Phantom II, 600 watt PA Cabs pair £365
YAMAHA 212-100 Lead Combo S/H £185
YAMAHA S250X, 500 watt PA Cabs pair £589
MARSHALL PA100, 8 channel, 100 watt Reverb £145
BOSE 101, 100 watt Monitors, pair £110
H/H SL-100, 100 watt Slaves £75
H/H VS-Musician, 100 Top £95
H/H VS-Musician, 1x15 Bass Combo £185
H/H Mini PA Horns, pair £65
PEAVEY Artist 120 Combo, Black Widow Speakers £225
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YAMAHA 9000 Recording Series, 5-Drums only. No stands. 22, 16, 13 & Deep Snare, Cherry Wood ... £995
YAMAHA NEW 8000 Series 5-Drum Power Outfit, 22, 16, 13, 12+Snare, No stands. Jet Black £799
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PEARL DX Series 7-Drum Outfit, 22, 16, 13, 12, 10, 8+6½ Snare, No stands, Jet Black £639
PEARL DX Series 5-Drum Outfit, 22, 16, 13, 12 & 6½ Snare, Inc. Stands, Black £645
PEARL DX Series 5-Drums Only, 22, 16, 13, 12 & 6½ Snare, No Stands £495
PEARL DX Series 7-Drum Outfit, 22, 16, 13, 12, 10, 8+6½ Snare, Inc. H/Duty Stands £789
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PEARL Rising Sun 5-Drum Outfit, 22, 16, 13, 12+Snare, Inc. Stands, Unique Rising Sun Finish £459
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MAXWIN 705 Series 7-Drum Outfits 22, 16, 13, 10, 8+Snare, Inc. stands, Black, Silver, White & Red £359
MAXWIN 705 Series 5-Drum Outfits, 22, 16, 13, 12+Snare, Inc. stands, Black, Silver, White & Red £279
TAMA Supestar 5-Drum Outfit, 22, 16, 14, 13 & 6½ Snare, Titan Heavy Duty Stands, Lacquer Finish £1299
TAMA Swingstar Power Tom, 5-Drum Outfit, 22, 16, 13, 12+6½ Metal Snare, Inc. Stands, Black £425
TAMA Swingstar Power tom, 5-Drum Outfit. 22, 16, 13, 12+6½ Snare, H/Duty Stands, White £445
TAMA Swingstar 5-Drum Outfit, 22, 16, 13, 12+5" Metal Snare, Inc. Stands, Platina £399
PREMIER Soundwave 5-Drum Outfit, 22, 16, 13, 12 plus 2003 Metal Snare, Tri-Lock Stands, Rosewood Finish £545
PREMIER Crown 5-Drum Outfit, 22, 16, 13, 12+5" Metal Snare, Inc. Stands, Natural Maple Finish £475
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PREMIER APK 5-Drum Power Kit, 22, 16, 13, 12+6½ Snare, Inc. Stands, Rosewood Finish £425
PREMIER APK 7-Drum Kit, 22, 16, 13, 12, 10, 8+6½ Snare & All Stands, Jet Black £499
PREMIER APK 5-Drum Power Kit 22, 16, 13, 12+6½ Snare & all Stands, Walnut Finish £425
PREMIER APK 5-Drum Power Kit, 22, 16, 13, 12+6½ Snare, Inc. Stands, Jet Black £399
TRAK System Two, 7-Drum Outfit, 22, 16, 13, 12, 10, 8+5" Snare, Inc. Stands, White £445
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ROGERS R-360 5-Drum Outfit, 22, 16, 13, 12+plus 5" Snare, Inc. Stands, White Finish £325
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Powertran MCS1

Part 5: Tidying Up

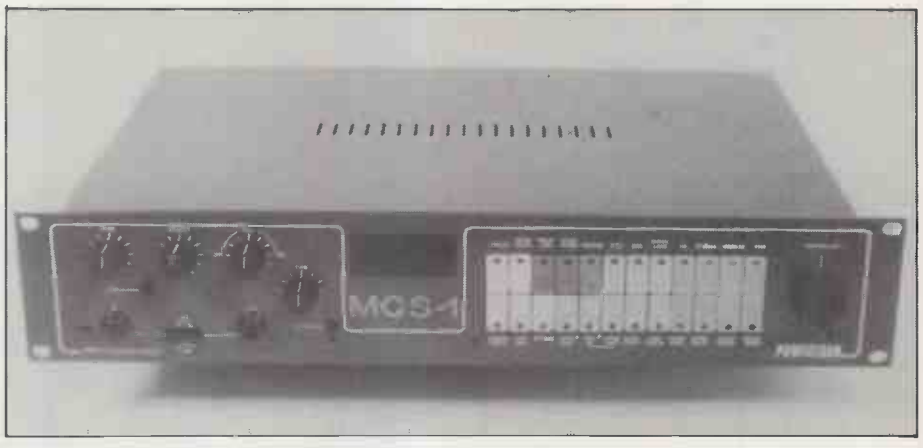
We conclude our coverage of the build-it-yourself MIDI Controlled Sampler with mechanical assembly details and a quick run-down of the unit's front panel controls. *Tim Orr*

We've now covered most aspects of the MCS1's design, performance and construction, but one element of the last-mentioned topic that hasn't yet been dealt with is the mechanical assembly which, though not in itself particularly demanding, has to be done with care if you're to have a unit that works as it should do and, just as important to many, looks the part as well.

E&MM's over-worked Technical Illustrator, Len Huxter, has done such a good job on these particular drawings that, to a large extent, the diagrams speak for themselves, and no additional explanation is necessary. Figure 1 is a case in point. This shows a plan view of the interboard wiring that has to be undertaken before the various PCBs within the MCS1 will get to be on speaking terms with each other: the picture says it all.

The front panel wiring is a little bit more involved, as a quick glance at Figure 2 would suggest. The problem here is that what was originally a multicolour (one colour for each connecting wire) illustration is now a decidedly monochrome one, so it isn't perhaps as easy to read as it could be. Note also that VR3, labelled on the diagram as Pan, carries the name Mix on production Samplers: the change in nomenclature is due simply to a change of heart over how the pot's function could best be described, as the panel description on the pages that follow should explain.

The transfer of Figures 3(a) and 3(b), which together show the mechanics of how to wire up the unit's power supply, from original colour sketch to printable diagram also posed problems, in that the two drawings you see here form one super-diagram in the author's original. The split is a logical one, though, with (a) showing the connections between the transformer and the PCB and (b) illustrating the wiring between transformer and the MCS1's back panel. With luck, the printed results should be even clearer than they need to be.



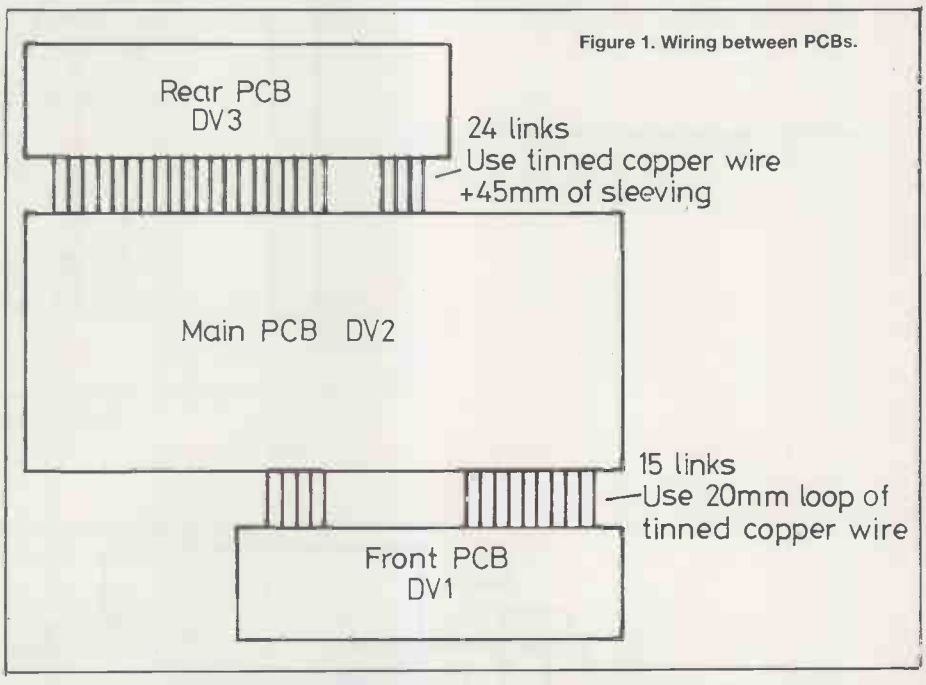


Figure 1. Wiring between PCBs.

Assembly in Detail

Figures 4 and 5 are detail illustrations of mounting procedures for the front panel and main PCB (DV2) respectively. These are pretty self-explanatory, but the drawings that follow aren't quite so easy. Figure 6, for instance, is a view of the inside of the front panel, with the display filter as the focus of attention: don't forget to peel off the protective covers from both sides of the filter before you attempt to fit it, and once you've done that, the device should be installed with its matt side pointing outwards and its gloss side in, with a 3mm gap left at the top of the panel. Trim off any excess double-sided tape with a sharp knife to complete the job.

The installation of the spin-wheel controller (RC300) poses similar difficulties, though like the display there's only one of it, so things aren't nearly as serious as they might be. Figure 7 is obviously a help here, but there are a few more points worth making concerning the exact sequence of operations. The first task is to pack out the inside of the controller with a surplus jack-socket washer, after which the wheel can be trial-fitted to the front panel. Mark the controller's shaft as close to the panel as possible once it's fitted, remove the controller and cut to the appropriate length - you can now fit it for real. One last mechanical detail is the fitting of four rubber feet to the underside of the MCS1 cabinet, with a further two beneath the main PCB: Figure 8 shows the approximate positioning of the latter.

The Controls

Our last port of call is an explanation of the MCS1's controls and connections – what they do and why they're there. We'll start, logically enough, with the Audio In connection, which is made *via* a standard quarter-inch jack socket. A pushbutton is used to select low (1K5) or high (28K5) impedance levels, which should cover most operational eventualities. Audio Out is similarly connected, its socket being echoed (no pun intended) on the rear panel – another pushbutton selects zero or 20dB attenuation.

The four rotary pots at the left of the Sampler's front panel are easily explained. Level is a continuous gain control operating on the input signal, Repeat controls the amount of internal feedback around the delay line and hence the number of repeats produced, Mix alters the proportion of direct signal in relation to the output of the delay line, and Tune is a fine overall pitch control. The Controller on the panel's extreme right is a bit more complicated, as it's used to alter the value of whichever parameter has been selected. It has a 360-degree rotation, and is capable of incrementing or decrementing up to 50 steps ▷

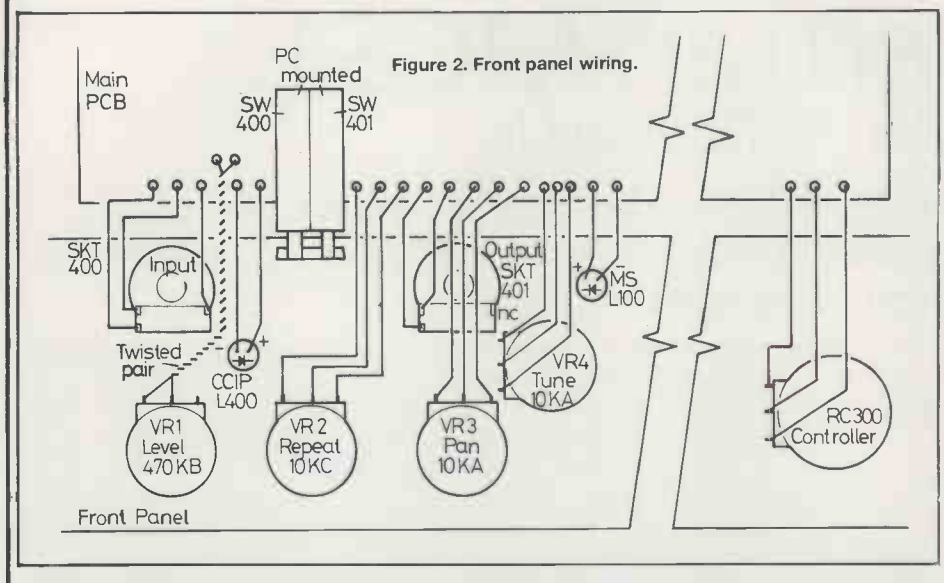


Figure 2. Front panel wiring.

per revolution, depending on the parameter in question. Just left of centre on the panel layout is a four-digit (0.56", seven-segment LED) display, and this shows both parameter values and other information of importance to the user.

