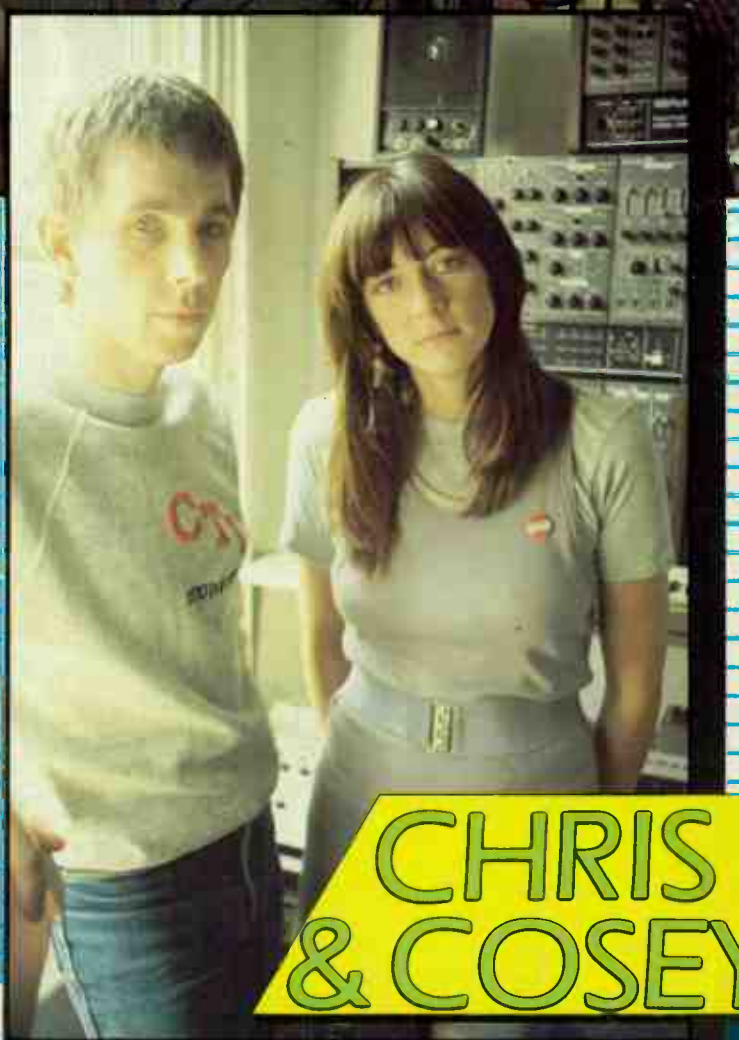
Electronics & MusicMaker
INCORPORATING COMPUTER MUSICIAN
SEPTEMBER 1984 95p

BRITAIN'S SYNTH PIONEERS

THOMAS LEER

BRITISH MUSIC FAIR REPORT
REVIEWS: OBERHEIM XPANDER
ROLAND MPU401
PASSPORT MIDI SOFTWARE
CUTEC MX1210 MIXER
MICRO MUSICAL ML10 SYSTEM
PART TWO OF OUR KORG COMPETITION



CHRIS & COSEY

JUNO-106

PROGRAMMABLE POLYPHONIC SYNTHESIZER

MIDI

The JUNO-106 is a completely new polyphonic synthesizer that accepts all MIDI information. The Juno-106 features three MIDI jacks on the rear panel — In, Out, and Through — as well as a Function switch used to select the send and receive mode for I KYBD, II KYBD + BENDER + PGM CHANGE, or III ALL. The settings of all front panel controls (LFO, DCO, HPF, VCF, VCA, ENV, and Chorus) can be sent and received using the Exclusive Message in the ALL mode. There are sixteen MIDI channel select buttons on the front panel, enabling you to interface with other MIDI products. Several MIDI devices can then be simultaneously controlled using the MIDI Through jack. All instrumental parts of a composition can also be performed using the data stored in a computer.

ELEMENTAL PARTS

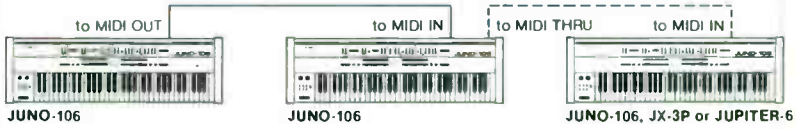
The JUNO-106, 61-key, 6-voice polyphonic synthesizer is easy to operate and packed with exciting functions. The JUNO-106 features a highly stable DCO, the same kind as used in Roland's famous JX-3P and JUNO-60. There are 2 groups (A and B) with 8 banks stored in each group. Each bank stores 8 patches for a total of 128 patch memories. All the LFO, DCO, HPF, VCF, VCA, ENV, and Chorus settings can be memorized. A cassette interface is provided to allow all program data to be stored on a cassette tape.
Since the program data of groups A and B are saved and loaded independently, it can be combined or rearranged as you like.
A memory protect switch is provided to prevent the program data from being accidentally erased.