The remainder of the MCS1's front panel is occupied by no fewer than 24 selector switches, and I can think of no better way of explaining these than going through each of them one by one.

The Freeze button is what you use when you want to prevent any further data being written into the unit's memory, so that any sound already in there is frozen. The switch operates only in Delay Line mode and works in conjunction with the Rear panel input on the rear panel. Like all the selector switches, it incorporates its own LED, and this is used in Voice mode to indicate when a recording is in progress. The light remains off while the recording is actually taking place, but illuminates once the sound has been successfully stored in memory.

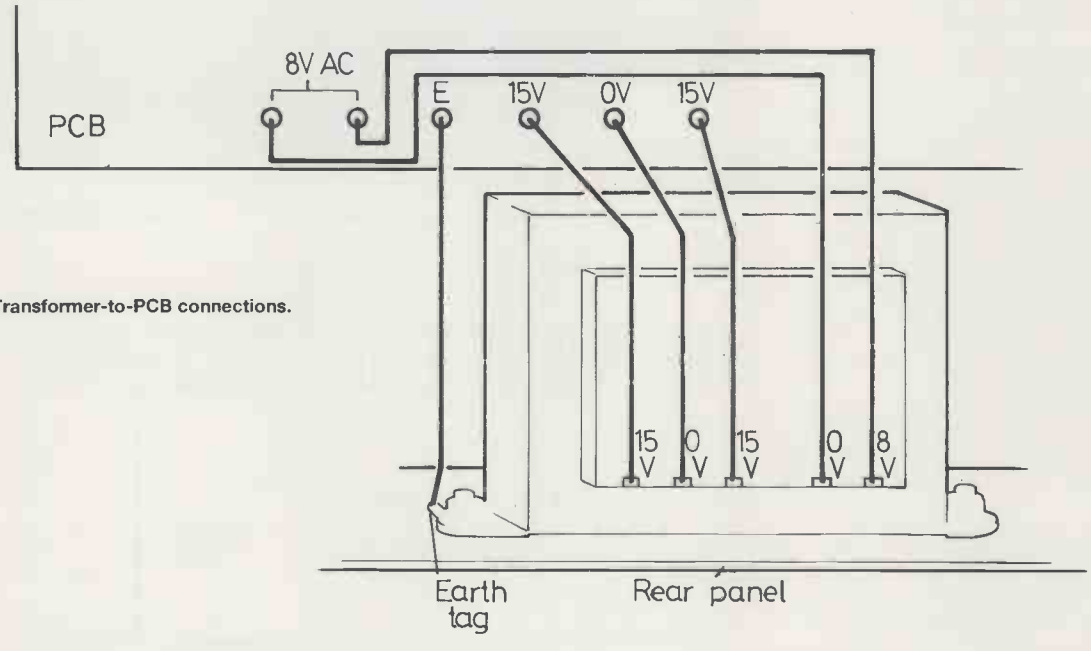


Figure 3(a). Transformer-to-PCB connections.

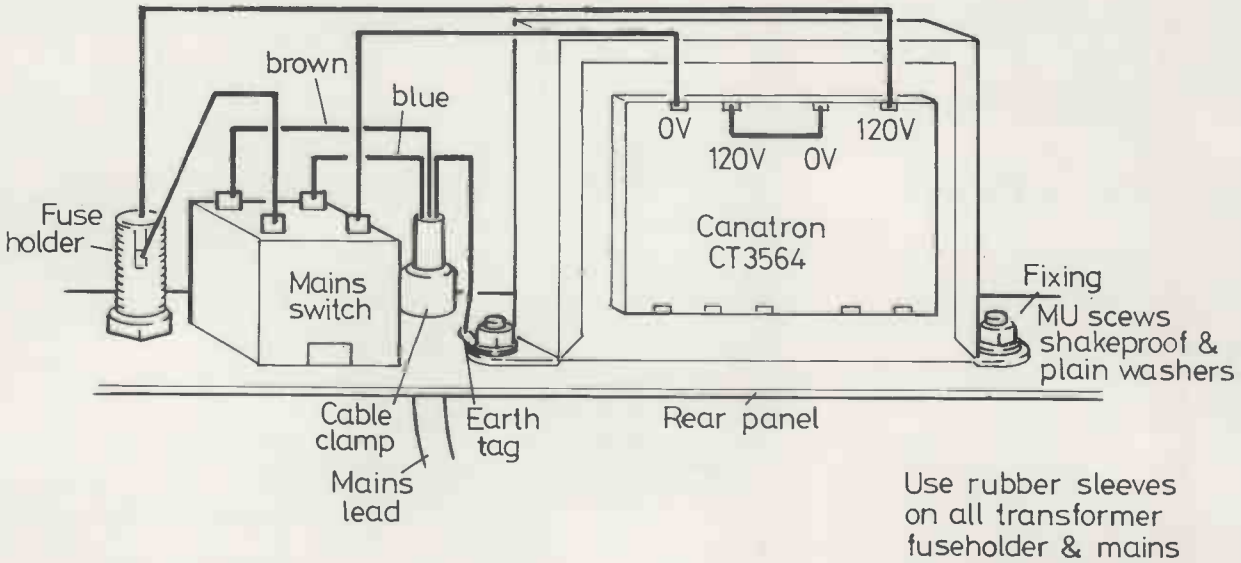


Figure 3(b). Transformer-to-rear panel connections.

Use rubber sleeves on all transformer fuseholder & mains switch connections

Earth tag does not need a sleeve

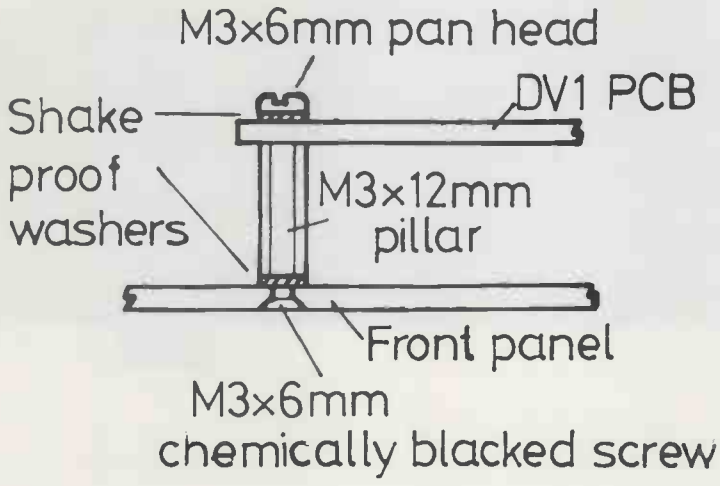


Figure 4. Front panel mounting details.

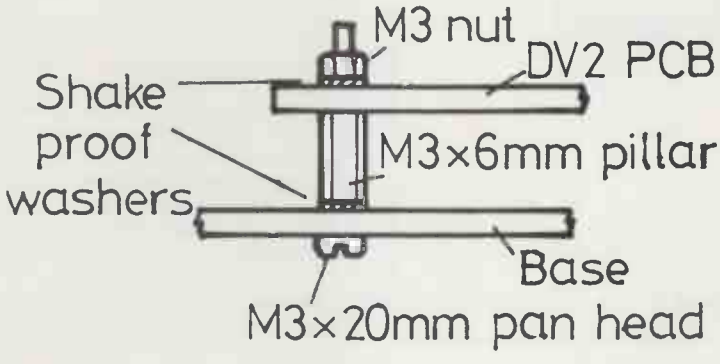


Figure 5. Main PCB mounting details.

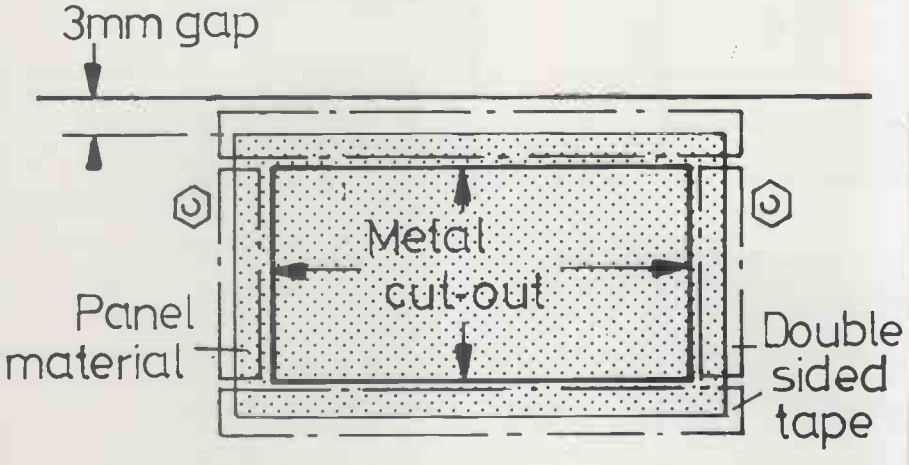


Figure 6. Display filter fitting (see text).

Moving to the right along the front panel, Click Track selects the unit's built-in metronome, capable of superimposing 16 beats onto the audio output for every complete trip around a full memory length, though obviously the shorter that length, the smaller the number of clicks the circuit will produce.

The two blue switches that follow are used to select Delay Line and Voice modes respectively. In the former, the MCS1 reads and writes from memory continuously, thereby generating a continuous cycle of sounds/echoes. As we've just seen, these sounds can be frozen or, should you so desire, transferred to Voice mode operation, in which their pitch and duration can be played from a connected keyboard. The red Record button comes into play in Voice mode, and its operation is worth describing in some detail. Once your finger (or whatever part of the body you happen to be using) has made contact with the button, the associated LED starts to flash at a rate of about four times a second, indicating that the MCS1 is ready to begin recording. Said recording commences at the onset either of an audio trigger or the Record button being pressed for a second time, and it's at this point that the Record LED turns continuously on and the Freeze LED continuously off. And when the recording is complete, the status of these indicators is reversed and the stored sound can be replayed *via* either a keyboard or the Play switch that lives next-door, as it were.

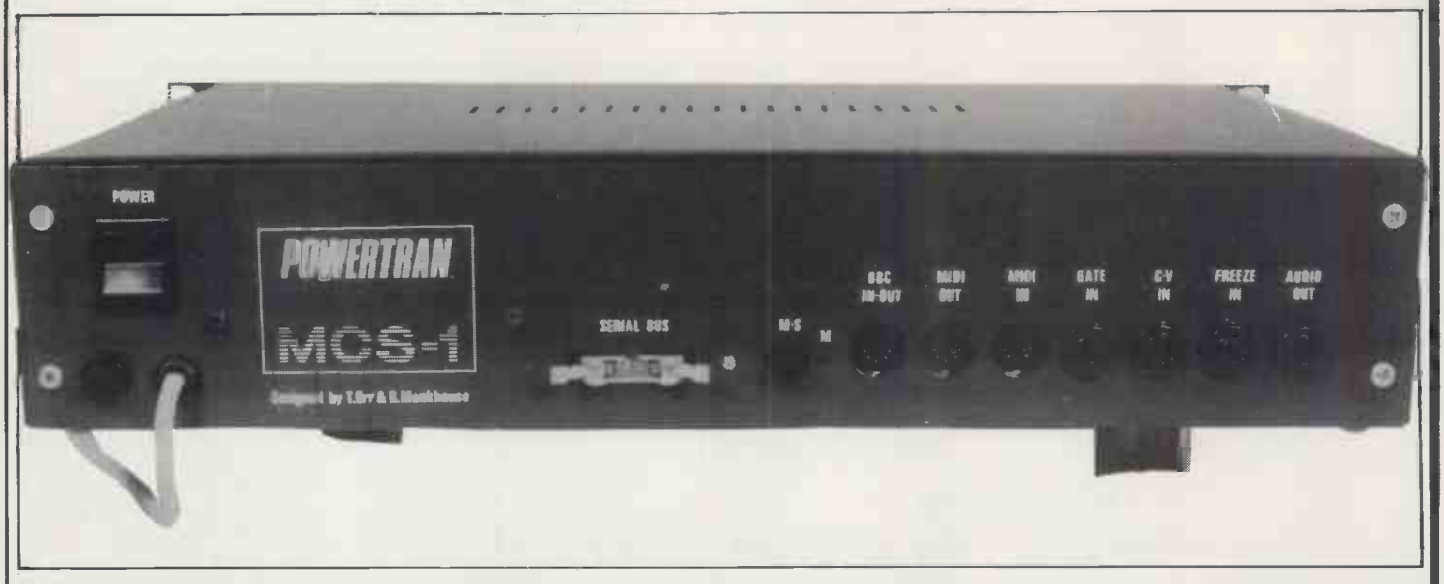
Future Options

The BBC and Down Load pushbuttons are both concerned with add-on hardware options that'll be available in the near future. The former is so called because a soon-to-be-available interface will allow MCS1 sounds to be stored within the memory of a BBC Micro, and the pushbutton will be used to access this facility. Moving on, the NR switch is already fully operational and is used to activate the MCS1's built-in noise reduction circuitry, which brings about a useful audible removal of otherwise bothersome quantisation noise.

The Coarse, Medium and Fine switches are used to select the sensitivity of the spin wheel controller, something that will obviously vary depending on the parameter whose value is being modified. The operation of the Sample Speed selector isn't quite as straightforward as its name might suggest. On the MCS1, the speed is expressed as a variable number with a value between 128 and 4095, which represents the value needed to program the internal divider chain. Thus, contrary to all expectations, 128 is a fast sample speed and 4095 a rather slower one. Whichever speed you select, it's indicated on the LED panel display, so you always know precisely where you stand.

Like the Sample Speed selector, the RAM Size button functions in Delay Line mode, and in this case the display shows the parameter as a number between zero and 6553 (actually, 65,536, but the display can only show a maximum of four digits, so you'll have to use your imagination a little). And once you've discovered what the current RAM size is, you can modify it using the Controller. Another somewhat self-evident selector is Bypass, which simply routes the input signal to the audio output, thereby ignoring the antics of the MCS1's processing entirely.

If you intend connecting the Sampler to a controlling keyboard, then a working knowledge of the Gate* Trig and MIDI* CV selectors is essential. Both induce Voice mode functions, and as its name might imply, the first switch is used to select whether the sound stored in memory is gated (* = LED on) or ▷



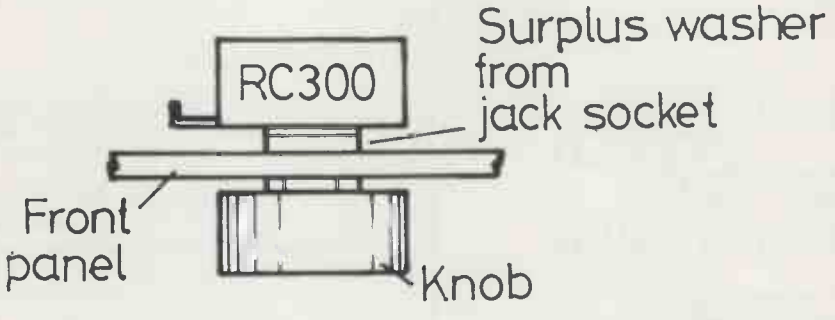


Figure 7. Controller fitting (see text).

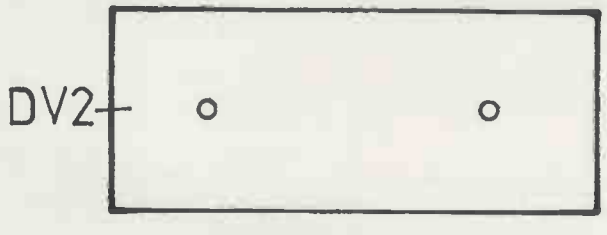


Figure 8. Outline of rubber feet positioning on main PCB.

triggered. Two gate modes are available, one that turns off abruptly and a second that has a half-second decay tail on its end. The display shows S for a short decay time and L for a long one. An unilluminated LED tells you the sound will be triggered, which means that although it's started by the gate signal, it'll play itself automatically to the end of the memory. For the non-synthetically literate, a gated signal can be put through a looping process, but a triggered one cannot. The second switch selects whether MIDI (LED on) or CV connections will be used to relay pitch information to the MCS1. In fact, pitch, sound duration, pitch-bend and vibrato are all controllable *via* MIDI, the note(s) played being indicated in MIDI code on the LED display. On switch-on the MCS1's MIDI channel number will default to 01, but all you do to alter this to any of 16 channels is hold the selector switch down and rotate the Controller accordingly.

We've already seen that the sample speed of the unit can be varied continuously as a value of N from 128 to 4095, but there is in fact an alternative way of changing that speed. The Pitch Shift button lets that same value be altered in semitone increments, from 12 (low end) to 80 (high end), and again, it's the spin wheel controller that's used to do the value-changing. Looping is quickly and simply achieved on the MCS1, using the Loop Start and Loop Length selectors. The former defines the point in memory where the loop begins, while the latter determines the 'jump-back' length. If you're foolish enough to set a loop length greater than the loop start (or to put it in layman's terms, you ask a loop to jump back to a position that's actually in front of its starting point), the display will show all its decimal points lit up at once, and the unit will automatically reset the jump-back address to zero.

The four remaining selectors (yes, the end is well and truly in sight) operate in conjunction with the MCS1's internal tracking filters and sweep oscillator. Not surprisingly, Filter Offset allows said filters to be offset by an octave less or an octave more than the system sample speed. The chosen figure is displayed by the LED network as a number between zero and 12. Sweep On-Off is used to, er, turn the sweep on and off, and Sweep Range acts as a level control for the oscillator's sinewave modulation. This is shown on the display as a figure between zero and 100, while the value set by the Sweep Speed pushbutton (in conjunction with the good ol' Controller, of course) is displayed as a figure between 1 and 100.

Rear Panel

In addition to the somewhat insignificant Power switch, the MCS1's *derrière* houses a fair complement of connecting sockets, a couple of which – the Audio Out and Freeze In jacks – have already been mentioned. As for the rest, the CV and Gate In connections are also quarter-inch jacks: the latter carries a high TTL (+4V) signal to generate a gate command, and can be used either in conjunction with the CV socket for control *via* a one volt per octave keyboard, or on its own as a trigger input from a drum unit of some description.

Five-pin DIN connectors take care of MIDI In and Out (note that the latter does not function as a MIDI Thru connection) and the BBC In-Out socket that connects the MCS1 to a BBC Micro *via* the custom-designed interface unit. Finally, the Master-Slave and Serial Bus multi-way connecting points are both intended for use with future options, so you needn't worry about them for the time being. ■

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COMPUTER MUSICIAN

You know, there's a danger in believing too much of what you see in and on the mass media. Like the idea that synthesisers stopped with Robert Moog and started up again with the Synclavier. Or that mixing desks and their operators should be seen rather than heard; that Fairlight composers stare lovingly at waveform plots when they're not conjuring up the latest jingle; that the SynthAxe is an 'ancient electric guitar'; that a large Sony Profeel monitor showing a CX5 display of DX7 parameters can be found in every self-respecting electronic musician's studio; that Dave Whittaker is totally unconnected with the Synclavier's UK distributor. Or that Melvyn Bragg is *really* interested in electronic music.

If you hadn't already guessed, all that's to do with the *South Bank Show*'s electronic music extravaganza on Sunday, January 27. You know, the one with silly people doing equally silly things with electrical appliances . . . To be honest, the entire programme was about as compatible with current trends in music and its technology as the idea of a punk with a mohican haircut wearing a crash helmet on a motorcycle. In short, it stuck out like a sore thumb.

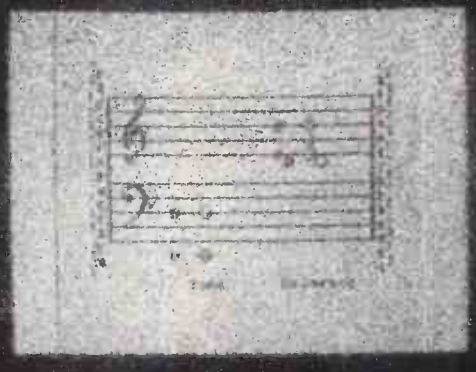
Aside from the anachronistic discontinuities between content and intent, what really concerned me was the way the programme insisted on portraying electronic music as a series of cosily-packaged ivory towers. One moment there was Denis Smalley (the LWT Press Release said it would be Roger, but never mind) mixing away in the midst of multiple speakers, courtesy of Lord Sainsbury's benevolence to the University of East Anglia, another moment it was the residential studio belonging to Phil Manzanera *et al*, complete with spiral ladder, sunken swimming pool, and all the other trappings of the one-time megastar – but without a synth in sight! And then there was Tim Souster, manfully trying to turn his garden shed into a musical TARDIS despite pathetic attempts on the part of the Synclavier at being a varispeeded Revox and Vogon impersonator.

More worrying still was the complete absence of any mention of the way in which the micro revolution is shaping music production. And not just music production, but music making in its broadest sense – from kids composing music on computers in the classroom to all that's happening on the MIDI and home micro scene. It's made all the more ironic in the light of the micro companies' waking up over the past year to this 'do-it-yourself' side of the entertainments industry.

Take Yamaha's CX5M and Acorn's Music 500, for example. Or take the Winter Consumer Electronics Show held in Las Vegas at the beginning of January, where Atari unveiled their truly remarkable ST range of 68000-based micros. Would you believe a 128K machine with an offshoot of Digital Research's GEM icon-driven operating system and built-in MIDI connection for just £350? Better still, a 512K version for £550. There's more: a 1 megabyte 3.5" disk drive for £125, a 10 megabyte hard disk unit for 'under £600', and a music computer called 65XEM for under £250 (watch out, Yamaha!) with eight sound channels courtesy of a custom sound chip which may or may not have anything to do with FM synthesis.

As every E&MM reader knows, this is the reality presented by today's music technology, and it's where the future of electronic music lies. The only problem is that the *South Bank Show* may have put back electronic music ten years in the eyes and ears of the non-cognoscenti public. So, what we need now is a programme – no, a series – that puts the matter straight. In the meantime, let's hope the *South Bank Show* takes Tim Souster's bizarre idea of 'musical telepathy' to heart, and goes straight back into its cultural vacuum.

David Ellis



Rumblings . . .

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

David Ellis

A German company called Klangenwerk is behind what's sure to be one of 1985's real biggies – the **Audio Operator** sampling keyboard, to be released at around the time you read this. Sampling is 12-bit at a rate of 40-50kHz, and there's up to 1 megabyte of RAM provided within the instrument for sound storage. Also included as standard is a 5.25" disk drive (with a second one optional) for sample and sequence storage. Talking of sequencers, the one in the Audio Operator sounds mighty impressive, with both real-time and edit modes, a capacity of 80-100,000 notes, MIDI sync, and optional SMPTE-compatibility. All this, plus the option of a five-octave dynamic wooden keyboard, serves mankind *via* 32 voices with full ADSR, VCF, and LFO control of 16 sample-fed digital sound generators. Other facilities include polyphonic arpeggiation, selectable keyboard split-points, multi-sampling, and a host of useful inputs and outputs. It's particularly nice to see printer and monitor interfaces in this latter category – meaning that the Audio Operator allows you to visualise what's going on inside with rather greater illumination than the average 40 character LCD display (which it also has).

Doubtless more will be heard about this system once the Frankfurt drooling is over. You'd probably also like to know the price, but that's something else that's pending discussion. For more information though, contact Lars Hidde at *Micro Music, Fruchtallee 19, D-2000 Hamburg 20, West Germany. ☎ 040-439 2919.*

MacMIDI

One of the most attractive features of Apple's Macintosh computer is its use of icons and a 'mouse' to humanise the business of interacting with a micro. In principle, this means that excess button-pushing and lists of convoluted commands become a thing of the past, but there's also the counter-argument that a little micro knowledge is better than none. In fact, some aspects of the Mac are nothing less than infuriating (the jettisoning of cursor edit keys in favour of mouse movements, for instance: hardly the way I'd want to word process) but there's also no doubt that icon-driven operating systems are here to stay, so the best bet is to make sure that they really do make the user's life easier rather than just adding yet more gimmick value.