PROGRAM MEMORY

The DCO's waveforms and ranges are selected by touch pads and the PWM, Sub-Oscillator, Noise and LFO controls are adjusted by sliding controls. The tone color is tailored at will by both VCF and HPF. The VCA has a level slider and ENV/Gate select switch. A Chorus effect is provided to reproduce realistic string or organ sounds. And for the first time in this price class, the JUNO-106 features a portamento function that is effective for both live performances and multitrack recording.

Typical set-ups using MIDI

A. JUNO-106 + other MIDI Keyboards

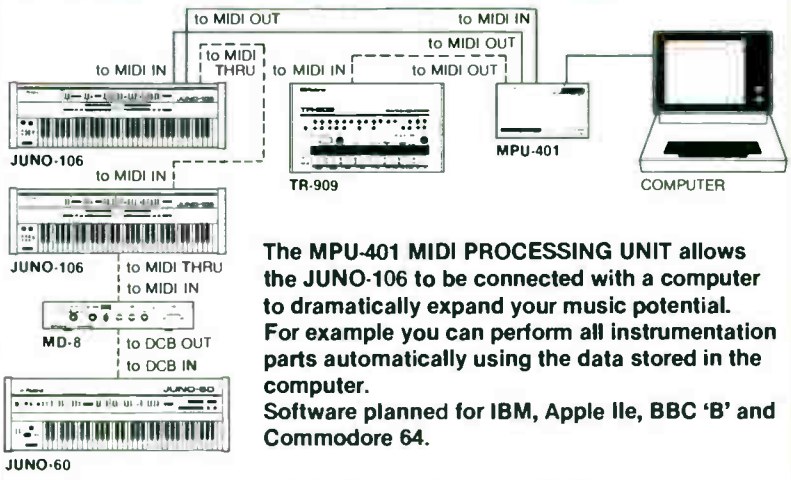


The JUNO-106 can control another MIDI keyboard. By connecting with its MIDI THRU jacks, the JUNO-106 can also control more than one MIDI keyboard simultaneously.

B. JUNO-106 + MSQ-700

When the JUNO-106 is connected with the MSQ-700 MIDI/DCB MULTI-TRACK DIGITAL KEYBOARD RECORDER, the MSQ-700 can memorize the JUNO-106's performance data.
If two JUNO-106 units are assigned different MIDI channels when writing performance data into the MSQ-700, the two JUNO-106 units can simultaneously perform two different instrumental parts.

C. JUNO-106 + MPU-401 + Computer



The MPU-401 MIDI PROCESSING UNIT allows the JUNO-106 to be connected with a computer to dramatically expand your music potential.
For example you can perform all instrumentation parts automatically using the data stored in the computer.
Software planned for IBM, Apple IIe, BBC 'B' and Commodore 64.

Roland

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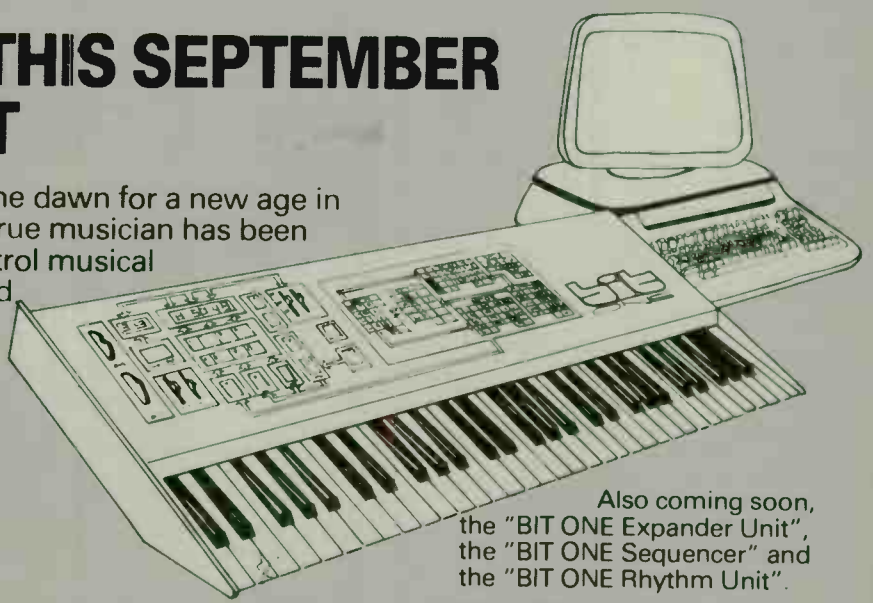

Sounds Great

The keyboard is completely touch sensitive giving you total control through the velocity of the keys over the attack and envelope of the VCF's, the attack and amount of the VCA's, the pulse width modulation of the DCO's and the modulation rate of the LFO's – all by the way you touch the keys – note by note ...but you'll really have to hear it to appreciate the difference this makes.

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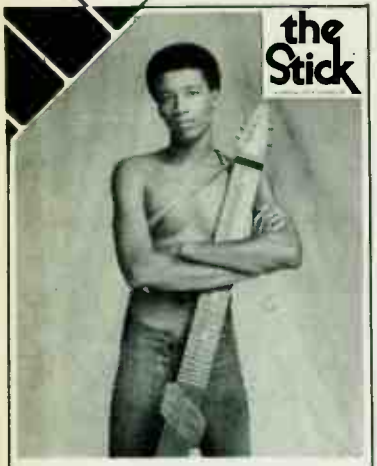

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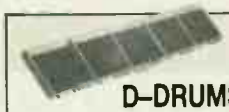

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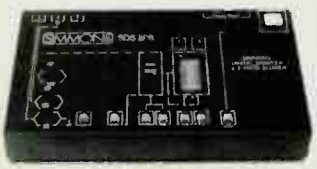

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E&MM September 1984 Volume 4 Number 7

NEWS

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Fair's Fair

Not a million miles away from this leader, you'll find the E&MM guide to last month's British Music Fair in London, traditionally the UK music industry's showcase for the new season to come. Like most show reports, it lists most of the significant new products that were on display, and also gives a few clues as to the general trends the various manufacturers' displays showed evidence of.

What it doesn't tell you is what the show's attendance figures were like or, indeed, why the BMF is Britain's only annual musical instrument festival: or why it's open to the trade only, not to the general public. The truth is, like almost every trade show over the last few years, August's BMF saw a Sunday in which almost every dealer in the land journeyed down to London to look at what was new, and three subsequent weekdays when very little business was done by anybody, anywhere. The reasons for that situation occurring are pretty obvious – all the music shops are closed on Sundays but they all open again the following Monday – so why do the show's organisers, the Association of Music Industries, persist in closing the BMF's doors to all but members of the music trade?

Well, the reasons for that are mainly historical and not worth going into detail about here, but suffice to say that the AMI is a trade-only body that doesn't want to be involved in running anything other than a trade-only fair.

And in a sense, of course, they're right. The British Music Fair is never going to be the ideal venue for members of the public to cast their eyes over the latest musical goodies. The distances between the hotels are too great for most musicians for one thing, and for another, because so many of the younger manufacturers/ importers aren't members of the AMI, the show no longer covers such a comprehensive slice of the market as it used to.

What's needed instead is a completely separate, independently-organised event, open to all sections of the industry and, of course, Joe Public. 'But', I hear you cry, 'all that's been tried before, and it's never worked.'

Perhaps not. But that hasn't stopped at least one organisation from making preliminary arrangements for a big trade-and-public show (possibly at the Olympia exhibition complex in London) and trying to gauge industry reaction to their proposals before this year's BMF – the planned all-comers fair wouldn't take place until August 1985!

Although that plan may succeed, large, centralised exhibitions in one hall do pose problems in themselves. The most obvious one is soundproofing, or rather the lack of it. As anyone who's been to the Frankfurt Musikmesse will testify, lots of exhibitors all grouped together under one large, echoey roof do not make for an environment that's particularly conducive to the objective evaluation of new music hardware. True, keyboard players can wear headphones, but guitarists and drummers generally can't, and in any case, how much bass end can *you* get out of the cans supplied at most big demonstrations?

The other major problem is simply that of geography, or how to give as many musicians from as many different parts of the country a chance to see and try out all the latest gear. The usual solution to this is to hold one big fair in London (see above), but how many musicians are going to travel down from Scotland to hear a couple of completely meaningless keyboard demonstrations, especially when they can read about all the new products two weeks later in E&MM or a similar publication?

Not too many, methinks.

E&MM's ideal solution would be to have lots of local shows dotted around the country, at which the local playing community would have ample time and space to evaluate new hardware, without having to travel hundreds of miles or having to be a member of some sort of trade organisation.

Whatever the final outcome,and it may well prove that a combination of the above possibilities will solve the needs of both the trade and the musicians, we remain convinced that music shows, of whatever kind and at whatever level, remain a worthwhile endeavour for all sections of the industry.

After all, no dealer – no matter how comprehensive his stock or how efficient his display – is ever able to demonstrate all the currently available hardware, in ideal surroundings, 100% of the time. ■

E&MM staff on the Music Maker Publications stand at the recent British Music Fair. From left to right: Terry Day, Dan Goldstein, Stuart Catterson, Linda Catterson, Ian Gilby, Trish McGrath, Dennis Hill.