Well, an oft-quoted statement is 'you don't need a master's degree to drive a Macintosh'. Similarly, you shouldn't need a master's degree to drive a MIDI. Which is roughly where the MacMIDI products from **Musicworks** come into the picture. First off is the MacMIDI MMU501 MIDI interface at $150 (but free with any three of the company's other products), followed by the MacMIDI VoicePatch Librarian (also at $150), which provides voice storage for a range of MIDI keyboards, including Yamaha DX7, Korg EX800, Oberheim Xpander and Ensoniq Mirage, and then there's the MacMIDISynth ($125), which appears to provide six-voice synthesis from the Macintosh itself.

The second set of software products comes under the heading of 'Musicwork Studio', and includes the MegaTrack MIDI Recorder/Sequencer ($150), the MegaMix MIDI Console ($100) – simulated automated mixdown on the Mac, interesting! – and MIDI Writer ($150). To cap it all, there's a further bit of software called Musicwork Studio (an extra $100) which enables you to 'create a convenient custom environment for the concurrent use of your MIDI studio resources' ie, the combination of MegaTrack, MegaMix and MIDIWriter. All of which sounds extremely impressive. For more info, contact *Musicworks, 18 Haviland, Boston, MA 02115, USA. ☎ 617-266 2886.*

MacMusic

. . . actually has nothing whatsoever to do with the Macintosh. Well, almost nothing, because it does borrow the Macintosh's style of graphics to make its point. In fact, MacMusic is **Passport Designs'** latest product for the Commodore 64 (and its soon-to-be-released successor, the C128, which has a special 'C64 mode') – sort of 'screw the SID chip to the limit' package that makes plentiful use of icons, pull-down windows and all the other graphical goodies that 1985 seems to throw at us with gleeful abandon. MacMusic will also operate with Passport's four-octave Music 64 Keyboard (which must be something like the fifth add-on keyboard for the Commodore to have appeared on the market so far).

More interesting (largely because of the copyright angle – see January's *CM Editorial*) is the news that MacMusic includes ten pre-programmed arrangements of songs by Michael Jackson, The Police, Lionel Ritchie, Willie Nelson and others. And that's only the tip of the iceberg of what looks like being Passport's best money-spinner yet – the co-publishing of music software and sheet music in what Passport and their publishing partners, the Hal Leonard Publishing Corporation, call 'Computer Sheet Music'. On the basic micro level, they're producing software for the Commodore 64's SID chip under the banner of Computer Hitware (ugh!), 'a computerised rock video program that gives the added features of arranging your own graphics to popular songs like 'The Reflex' from Duran Duran . . .' (surprise, surprise). Marginally more upmarket is the first Computer Sheet Music *Thriller* package, which

Duran Duran, one of several bands featured in Passport's latest 'mass-market' music software.

consists of MIDI arrangements of the tracks on the Michael Jackson album, plus a book containing 'big-note, easy-to-play notation'. Well, it may not be your cup of tea, or mine for that matter, but if this breaks MIDI out of the pro music clique and into the home, then I'm certainly prepared to give it my vote. Who knows? Perhaps this is the road to sub-£10 MIDI software and £100 MIDI keyboards.

But until then, the prices will come a little steeper. For starters, if you want to be thrilled by *Thriller*, you'll need a Passport MIDI card – that's $195 for either the Apple II or Commodore 64 version – and the $29.95 Computer Sheet Music package. Alternatively, there's the Computer Hitware package at $19.95, the MacMusic software at $49.95, and the Music 64 Keyboard for $199. For more details, contact *Passport MusicSoftware at 625 Miramontes Street, Half Moon Bay, CA 94019, USA. ☎ 415-726 0280.*

CMA

Worth joining, if your bag is computer music in the widest sense of the term, is the San Francisco-based **Computer Music Association**. They describe themselves (modestly) as a 'grass-roots organisation' dedicated to promoting the use of computers in music. Aside from providing the means for finding out about the latest hardware and software, there's also a quarterly newsletter and an annual conference. And to cater for different sorts of members (universities, individuals, impecunious musicians, studio cats, the pet gerbil), the CMA offers four membership schemes at varying subscription levels. To find out more, write to the Association at *Box 1634, San Francisco, CA 94101-1634, USA.* ■

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THE CX5M

revisited

We start an occasional series that aims to clarify the use, expansion and programming of Yamaha's popular music computer. *David Ellis*

One thing that's already emerged from the response to our Readership Survey (E&MM January) is that an awful lot of people have already bought CX5Ms. And if the speed with which those readers sent in their replies is anything to go by, it's clear that they're mighty keen to see more coverage of the micro in the magazine's pages. I'll admit that I've also been bitten by the CX5M bug, so it seemed only logical to put pen to paper in an attempt to fill some of the gaps in readers' CX5 know-how.

So, like the other 'under 1000' or so people in the UK that bought CX5Ms before Christmas (the estimate of *What MSX?* magazine, not Yamaha), I've got a machine that looks good, sounds good, but perhaps doesn't quite get it right when it comes to letting you know what's going on beneath its sleek exterior. The point about any computer – 'home', 'music', or otherwise – is that it's nothing more than a dumb workhorse at the beck and call of the user, but like all good working relationships between slaves and masters, mutual trust comes from mutual understanding. Unfortunately, in labelling their MSX micro as a 'music computer', and describing it as a 'musical instrument', Yamaha seem to be making it pretty tough for the user to find out just what it is that makes the machine tick with more musical finesse than the average, run-of-the-mill MSX micro.

I think every CX5M should come complete with a decent user's guide (not the paltry 42-page owner's manual, which includes just a single page on programming in MSX BASIC) that details the operation and programming of the SFG01 FM/MIDI unit. And I don't mean the Music Macro cartridge, either, because it's too slow to do anything particularly exacting with. True, Yamaha are prepared to make available details of the music BIOS (Basic Input Output System) side of the CX5M software – the routines, addresses, and so on that operate the SFG01 – to interested parties, but there's some positive vetting in operation, and it's more than a bit tough on the musician who, having bought a CX5M, finds his or her taste for computer music whetted and wants to find out more.

It's my view that if Yamaha made an effort to disseminate this information more widely, they'd stand a much better chance of breaking the CX5M out of the restricted musical marketplace into the more public arena, and thereby establish the CX5M as one of the more important MSX micros rather than the 'expensive curiosity' (a phrase used by one micro magazine) position it occupies at present.

But even given this moan, I still reckon that the combination of the SFG01's FM synthesis capability and MIDI control – when driven with the right sort of software – is the most cost-sensible way of getting around the timing bottle-neck that afflicts other micros attempting to do the multitrack MIDI bit. Which brings us to another temporal concern, and the main point of this month's CX5M update – the small matter of getting your CX5M to communicate its orientation in time and space with other like-minded machines.

Connections

From the word go, the YRM101 Music Composer looks to be a pretty bossy bit of software – very much a question of

MIDI master rather than MIDI slave. Try as you might, you won't find a single mention in the English instruction manual about running the CX5M from an external sync source or keyboard. But the fact of the matter is that there's rather more to the CX5M's life than just sending MIDI data ('mdon', 'mdoff' and 'sm') or synchronising MIDI drum machines ('msst'). Take these control commands, for example, gleaned from the Japanese music composer manual:

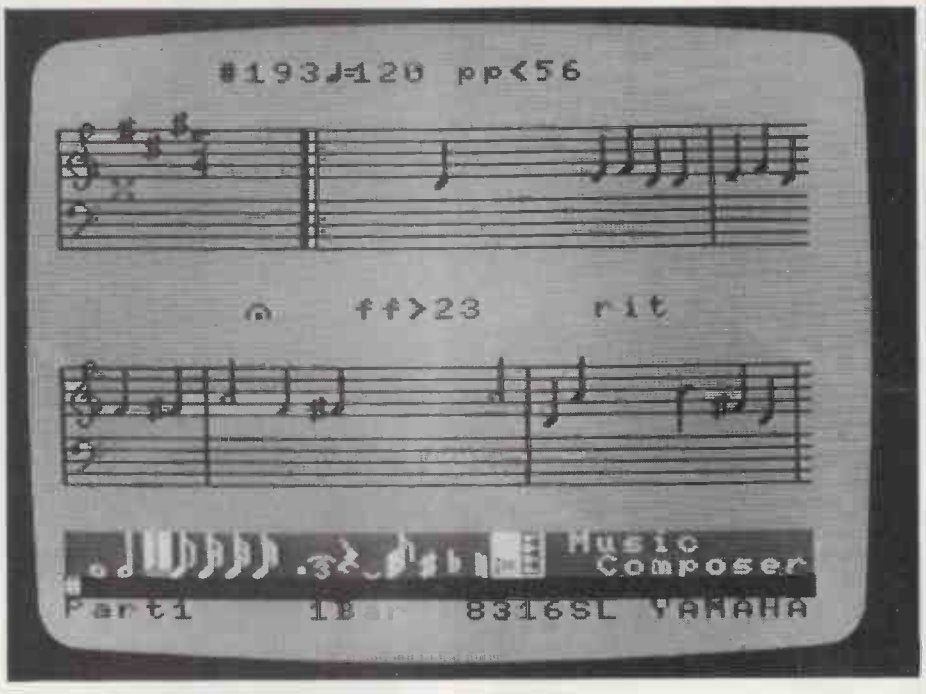
tsin	Tape sync in
tsout	Tape sync out
msin	MIDI sync in

Self-explanatory, really. But if you've read the English instruction manual from cover to cover, and still managed to escape the micro equivalent of the toxic confusional state, you might be getting a vague feeling of uneasiness, wondering why you've forgotten features which you're ceaselessly told are the lifeblood of the synced-to-the-eyeballs, thoroughly modern MIDI-ed musician. Well, fear not, you're in no danger of losing your sanity. The fact is that these control commands simply don't appear in the English music composer manual. So what gives? Some bizarre sort of musical trade embargo, perhaps, giving the UK market enough features to keep it happy, but not everything?

The truth of the situation is actually a lot less sinister. Knowing how finicky we Brits are about things working without hitches, the Japanese end of Yamaha felt that the tape sync and MIDI sync options should be left out of sight and out of mind because they weren't quite up to par with the rest of the software. But the problem wasn't anything to do with bugs in software. Rather, it was the Music Composer software coming up against precisely the same sort of timing bottle-neck that besets the MIDI – namely that there's a limit to the number of things that can be done within a given time slot. However, the commands still exist within the software, and there's no reason why they shouldn't be used, provided a few cautionary guidelines are borne in mind.

First, let's look at 'tsin' and 'tsout'. This pair of commands provides a tape sync feature that operates along standard FSK (standing for Frequency Shift Keying) lines, courtesy of the CX5M's cassette interface. If you want to record the tape sync signal onto tape, the first step is to go into the 'command' mode of the Music Composer, and then head for the beginning of Part 1, ie. where you'd normally put all the indications for tempo, key, output volume, and so on. Next, type 'tsout', and the display will be updated accordingly to indicate that the command has been added to the first part. Then, when you play that part or the entire piece, the cassette interface will send out the tape sync signal.

To check that the tape sync has been recorded satisfactorily, delete the 'tsout' command at the beginning of Part 1, and change it to 'tsin' (by typing 'tsin',



logically enough). If you then press the f5 function key to play the entire piece, or type 'play=1' to play Part 1 alone, nothing will happen. Or at least, not until you've rewound the tape and put the machine into playback. The point is that, having instructed the composer software to use the tape sync for timing purposes, you've now converted the CX5M from a master to a slave, and it won't play unless the tape sync signal is coming back into the machine *via* the cassette interface. The same is true of the MIDI sync facility (the input to the CX5M coming *via* the MIDI In socket, of course), which is invoked by entering 'msin' at the start of Part 1, but remember that setting Part 1 to 'msin' and 'tsin' at one and the same time won't exactly endear you to your CX5M. Another point to bear in mind is that the tape sync facility requires you to assign 'tsin' to each part you're putting down onto multitrack in turn.