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

MIDI and the Micro

Dear E&MM,

I am currently running several synthesisers from a Commodore 64 *via* MIDI and appropriate software. Is it possible to sample sounds through the CBM 64 as you can with the Apple/Decillionix or Spectrum/Ricoll systems?

Pete Chelmes
Auckland
New Zealand

Our recent July issue carried brief details of a sound-sampling add-on for the Commodore 64 to be released soon by Autographics, to compliment their Microsound 64 Keyboard. We hope to publish a full review as soon as the hardware/software becomes available. In the meantime, further details can be had from Autographics, 3a Reading Road, Henley-on-Thames, Oxon PG9 1AB, UK.

BeeBMIDI 4?

Dear E&MM,

I have been following your series of articles about using a BBC Micro to control a MIDI synthesiser, and am very impressed by the potential of the system. However, I wish to drive a Juno 106

synthesiser rather than a Yamaha DX7/9: when can I expect the necessary software for this combination?

Lee Jones
Wirral
Merseyside

BeeBMIDI's designer, Jay Chapman, is currently putting the finishing touches to multitrack polyphonic sequencing software to drive all MIDI synths, which should fit your requirements admirably. You can also look forward to a similar voice dump program to that published for the Yamaha DX7 in E&MM July, but this time designed specifically for the Juno 106.

A Matter of Course

Dear E&MM,

I have been actively engaged in both playing and writing many types of music for the past six years, and last year went to the Colchester Institute to study a degree in music. The course was something of a disappointment and the electronic music course offered did not in fact materialise. As I want to work in, and ultimately own, a studio, I feel that although my knowledge of music synthesising, recording and studio techniques is fairly comprehensive, I cannot hope to pursue this career without further education in the above topics.

To this end, I would be most grateful if you could supply me with a list of colleges or universities that provide a course similar to the one outlined. Although UCCA provide a booklet detailing universities, they do not outline any other possibilities.

Max Howarth
Edinburgh

What can we say? 'Home Studio Recording' July '84 contained 'A Guide to Recording, Electronic Music and Popular Music Courses in Britain', with details of all relevant training courses. Back issues available at £1.20 from our Mail Order Department.

We have no doubt that reading HSR regularly will supplement your recording knowledge, but it's worth keeping in mind that you don't need a university degree to set up a small studio! And from small beginnings . . .

On the Right Track

Dear E&MM,

Is there any chance that in the near future there will be a supplement in E&MM on portastudios? I have read through many rave reviews of the Fostex X15 and Cutec MR405, but as yet no comparisons have been made.

I would be grateful if you could publish a comprehensive review of personal multitrack machines, as other supplements in the past have helped me to choose equipment which is invaluable now!

Thanks anyway for being around for the past four years.

Richard Woodward
Folkestone
Kent

Up to September '83, E&MM regularly carried reviews and features related to recording, but as this aspect of the magazine expanded due to the 'home recording boom', we found ourselves with less space to devote to electronic instruments and music. So from the recording side of E&MM our sister publication, 'Home Studio Recording', was born in order to devote more space to studio equipment reviews, interviews, and techniques. We're sure you'll agree that in the long run this decision serves both recording freaks and electronic/computer music enthusiasts best.

Chip On His Shoulder

Dear E&MM,

I have now been waiting several weeks for the supply of a 74C922 chip to enable me to complete the Bass Pedal Synth project featured in E&MM April '84, and have been told that the chip is unlikely to be available from Watford Electronics, or indeed anywhere else. Perhaps you could suggest an alternative as well as any circuit modification which might be necessary to accommodate the other component(s)?

T Dawson
Bath

We are sorry you are experiencing difficulties obtaining this chip, and can assure you that at the time the project was designed, the 74C922 chip was in plentiful supply. Our enquiries to component suppliers brought to light the rather disturbing news that the average waiting time for this chip is now something in the region of two years! However, the latest news is that the worldwide shortage problem is improving. and we will let readers know as soon as we are aware of the chip being restocked. Further, if there's any component supplier out there holding a supply, please let us know!

We regret that no alternative to the 74C922 chip exists.

Voice Over

Dear E&MM,

I am interested in buying a Vocoder plus a headset, but am having trouble actually *locating* any of the less expensive models. I'm desperate (mainly because I'm not a very good singer!) so is there any practical advice you can give?

Kevin Baldwin
Beckenham
Kent

The only budget Vocoder still being manufactured (as far as we're aware) is the Roland SVC350, retailing at around £680 – not exactly 'cheap'. However, you
may find secondhand versions of the Korg VC10 (which comes complete with keyboard and mic), the Powertran ETI Vocoder, or (if you're very lucky) the excellent Roland VP330 Vocoder Plus.

Headset mics, no doubt due to consumer interest, are now being produced by many manufacturers, Boss and Shure to name but two. The Boss RH11M Stereo Headphones with Mic currently retail at just £69.

Incidentally, Advanced Music Synthesis (E&MM Nov '81) investigated the theory, technology and history behind vocoding. ■

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MUSIC

UK Electronica

Please note that the ticket prices announced last month for the UK Electronica festival were in fact correct only for tickets purchased in advance. The full price list is as follows: Daytime – £4.00 in advance, £5.00 on the door (includes £1.00 food voucher): doors open 11.00am. Evening – £3.00 in advance, £4.00 on the door: doors open 7.30pm.

Also, we heard just before going to press that Computer Music Studios will be holding a day-long demonstration at the event, being held this year at Sheffield University Campus on Saturday, September 8.

Further details from the organisers: Inkeys, 50 Durell Road, Dagenham, Essex RM9 5XU.

Ian Boddy – On Stage

Newcastle Media Workshops are playing host to Ian Boddy on September 22 at 7.30pm for an evening of electronic music. *Ticket information from Newcastle Media Workshops, Bells Courts, Pilgrim Street, Newcastle Upon Tyne. ☎ (0632) 322410.*

German Oddities

Conrad Schnitzler, founder member of Cluster, has made available (through Transmitter Cassetten) a box of 12 previously unpublished albums in cassette form. *Container T1-T12* consists of six C90s worth of new material at a cost of DM600. Contact *Transmitter Cassetten for further info and their current catalogue, at Medienexperimente, D-6941 Lohrbach, West Germany.*

News has also reached us from Germany about a new music cassette from **Peter Kaminski:** *Synthesis.* A mixture of EM styles ranging from Bach fugues, through Tangerine Dream to modern rhythmic synthesis, acoustic instruments are nowhere in sight on the album, the music being performed mainly on MIDI synths (two DX7s, SCI SixTrak, and Roland JX3P) controlled by a Commodore 64 and run by software and interfaces designed and developed by Kaminski himself. Copies are available from *Electronic Music Productions, Peter Kaminski, PO Box 5026, 4709 Bergkamen, West Germany.* Cost to residents of European nations (inc. postage airmail) is DM13 (IMO or Eurocheque), Overseas DM15 or $6.

Computer Love

Due for release about now is a new film ***Electric Dreams,*** the plot of which centres around a home computer that 'falls in love' with the girl upstairs. Wait up, what's that got to do with E&MM? Well, it so happens that the film soundtrack features the likes of Philip Oakey, Culture Club, Helen Terry, Jeff Lynne (ELO), Giorgio Moroder, and Heaven 17. The film may not win any Oscars, but the soundtrack – combined with some impressive Tron-like computer graphics – saves the day. We especially liked the part where the (home?) computer composed high-tech pop totally unaided, yet with the sound capabilities of a Fairlight, DX7, and Drumulator combined: and not a MIDI link in sight – strange . . . The original soundtrack is etched on Virgin Records, V2318.

HARDWARE

Alternative Linn

Alternative percussion sounds are now available for the LinnDrum from Syco Systems, who've set up a special demonstration computer program to play any of the 100 available sounds on demand. Prices range from a single chip at £35.00, two at £45.00 and four at £65.00 (all prices plus VAT). An expansion board to increase the maximum number of steps per song (from 99 to 250) is also available.

Further information from Syco Systems, 20 Conduit Place, London W2. ☎ 01-724 2451.

Tubby Synth

The Tubby Drum Company have come up with a nice idea in the shape of their Tubby Synth percussion synthesiser. Tubby Synth comes complete with eight Tubby Drum mic pickups, one of which is placed inside each drum shell or under each cymbal of an acoustic drum kit, an eight-channel stereo mixer, and a drum synthesiser section incorporated into each channel.

Each input channel allows the user to balance the levels of acoustic and synthesised sound and create the desired synth drum effect, and also offers an input sensitivity control and a pan pot for placing the drums in a stereo mix. Eight XLR input and output sockets are provided (as well as master L and R outputs), so that the drums' sounds can be given further individual EQ and treatment at the main mixing desk. A headphone socket and volume control will no doubt prove useful, while a Sequencer input socket on the back panel allows the Tubby Synth to be controlled by any sequencer with a Centronics D output socket.

The Tubby Drum Synth carries an RRP of £695.00 (inc. VAT) and further info can be had from the distributors, Musimex, at their new address 46a Marlborough Road, London N22 4NN. ☎ 01-881 6060.

Judging was recently completed for the Carlsbro Competitions, featured over four issues of E&MM earlier this year. Details as follows:

January '84 Competition: ***Winner*** D W Fox, Leicester ***Prize*** Scorpion Lead ***Dealer*** Carlsbro Sound Centre, Leicester.

February '84 Competition: ***Winner*** Jerry Cameron, Southend-on-Sea ***Prize*** Cobra 90 Keyboard Combo ***Dealer*** Honky-Tonk Music, Southend.