But hang on a minute. Before you leap for the sync-to-tape lead, a few words of warning. The FSK sync signal starts off with a one-second leader tone which seems to be at a level some 15dB higher than the sync tone itself. This presents something of a quandary: if you set up the leader tone to record at 0dB, the rest of the sync track will barely register on the meter; if, on the other hand, you push the level up so that the sync is saturating the tape more equitably, the leader tone may well spill over onto adjacent tracks. The best bet is really the commonsense one, ie. to ensure that the leader tone corresponds with the silent count-in and that the sync level is high enough to trigger 'tsin' satisfactorily.

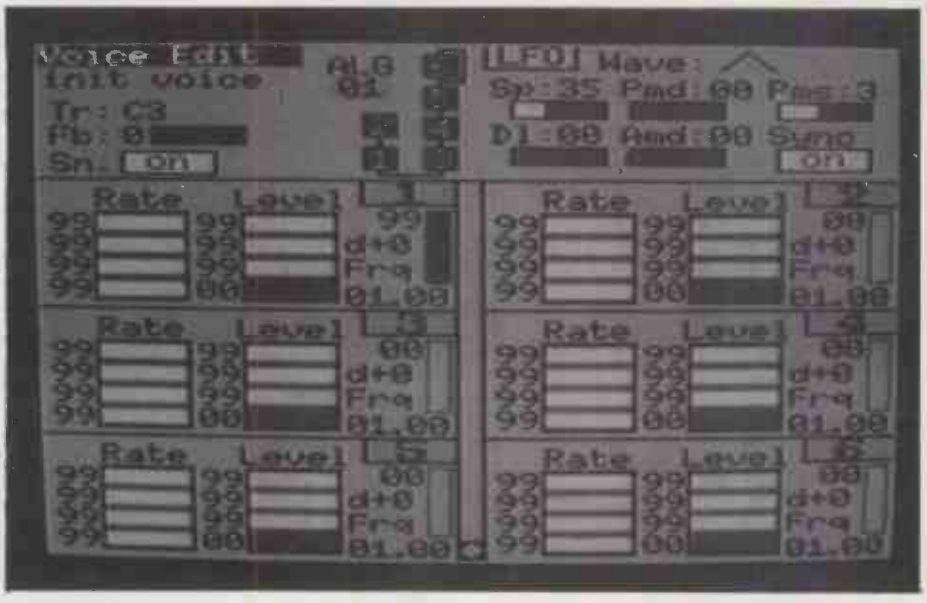
In fact, the input circuitry of the CX5M's cassette interface is a little on the sensitive side, so if the synced piece suddenly starts playing at a tempo that could vaguely be described as manic, try reducing the playback level, because what's happening is that the cassette interface is clipping the tape sync signal and making a right cobblers of the tape sync. Finally, remember that the Z80 processor in the CX5M has its work cut out trying to interpret the score's notes and commands acccurately, so if you elect to use the tape sync on all eight parts at once, don't be surprised if the timing goes a bit askew – especially if you're also sending out lots of MIDI data at the same time. And the same timing caveat applies to the MIDI sync facility, because again, you're asking the Z80 to keep its eye on an external time keeper at the same time as the notes and commands you've entered in the score. In short, try some experimentation first before attempting to commit anything to posterity.

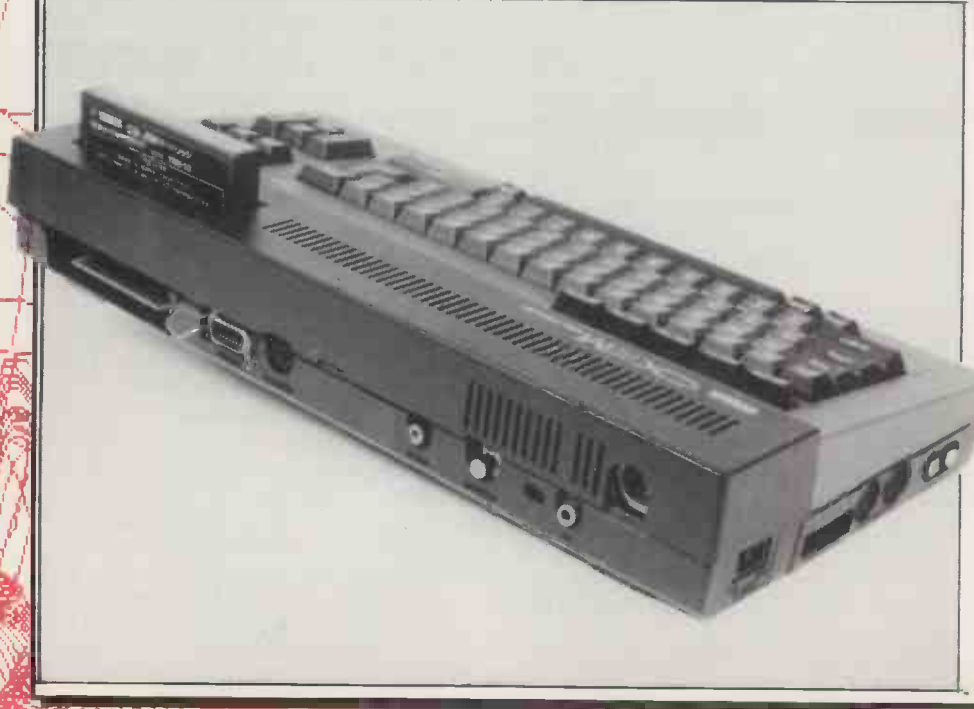
Storage or Bust

One of the most attractive features of MSX machines is that they have lots of orifices all ready and waiting to be connected up to a multitude of peripherals. If you take the CX5M, for instance, you'll find video and audio outs of various inclinations, the cassette interface, a brace of joystick ports on the side, a printer interface, the ROM cartridge socket on the top of the machine, the underside extension slot (into which the SFG01, FM/MIDI unit plugs), and a rear slot masked by a plastic cover. Now if, like me, you've come to the CX5M from other micros blessed with disk drives as standard (the Apple II and BBC Micro, in my case), it seems like a monumentally retrogressive step to return to the terrors of cassette storage. To be honest, it bores the pants off me to have to store note and instrument files on something as slow as the average cassette recorder, so the first thing I'm looking to add on to the CX5M is a disk drive: and I imagine the same thought has occurred to 99% of other CX5M owners.

Well, this is where that 'rear slot masked by a plastic cover' comes in – it's where the disk drive goes. Or at least, it's where the disk drive should go. The problem is that the current versions of CX5M software and the SFG01 simply aren't compatible with disk drive operation. For instance, in the case of the Music Composer software, the only loading and saving operations allowed are to the cassette ('cl' or 'cs') or to the 4K UDC01 data cartridge ('dl' or 'dc'). Furthermore, the SFG01 currently occupies the same memory addresses used by the 'about to be released' MSX Disk Operating System (DOS) which, incidentally, looks very good – so there's an immediate conflict of interests. All this has created something of an embarassment for Yamaha (though since MSX DOS is a lot later coming onto the MSX scene, it could hardly be said to be their fault), and the long and short of the story is that all their CX5M software is being rewritten to accommodate the use of disk drives. Precisely what this means as far as the distribution of software upgrades is concerned is anybody's guess. I just hope that Yamaha get it right, and avoid the farce that occurred with the BBC Micro and its innumerable ROM versions of the OS and BASIC. These upgrades should be free – OK, Yamaha?

As things stand at present in the UK MSX market, the only disk drive available is the 3.5" microdisk drive for the Sony Hit-Bit. But at around £350, this can hardly be said to be good value for money – especially when drives of similar capacity are already available for the BBC Micro at less than half that sum. Now, there's no reason in theory why this disk drive shouldn't be used with the CX5M – after all, mutual compatibility is meant to be the name of the MSX game – but don't expect your Yamaha software to work with it, because for the reasons I've already outlined, it won't. Don't lose heart, though. One of the brighter prospects to appear from manufacturers of MSX peripherals is a new type of disk drive called the Quick Disk. Priced at around £150, though not yet available in the UK, it comprises a 5.25" disk in a hard plastic shell with a capacity of 64K. And unlike the standard 'random access' disk drive (which means you can read or write to any spot on the disk's surface), the Quick Disk arranges itself as one long, continuous (or 'sequential') file, arranged in much the same way as the concentric groove on any LP. The good thing about this is the speed with which large files can be shifted to and from the micro – just six seconds for 64K (the equivalent of around 20,000 CX5M events, in fact). But like as is the case with so much in the wonderfully wacky world of MSX, there's no indication at the moment as to whether Yamaha's software will work with it.





Future Prospects

As far as MSX itself is concerned, the prospects are looking distinctly gloomy – it'd take a brave man to put his money on an area of the micro market that only took 2% of the 1984 Christmas sales – especially now that the UK launch of Atari's 68000-based and MIDI-inclusive Mackintosh lookalike (dubbed the Jackintosh) is scheduled for late Spring, and at an incredible 'under £400' for the 128K version. But be that as it may, there's no doubt that Yamaha are in a much healthier position than the majority of their MSX brethren. In fact, 1985 should see a host of new CX5M products – of both Japanese and home-grown origin – and a number of these will no doubt have made an appearance at the Frankfurt Musik Messe by the time you read this. Advance details have already been released of two new Yamaha packages, namely the real-time, four-track MIDI Recorder and an RX Editor which essentially adds a TR707-type programming grid to the RX11/15 drum machines. Both make effective use of 'icons' (graphical representations of a particular function) and also provide the option of using an MSX 'mouse' (dubbed 'Msx Minnie' in some quarters . . .) instead of a cursor. Who knows, perhaps the updates to the old CX5M software will follow similar iconic, murine trends?

Finally, if you've got any queries, or want to pass on any words of wisdom to fellow CX5M owners, I'd be pleased to hear from you. So too would the DX Owners' Club, who've now expanded their field of operations to include the CX5M. They recently sent me a cassette of new CX5M sounds (it's free to all new members), some of which are really excellent. Their address is PO Box 6, Ripon, N Yorks HG4 2QT and this month's E&MM has details of a hi-tech presentation they're holding in London this coming March. ■

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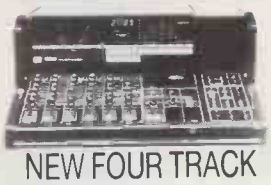

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THE FAIRLIGHT EXPLAINED

Waveforms, lightpens and interpolation all come under examination in this instalment of our Fairlight CMI Grand Tour. *Jim Grant*

Just when you thought it was safe to open up a copy of E&MM without reading anything about the world's most influential computer musical instrument, your intrepid reporter returns from a New Year hangover with another action-packed episode. This month we look at the information presented by Page 5 in a slightly different light. You'll remember that Page 5 held the values for 32 harmonic faders and computed the resultant waveform for the current segment. You should recall also that the only way to create a complete sound of 32 segments was to define the fader levels for each segment and compute over the whole waveform; or define a few segments and Fill the harmonic data to the rest of the segments before computing. It's not hard to see that this method of creating sounds may be very precise but can also be extremely tedious. In a lot of cases, all we need is a way of tailoring the harmonics as the sound progresses: harmonic envelopes, in other words. Enter Page 4.