March '84 Competition: ***Winner*** Tim Williams ***Prize*** Marlin 6-150 PA Mixer Amp ***Dealer*** R & T Music, Cumbria.

April '84 Competition: ***Winner*** Mark Duffield, London ***Prize*** Cobra 90 PA plus two 2x10 150W Speakers ***Dealer*** Rose Morris Ltd, London.

Congrats again to the lucky winners...

CORRIGENDA

DX7DUMP (E&MM August '84)

The *SAVE command for the machine

code should have been as follows: *SAVE MC CA3 DOO

You can thank an error in the Watford DFS manual for that one – but the rest of the DX7DUMP errors are all the author's (Chapman hangs his head in shame!). He's also set the keyboard links on his BBC Micro so that the beast boots up in screen MODE 3 – if you haven't, you might like to add the following line to DX7DUMP: 10 MODE 3

Finally, alter the lines below to read as shown in Figure 1.

```
2390freq$=STR$(freq):IF INSTR(freq$,".")=0 THEN freq$=freq$+"."

2510pitch$=" "+MID$(notes, pitch MOD 12 + 1, 1)+MID$(sharp$,
    pitch MOD 12 + 1, 1)
2520IF pitch >= 3 THEN pitch$=pitch$+STR$((pitch-3) DIV 12)+" "
    ELSE pitch$=pitch$+"-1"
```

Figure 1.

BeeBMIDI

In order to ease the problem of obtaining the opto-isolator for this project, the magazine specified a different opto-isolator from that used in Jay Chapman's prototype. Unfortunately, the Maplin opto-isolator does not seem to be fast enough for the job, though at least one reader has succeeded in using this device by changing the values of R2 from 15K to 47OR, and R3 from 220R to 100R. To solve the problem once and for all, we're arranging to supply an opto-isolator with the right specification at the amazing price of only £2.75 (inc. p&p). *Please send orders to Mail Order Dept, E&MM, Alexander House, 1 Milton Road, Cambridge CB4 1UY, making cheques/POs payable to Music Maker Publications Ltd, and allowing 28 days for delivery.*

STOP PRESS

September 28 sees the release of ***The Complete Synthesiser Handbook,*** written by Michael Norman and Ben Dickey. A preview of the contents looks mighty impressive, with chapters ranging from synths (equipment and techniques), to electronic percussion devices, interfacing, synths in the studio, and interviews with leading exponents of synthesiser music. This 160-page publication will be available from Zomba Books, price £4.25, and a full review will follow shortly in E&MM.

Markk Lomas has sent us details of a new agency he's formed aimed at eliminating the expensive promotion stage that many bands have to go through on their way to the top.

The list of facilities on offer includes a musicians' contact service, promotion of bands to record companies, photography, video, preparing demos and leaflets, mailing, and so on, all at reasonable prices. For further info and rates, send an SAE to: *Markk Lomas Agency, 2 Chichester Rents, Chancery Lane, WC2A 1EG. ☎ 01-404 5737 or 01-504 8582.*

The Hi-Fi Show, Heathrow Penta Hotel, Heathrow Airport – September 6-9 (6-7 Trade Only).

Seventh Personal Computer World Show, Olympia 2, London – September 20-23 (£3.50 Adults/£1.50 Children).

Second APRS Digital Seminar, BAFTA Theatre, Piccadilly, London – October 29. ■

BRITISH MUSIC FAIR '84

The products that made headlines at the Association of Music Industries' annual London get-together. *Dan Goldstein*

For those not in the know, the British Music Fair is the most important event in the UK music industry's calendar, and while it pales into insignificance by comparison with the big multinational shows (at Frankfurt each February and Chicago every June), it's the one exhibition just about every dealer in the country gets along to, even if it's just to order another dozen or so trumpet mutes.

It generally acts as a launchpad for a good many new music products from manufacturers both British and foreign, and this year's show was no exception, even if many of the goodies on show had already been seen in alternative guises.

There were several themes running through the show from an electronic viewpoint, but perhaps the most important was the return of the modular synthesiser.

Korg and **Yamaha** were both showing performance keyboards, Korg's RK100 is designed specifically to link up with their EX800 MIDI Expander (you can win both of them in our free competition, see elsewhere this issue) while the Yamaha KX5 also transmits and receives information along the music world's most infamous communications bus: Dave Bristow was demonstrating it – along with its full-size brother, the KX1 – to the world and his wife in one of Yamaha's many demo rooms.

Roland's variation on the same theme – the Axis – won't be here until December, but they had an altogether grander form of modular system on display. First unveiled over a year ago, their MIDI-based 'mother keyboard' system should be available by the time you read this.

Basically, you start off with a choice of two free-standing controlling keyboards: the MKB1000 (£1665), which has an 88-note wooden keyboard, or the MKB300, an altogether cheaper (£990) but only slightly nastier version. Both 'mothers' look very elegant, if a little on the delicate side considering that many musicians will no doubt want to use them on stage.

You've then got a choice of two rack-mounting polysynth modules and a piano module. The latter is the MKS10 (or 'Planet P', as Roland would have it) which offers eight piano-type sounds and, like the others in the range, fits in a standard 19" rack and is fully MIDI-compatible. RRP is £990. The synth modules are the MKS30 ('Planet S') and the MKS80 ('Super Jupiter'), priced at £875 and £1800 respectively. Both have a lot in common with established Roland polysynths, notably the JX3P and Jupiter 6/8, and like the former, programmer add-ons are available for those unused to digital parameter value selection. The Planet S can be used with the already-established PG200, while the Super Jupiter has a 19" programming module of its own, the MPG80, RRP £395.

Siel MK900.


Roland MPG80 programmer.


d-drum and sound chips.

> 'Both Roland's mother keyboards look very elegant, if a little on the delicate side considering that many musicians will no doubt want to use them on stage.'


Roland MKB1000 Mother Keyboard.

Hats off to Roland for taking the modular idea a step further than anyone else (MD Brian Nunney sees it as being 'the only way forward'), but whether many will be prepared to pay the new gear's formidable asking prices is a question only time will answer.

The 'Big Three' Japanese concerns weren't the only ones showing off modular systems, though. Italians **Siel** were one of the first to exploit the potential of expanding synths *via* MIDI when they released their Expander at the beginning of the year, and two further developments should ensure that their system remains competitive. The well-known Opera 6 polysynth has been re-packaged as the DK600, and new features include fully-assignable MIDI Channels and programmable keyboard dynamics: it's gone down in price too, to £999. Siel were also demonstrating a number of software packages for their own MIDI hardware interface, among which was the Expander Editor program, which displays an Expander's internal circuitry as a graphic representation of the DK600 control panel, and allows the user to adjust individual parameters accordingly.

Oberheim's aptly titled Xpander (see review elsewhere this issue) was drawing a lot of attention in the Atlantex room, and deservedly so, whilst **Yamaha**'s modular DX rack (effectively eight DX7s in a 19" box for something in the region of £4000) has undergone a visual facelift and an ID change, from T8PR to TX816. Whatever it's called, it should prove immensely popular with wealthier musicians once it goes on general sale sometime in the ensuing months, especially if Yamaha's screen dump program for the CX5 (more of which anon) can be made compatible with each individual module, which will make programming the things a lot easier.

Siel UK were also demonstrating MIDI sequencing software for both the Spectrum and Commodore 64 (the latter package looking particularly impressive), while the company have also succeeded in modifying an interface to work with the BBC B, with production models on the way. Certainly, Siel's display showed them to be one of the most forward-looking of UK keyboard importers, and with the prospect of some new all-digital synths not too distant, their future looks rosy indeed.

Still, they weren't the only ones exhibiting MIDI software.

Jellinghaus Music Systems were tucked away in the company of Rosetti, who ill-advisedly stayed away from the main part of the show and exhibited instead at the Electronic Keyboard & Organ Trade Fair at the Connaught Rooms, thereby ensuring that almost nobody genuinely interested in the JMS stuff actually got to see it. I managed to, but only after being informed of the software demonstrations' existence by Wolfgang Jellinghaus himself.

> 'Jellinghaus' single-channel analogue-to-MIDI interface should confidently undercut most of the competition, if the German price of £150 is anything to go by.'

JMS were in fact one of the first companies anywhere to start designing and marketing MIDI software, and their new Recording Studio package should be music to a good few computer musicians' ears, offering as it does 12 tracks of fully polyphonic, real-time note storage, complete with assignable MIDI Channels for each track and some basic editing facilities, and all at a very competitive £99.

The Germans are also close to releasing two bits of hardware that should be of interest to a good many modern musicians. First off is a single-channel analogue-to-MIDI interface that should confidently undercut most of the competition if the German price of £150 is anything to go by, while Jellinghaus' Master Synchroniser does the same job (give or take a couple of pulses-per-quarter-note variations) as the Doctor Click *et al* for a fraction of the price. It's to be built in England and should be in music shops before Christmas.

Lastly on the software front are **Yamaha**, who are still in the process of developing multitrack sequencer programs for their own CX5M music computer. The latter is now in full production with a proper-sized QWERTY keyboard, MSX and MIDI, and amongst the software packages being demonstrated were some educational programs, a DX7 screen dump and an editor for the CX5's internal FM voices.

There are now two alternative keyboards (one miniature, the other full-size) to go with the CX, and it seems likely that the former will be offered as part of Yamaha's introductory package.

Electronic percussion – in the form of both programmable drum machines and more 'conventional' electronic drum kits – seems to be as popular as ever, as evidenced by the number of new percussion-related products making the debut at their show.