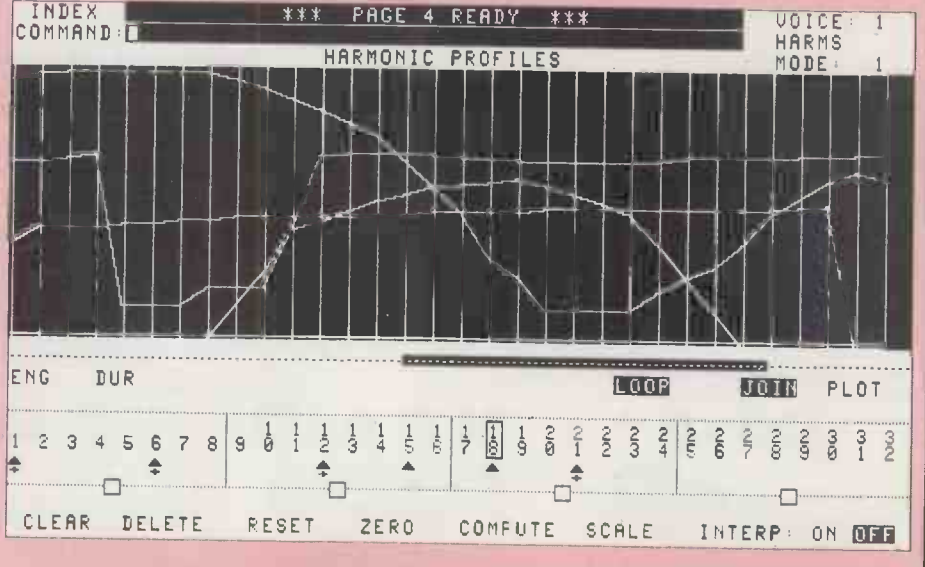
Figure 1 is a typical Page 4 display, and shows that it's one of the two Fairlight display Pages to be almost exclusively lightpen-driven. The large dark area is in fact a reverse video image, and pointing the lightpen in this region results in an arrow cursor appearing on the screen at the current lightpen position. For those unfamiliar with the term, the lightpen is now a fairly common computer add-on, mainly because of its simplicity of operation. Contained within every lightpen is a fast photoelectric diode or transistor which produces a voltage pulse as the TV line passes beneath it. Usually, the pulse is squared up and passed to the video controller chip, which stores the TV line number and position along the line in a couple of registers. This information can then be used by the programmer to initiate predefined events such as plotting a point or executing a command.

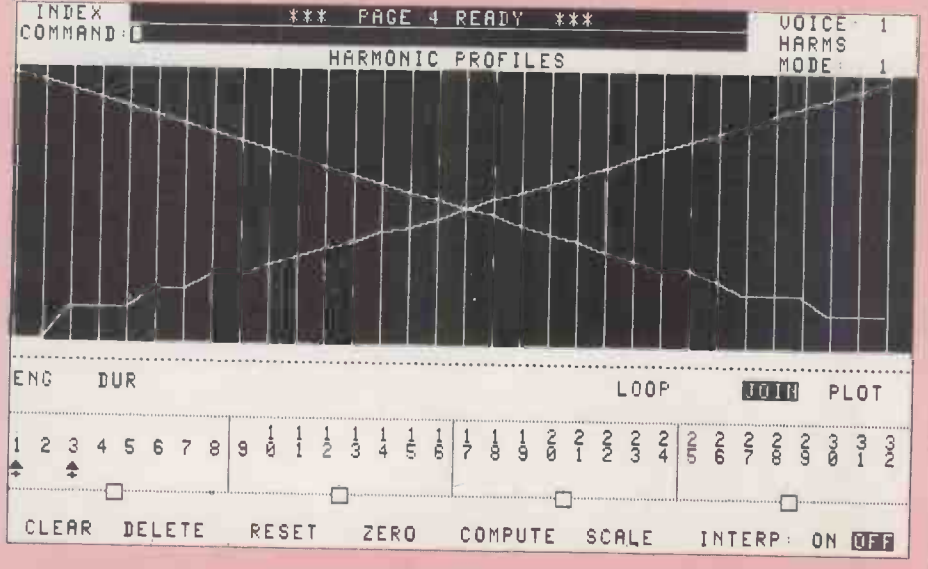
The Fairlight system is no different, except that the video controller is constructed from discrete logic chips and resides on a single eight-inch board within the CPU. In addition to latching the TV co-ordinates when the lightpen is used, it generates an interrupt to the processors to execute the selected task.

At first glance, the graph area in Figure 1 looks a bit confusing but it's really quite straightforward: the vertical axis represents amplitude while the horizontal shows time and hence the segment number.

Along the bottom of the display are the harmonic numbers 1 to 32. A small triangle under the number indicates that the time profile of that harmonic is being displayed on the graph, while a cross shows that the profile has a non-zero value.

So what does all this mean? Have a look at Figure 2. Two profiles are shown, one of which is the First harmonic (left to right downwards) and the other the Third (left to right upwards). On receipt of a Compute command, the CMI will fill the waveform segments with sound which initially at least, has a strong fundamental





but degenerates into dominant third harmonic.

You don't believe it? Look at Figure 3. This is great, because with 32 harmonics at our disposal, we can create sounds with interesting harmonic structures quickly and easily by selecting harmonics and waving the lightpen in the general direction of the profile area. Another bonus is that the profile data is mirrored segment by segment on the Page 5 faders, allowing detailed harmonic micro-surgery of the sound. Remember, though, that not every sound is created from harmonic data so that if, for instance, you're working on a sampled sound, calling up Page 4 will result in a completely blank profile graph.

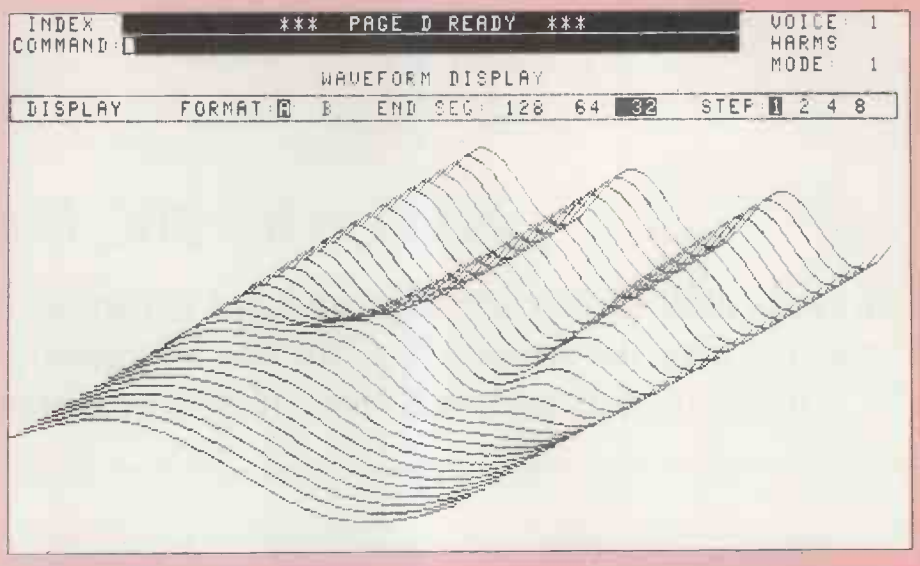
More About Mode

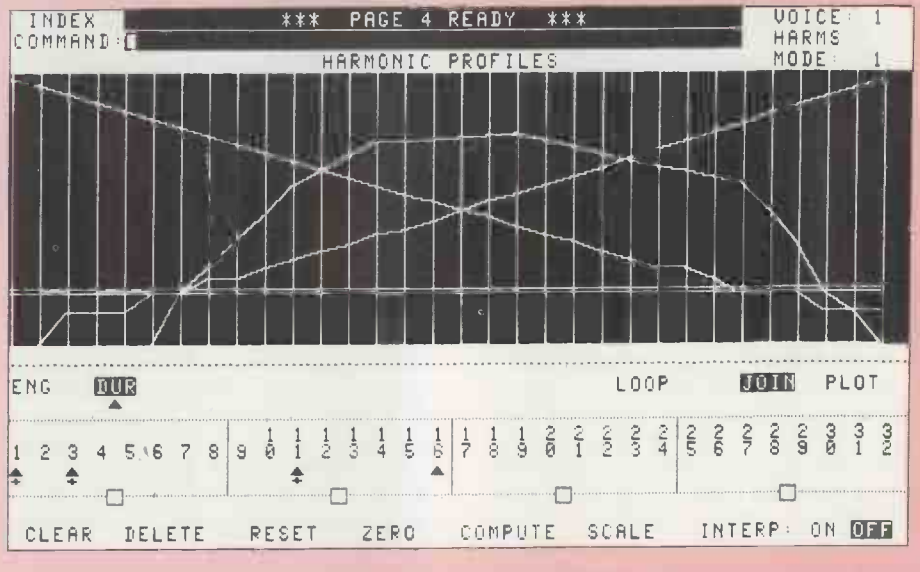
One of the previously mentioned features of a Mode 1 voice is the way in which the first 32 segments are looped several times to maintain the net event time of the sound across the keyboard. In fact, we have some control over how long a segment lasts before everything moves on to the next one, and this is accomplished *via* the profile. Figure 4 shows a harmonic profile graph with the duration profile indicated by a double line: the default value is approximately 50mS per segment and increases as the profile is drawn higher up the graph. This is particularly useful for creating sounds with a short click at the beginning of each note, such as that of a Hammond organ. A very short duration value can be drawn for the first one or two segments, and then a longer profile for the remainder of the sound. If the duration profile is made zero, the sound degenerates to a Mode 4 condition, except that it only lasts for 32 segments.

Another interesting aspect of Mode 1 sounds is their ENG profile. This is an artificial envelope that's superimposed on the waveform in much the same way as the more usual ADSR principle. But this one's a lot more flexible. When the Compute command is given, the CMI calculates the waveform segment by segment and scales the amplitude so that it fits exactly into the dynamic range of eight bits. The ENG profile is also generated (and its shape implied) by the harmonic data, but can be altered by the lightpen to control the amplitude of the sound on playback.

Auxiliary Functions

Along the very bottom of the display Page are a number of useful commands. Clear deletes all the displayed profiles from the graph, but they remain active and can be brought back to life simply by the programmer selecting the harmonic numbers with the lightpen. Delete, on the other hand, merely removes the currently-selected profile. The same sort of structure applies to Reset and Zero. Invoking





Reset causes a confirmation message to be printed and also results in Page 4 being restored to a complete default condition. Zero isn't quite so drastic, and results only in the current profile being set to zero. Every time you give a Compute command, a new energy profile is generated. Scale is the opposite: it redraws the harmonic profiles from a modified energy profile. This is not without its dangers, however, as it can result in some harmonic profiles being scaled beyond their maximum amplitude, which leads to clipping. The Fairlight *will* inform you of the situation when it occurs (by displaying 'Overflow') but is powerless to prevent it happening if the Scale command is issued. The only way to recover the sound then is to reload the voice.

Time now to introduce another concept with which some of you may not be overly familiar. Interpolation is the skill of guessing an unknown value that lies between two known ones, and is commonly used to predict values of points on graphs that aren't the actual ones originally plotted. When the Interp switch is On, each waveform segment is computed from a mix between the harmonic profiles of that segment and those of the next one. The difference between the two is subtle, and is only really noticeable when the profiles contain rapid changes throughout the duration of the sound.

Incidentally, becoming proficient at using the lightpen for drawing can take a lot of practice, so the CMI helps out by providing a Join Plot selector: when Join is active, any two points struck on the graph are immediately connected by a straight line, while fine detail can be drawn by selecting Plot. I imagine that most of you will be familiar with the Fairlight's Loop function by now, so I won't go through it all again. Suffice to say then that Page 4 offers a quick way of drawing the loop start and length. Mode 1 sounds are always calculated so that the waveform fits perfectly into a segment: the first harmonic does one cycle, the second harmonic two cycles, and so on. Gone are the Bad Old Days of trying to sample a sound to make it fit segments evenly. All you have to do now is use any old loop to span the sections of a waveform that are of interest, and Bob Moog's your uncle.

Next month (yes, there's still more to come), we'll take a look at Page 6 which, among many other weird and wonderful things, allows you to splice a sound down to no more than 16,384th of its length. And you thought a razor blade was powerful . . . ■

ATPL Symphony Keyboard

Add-on for BBC Micro

It looks like it's just another package attempting to get the best out of a micro's internal sound chip, but the Symphony's interfacing possibilities make it an altogether more fascinating proposition. *David Ellis*

It can't have escaped many readers' attention that one of the current crazes to have hit the more entertainment-orientated side of the micro add-on industry is the music keyboard that plugs into this or that user port on this or that micro. The BBC Micro has been far from unaffected by this sort of activity, and the Symphony Keyboard from Advanced Technology Products Ltd is among the current contenders aiming to turn musical keystrokes into meaningful realisations of Sound and Envelope statements.

So even though the advertising copy may claim that the ATPL product is an 'Electronic Keyboard' which 'provides simulation of a wide range of musical instruments and sound effects', you'd better have the Saxa ready between thumb and forefinger, because this is merely a 49-note keyboard of Italian extraction that uses the bog-standard diode matrix technique to send out a bit-code which subsequent software can then use as musical input to drive the Beeb's sound chip.

The major question, of course, is whether the cost of the keyboard (£125 inclusive of VAT and delivery) is warranted, given the limited capabilities of the aforesaid Texas SN76489 sound chip. Well, it is and it isn't, as we'll see, and it all really depends on what else you attach to the Beeb.

Keyboard

There's not really an awful lot more to say about the keyboard. It's a good one, but it's no different from just about every other keyboard that's been designed for adding on to micros. Which is hardly surprising considering that they're all made by one or other of two Italian companies who seem to have a monopoly in this field of endeavour. Mind you, one addition it does have is a jack socket for a sustain pedal, though it is an optional extra. Which leaves the ribbon cable to the Beeb's user port as being the only other item of hardware of mention, and there are no problems there.

Software

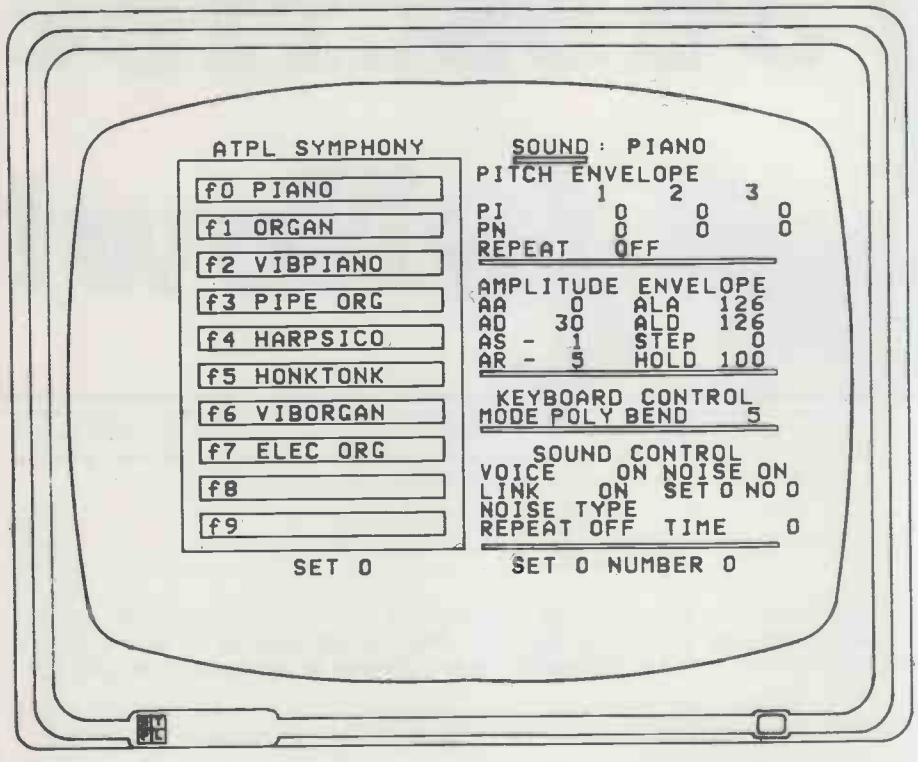
The software that comes with the basic Symphony Keyboard system is available on both cassette and disk. There's also a manual that does what it should do pretty efficiently, albeit labouring the point when it comes to self-justification. The disk software runs under the Beeb's turnkey booting-up option, ie. the pressing of Shift and Break together. A few seconds later, the first menu appears, offering a choice between playing the keyboard, loading or saving sound files, doing various things with envelopes, and cataloguing the disk or tape.

And what you get from the playing side of the software is roughly what you'd expect – a range of sounds making a brave if thankless attempt at acoustic instrument imitations (accessed in banks using Shift and the f0-f9 function keys), a smaller range of fairly ineffectual sound effects, a display of all the parameters making up the Envelope statement, and a number of other features for setting up independent percussion sounds on the numeric keys, switching between three-note polyphonic and monophonic modes of operation, editing the Envelope parameters, and so on. That's just about it on the creative side.

Curiously, what's missing is any attempt to extend the limited synthetic capabilities of the basic Beeb with imaginative multitimbral mixings or sequencing effects. In fact, there's no provision for recording anything played on the keyboard whatsoever. Which leaves us with a good keyboard and unimaginative software under the misguided impression that it's really capable of turning the BBC Micro into a live musical instrument. Doesn't make much sense, does it?

Music 500

Fortunately, there's a more positive end to the story. ATPL were quick to realise that Acorn's Music 500 box of tricks would be an excellent means of extending their system's synthetic capabilities, so they approached Hybrid Technology with a view to interfacing their keyboard with that company's Music 500. And the long and the short of this is that a common scheme of keyboard interfacing has been agreed upon (between ATPL and Hybrid, anyway), which means that the Music 500 now has a four-octave keyboard courtesy of ATPL's product. Hybrid will also be producing their own keyboard sometime in the future, but the agreement as regards keyboard interfacing means that Hybrid's own future keyboard-based software will be compatible with the product under review, regardless of what the future may hold. For the moment, though, it looks as if ATPL have got the market pretty well sewn up for Music



500 owners seeking a means of real-time input.

But beware. ATPL's keyboard *won't* work with the Music 500 without some software to interface with that product's programming language AMPLE. ATPL have produced some initial demonstration software (available on disk for £10) which turns the combination into an eight-note polyphonic stereo keyboard with function key selection of envelope, waveform, pitch offsets, rhythm accompaniment (of highly variable quality), and octave transposition. More interesting, from the point of showing what the Music 500 is capable of in the way of animated sounds, is a program rejoicing in the name JoyDemo. This uses the Beeb's four analogue input ports for joystick control of the waveforms, envelopes, and pitch shifts assigned to the ODD channel of each pair of Music 500 channels, together with the switching on or off of ring modulation and synchronisation. Good stuff if you're into real-time control of lots of synthesis parameters.

Conclusions

Good keyboard, dreary basic software, but lots of potential if you've already got or are thinking of getting a Music 500. It appears that more software will be added to the ATPL Music 500 demo disk as and when, so let's hope for more inspired attempts at sequencing than the current emulation of Japanese rinky-dinkism. The BBC Micro deserves better – so does the Music 500. But either way, the ATPL keyboard is good value at £125 – just don't fool yourself into thinking you're getting a proper musical instrument from the basic system. ■

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BeeBMIDI 7

The first of a two-part look at DX7ED, a catchily-named editing program for owners of the Yamaha poly, a BBC Micro and E&MM's hardware interface between the two. *Jay Chapman*

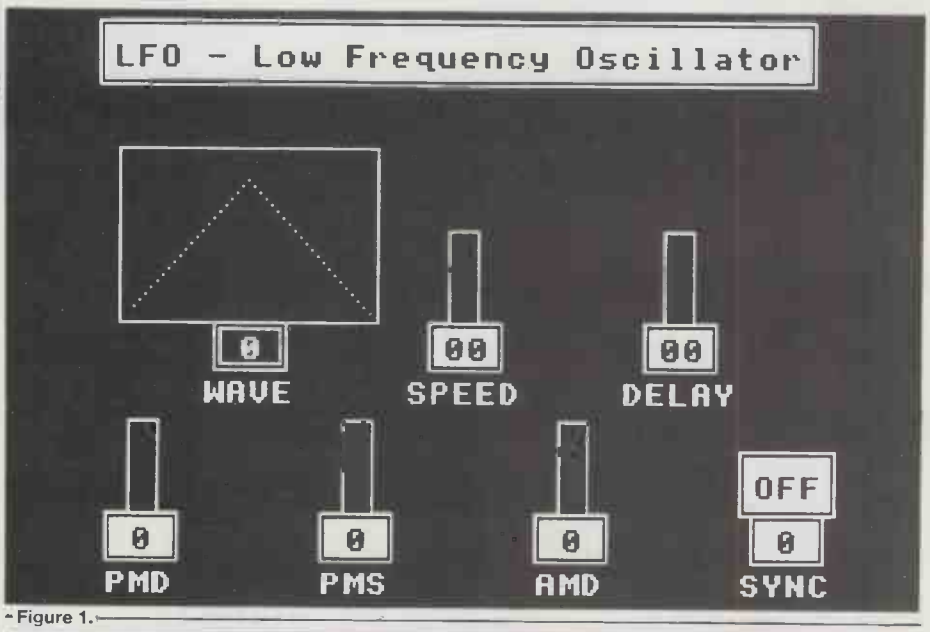


Figure 1.

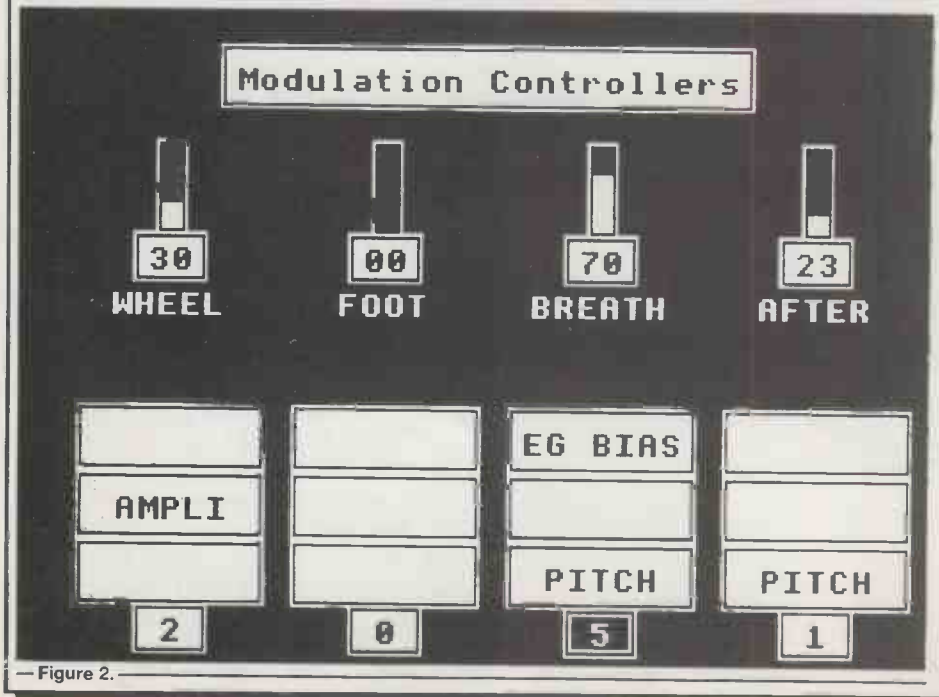


Figure 2.

The Yamaha DX7 has already earnt a significant place in the musical instrument history books for itself, its manufacturers, and its mentor, John Chowning – the researcher who pioneered the principle of Frequency Modulation (FM) synthesis. Not to put too fine a point on it, the reasons for the DX7's success are that it's a versatile, precise and highly musical synthesiser that sells at a relatively low price.

But that doesn't mean to say it's not without its problems. Because as it turns out – and as any DX7 owner will testify – the synth has at least two significant disadvantages by comparison with some of the more conventional models currently available.

The Problem

The first is inherent in the way FM works as a synthesis process. Put simply, keyboard players who come to an FM instrument after years working with non-FM machines are more often than not completely nonplussed by the array of panel controls they're suddenly confronted with. Analogue synth designs make the musician's job easier by grouping their various controls logically under separate sections, such as oscillator, filter, envelope and so on. Unfortunately, FM synthesis can offer no such logical equivalents, and many an 'expert' programmer has been defeated by the unfamiliar terminology the process finds it necessary to put his way.

The second disadvantage begins to take effect once the first has successfully been negotiated, as even if you know what they're all for, experimenting with the DX7's parameters can quickly become confusing, not to say extremely frustrating. If you doubt this, just try determining the pitch relationship between two Operators, or making one Envelope Generator's attack develop 'just a touch' later than another's.

Wouldn't it be nice to be able to view

the amplitude/time graphs of *all* six Operators' envelope generators at the same time? Or to analyse the construction of the current algorithm from a large on-screen diagram rather than having to search through the 32 miniatures on the DX7 front panel? Wouldn't it be useful to be able to move and/or swap complete sets of envelope generator parameters about at will? And just for that occasion when the latest piece of voice programming is going well, and you need another modulating Operator connected just there – and there isn't one in the current algorithm – but there is in a different algorithm – but the Operators you've already used are in different positions... instead of laboriously copying each parameter of each misplaced Operator into the right place for the new algorithm, wouldn't it be good to have the option of just moving complete sets of Operator parameters about at will?

The Software

If you haven't guessed by now, DX7ED will allow you to do all these things and more. The program reads in voice parameters from the DX7 and displays them clearly in useful related sets on a BBC micro's monitor. The synth's parameters can then be varied on-screen using the minimum of different QWERTY keys. And where diagrams or the odd bit of text might conceivably be of help in the quest to understand exactly what's going on, these are displayed in addition to the DX7 parameter's numeric value.

This month's BeeBMIDI feature is a bit of a teaser, really: there are four examples of what some of the program's screen displays look like, but more of these 'pages' will appear in next month's article, so that you can get a good feel for what DX7ED has to offer. Perhaps the most striking of this month's pages is that for the Envelope Generators (Figure 4), which I'll describe in more detail in a moment.

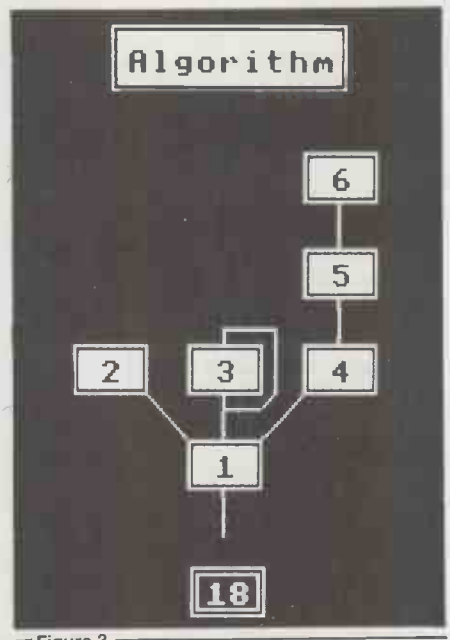


Figure 3.

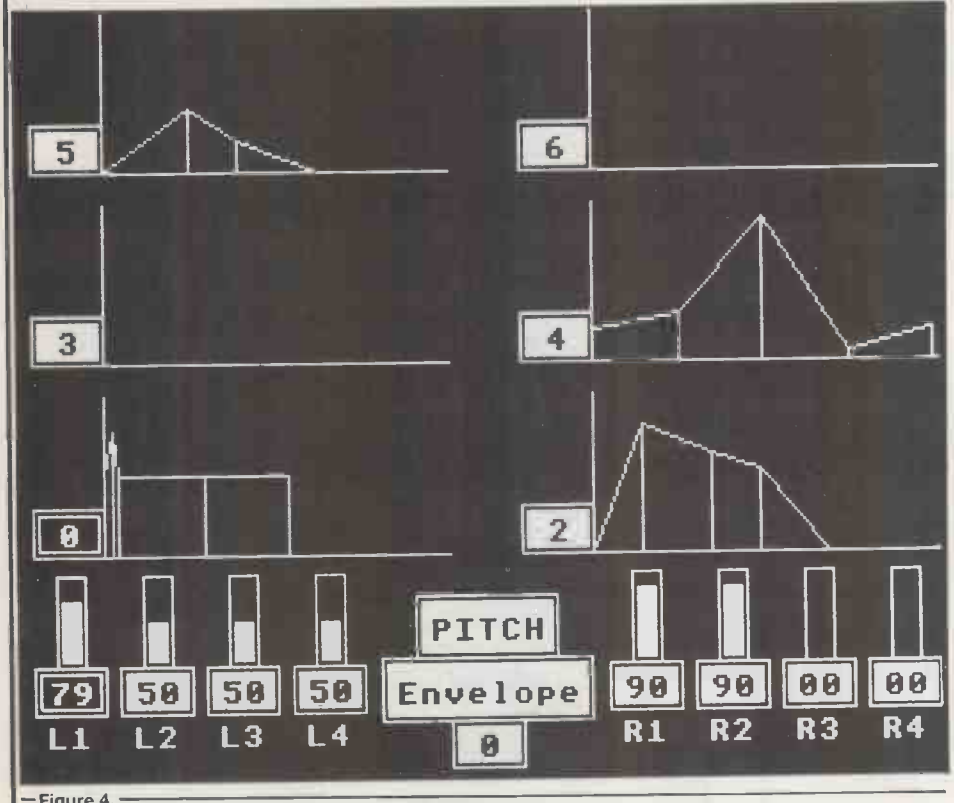


Figure 4.

First, though, let's look at an example of how DX7ED is used. Focus your attention, if you will, on Figure 1, the LFO page. When this page is selected, its title box and seven parameter 'graphics' are automatically drawn. The small rectangular boxes are used to show the current parameter values: they're all zero in the example shown. Where a parameter value is no more than a number in a range, such as the LFO Speed (0 to 99) or PMS (Pitch Modulation Sensitivity: 0 to 7), both the numeric value and a bar chart graphic above the value box are presented on the screen. The vertical bar gives a useful visual indication of the fraction of the parameter's range the current parameter value represents. Have a look at the 'Wheel' and 'Breath' graphics in Figure 2 for examples of this.

Now, where the parameter value is a rather more complex entity, ie. it has some other meaning than just being something within a numerical range, the software obliges by showing the additional data on-screen, so you don't miss a single slice of the action. Thus, in the case of the LFO Waveform (Figure 1) what's drawn is a representation of the actual waveform. Similarly, the Sync parameter actually shows whether Sync is On or Off, which tells you an awful lot more than the parameter values of 0 or 1 ever will.

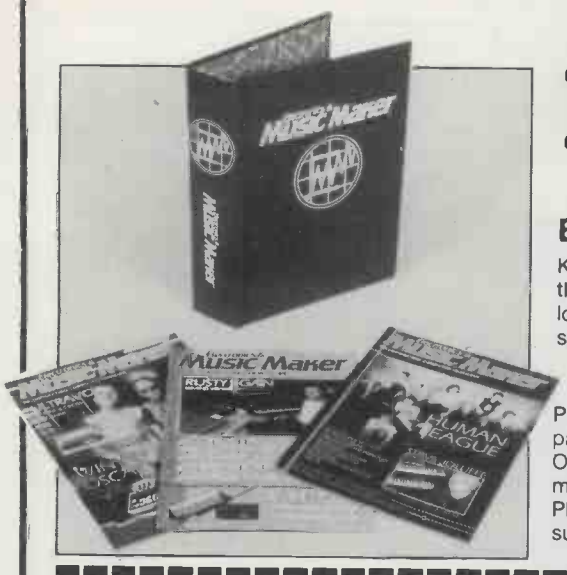
The way the software deals with an output of data in a non-numeric form is highlighted in Figure 4, where the Level and Rate parameters for any of the six Operator Envelope Generators and the Pitch Envelope Generator (which is shown temporarily replacing Operator 1's EG curve in the diagram) can be altered whilst viewing the change in the selected EG's curve relative to *all* the other EGs' curves. (Sorry about the tortuous vocabulary, but that's the way things are with these synths!)

I suppose it's not uncommon for music programs to highlight the selected parameter, and that's exactly what DX7ED does in all its pages. Thus, Figure 1 shows the LFO Wave parameter being edited, while Figure 4 has the Level 1 (L1) parameter of the Pitch EG (EG0) being adjusted. The software is configured so that the selected parameter value decreases or increases by 1 (or 10 if you press the shift key) when the ',' and '.' keys are pressed respectively. Pressing the 'm' or '/' key deselects the current parameter and selects the parameter graphic to the left or right of the previous one. Shifting for either of these keypresses exits the current page. The really alert amongst you will probably have realised by now that the DX7ED command keys appear in a block on the BBC keyboard, so control of the software is certainly an ergonomically efficient process.

The Teaser

Well, that about wraps things up for this month's episode, boys and girls. Next month's article will include the DX7ED program listing, more details of the package's facilities and a quick rundown on the working of the central routines, including the graphic displays and data input. I'll be paying particular attention to the coding of the data describing the 32 algorithm diagrams: have a think for a moment about how you might store the details of 32 drawings in a compact and easily accessible manner...

Oh and by the way, EmmSoft will be offering a cassette version of the program for those with blisters on their typing fingers – the price will be announced at the end of next month's article. See you then! ■



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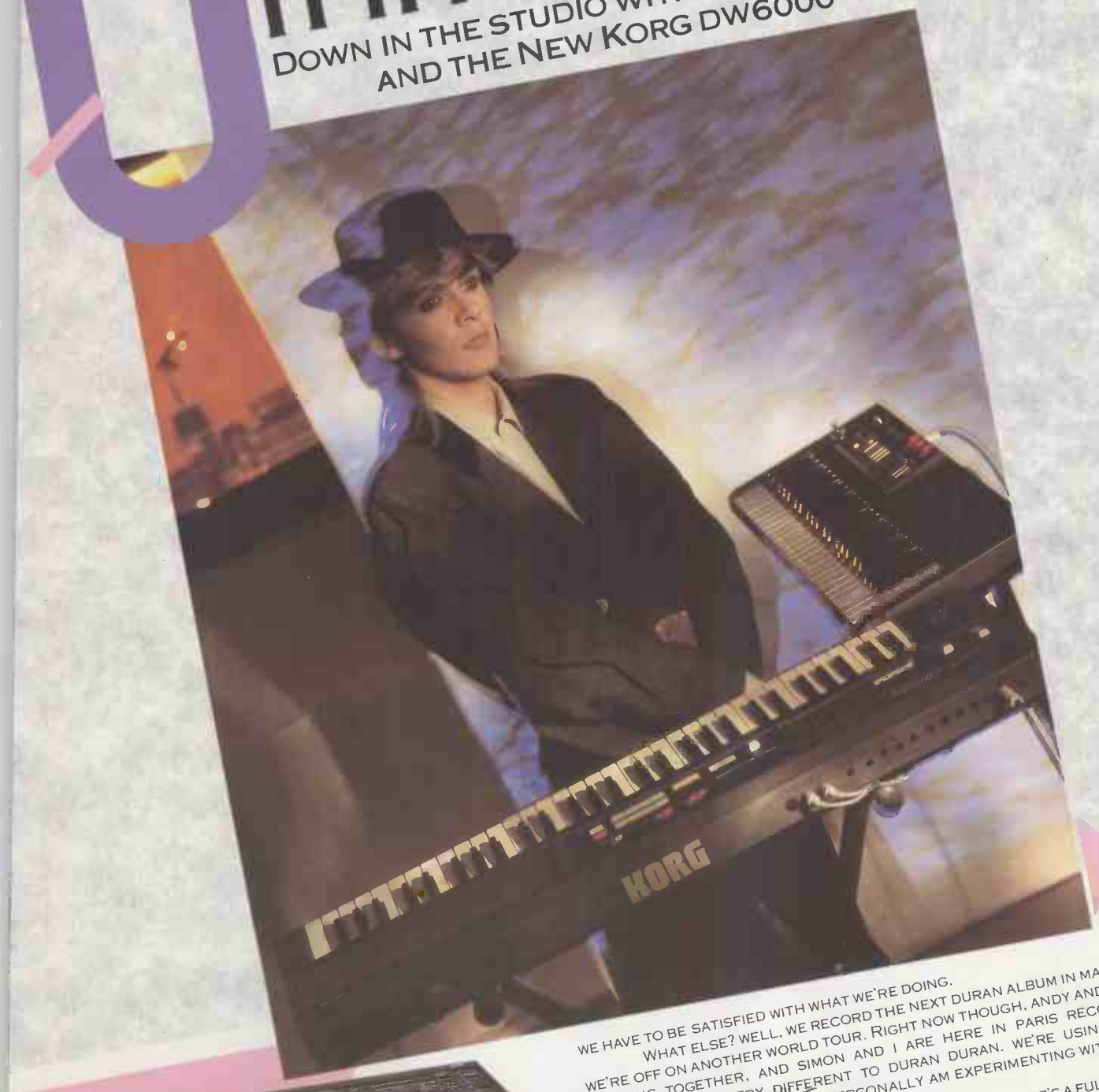
Off the record

DOWN IN THE STUDIO WITH NICK RHODES AND THE NEW KORG DW6000



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