Yamaha (yes, them again) have now got the RX11 and 15 into full production, and both sounded as excellent as the prototypes had done back in February.

But **Korg** stole the show in the drum machine stakes with their remarkable 'Super Drums' and 'Super Percussion' units, previewed last month in our NAMM Show Report. Both employ PCM-encoded drum voices and are fully programmable, and although they lack MIDI, Korg's own KMS30 MIDI Synchroniser enabled them to be linked up to a Poly 800 for a truly stupendous (and largely impromptu – the machines only arrived in the country a day and a half before the show's commencement) demonstration of the Rose-Morris stand.

A few unbelievers were heard to mutter that the sounds on the DDM110 (the conventional drum kit variant) were a little on the muffled side, but who can seriously argue with the machines' specification at an RRP of only £229 each, or with the fact that the DDM220's Latin Percussion voices are simply *superb*?

Moving on to drums you can actually hit, Japanese giants **Tama** unveiled the Techstar, their first foray into the world of electronic drums. To many, the kit will have looked and sounded much like any other Simmons copy, but what a number of drummmers seemed to be remarking on was the sheer *playability* of Tama's pads: even the man from Simmons had a worried look on his face as he approached Summerfields' stand, and perhaps not surprisingly so, in view of the fact that Tama are the first manufacturers of 'traditional' drums to enter the electronic field.

Elsewhere, things aren't quite so rosy in the **Dynacord** garden. They proudly demonstrated a complete electronic drum system consisting of pads, sequencer, and sampling unit at Frankfurt back in February, but one production difficulty after another has meant that only the first of these is yet available. Still, the Germans have at least found a neat way of fitting the PROMs for each voice so that the user can exchange and insert them at will: Dynacord's plug-in modules looked about as drummer-proof as anything can be.

A similar plug-in system is also employed on the **d-drums**, Swedish-built electronic percussion units that are also made (under licence) by E-mu Systems in America where they're known as E-Drums, which is all highly confusing. Anyhow, d-drums are sold as single units containing a touch-sensitive pad, controls for pitch, pitch sensitivity, bass and treble, and one pre-recorded EPROM of the purchaser's choice. Some of these contain up to four sounds, depending on the length of sample needed to replicate a sound convincingly.

The units are superbly constructed, and the quality of some of the samples is excellent, thanks to some extensive research by the manufacturers into the sorts of sounds drummers want and how to set about recording them. Many of the available bass and snare sounds, for example, were recorded using a Lexicon digital reverb system, and it certainly seems to have paid off.

One of the most novel products in the 'things to be hit' section was **Roland**'s MPC8 MIDI Pad. Demonstrated only in prototype form and awaiting a change of ID code to prevent further UK corporate embarrassment, it nonetheless succeeded in transforming the same company's TR909 rhythm box into a 'live' instrument of some power.

Basically, the MPC8 is a MIDI controller with eight individually-assignable, touch-sensitive pads, with foot control for hi-hat and bass drum, assuming you're using it to control a drum machine. You could, of course, connect the MPC8 to a MIDI keyboard and assign each pad to a different note, thereby reversing last year's fad for controlling individual drum machine voices *via* set notes on a dynamic keyboard.

Still on the subject of MIDI, it seems that several companies have realised the scope for putting the new interface standard on instruments aimed at the domestic end of the market, the idea being to encourage home micro owners to get into 'serious' computer music without having to spend vast sums of money on sound-generating hardware they're not (yet) competent to handle.

To this end, **Yamaha, Siel** and **Casio** have all produced MIDI-compatible personal keyboards. Unsurprisingly, Yamaha's PS6100 features FM-generated preset voices and a drum machine that incorporates PCM-encoded percussion sounds, and a built-in 'music programmer' that takes the basic programming facilities of the smaller MK100 keyboard (reviewed in E&MM July) a stage further. Less predictably, the 6100's spec sheet also includes a three-way splittable keyboard and after touch – not the sort of thing domestic instruments are normally endowed with.

Like the new Yamaha, Siel's new MK900 incorporates some degree of programmability as part of its auto-accompaniment section, though in terms of sound-generation it is less adventurous. Still, one novel feature is the provision for four of the instrument's preset drum sounds (bass, snare, cymbal, and bongo) to be played manually using the topmost notes on the keyboard. Built-in rhythm units will never be the same again.

Meanwhile, Casio's lengthy abstention from the professional/semi-pro side of things was ended with the launch of the CT6000. Again, its keyboard offers touch-sensitivity and after touch, while as if to make absolutely sure *nobody* mistakes the 6000 for a home organ in a flashy case, its designers have also included a pitch bender in the traditional position at the left-hand end of the keyboard. There are 20 polyphonic voices to choose from, and many of them, the string voices in particular, were very impressive.

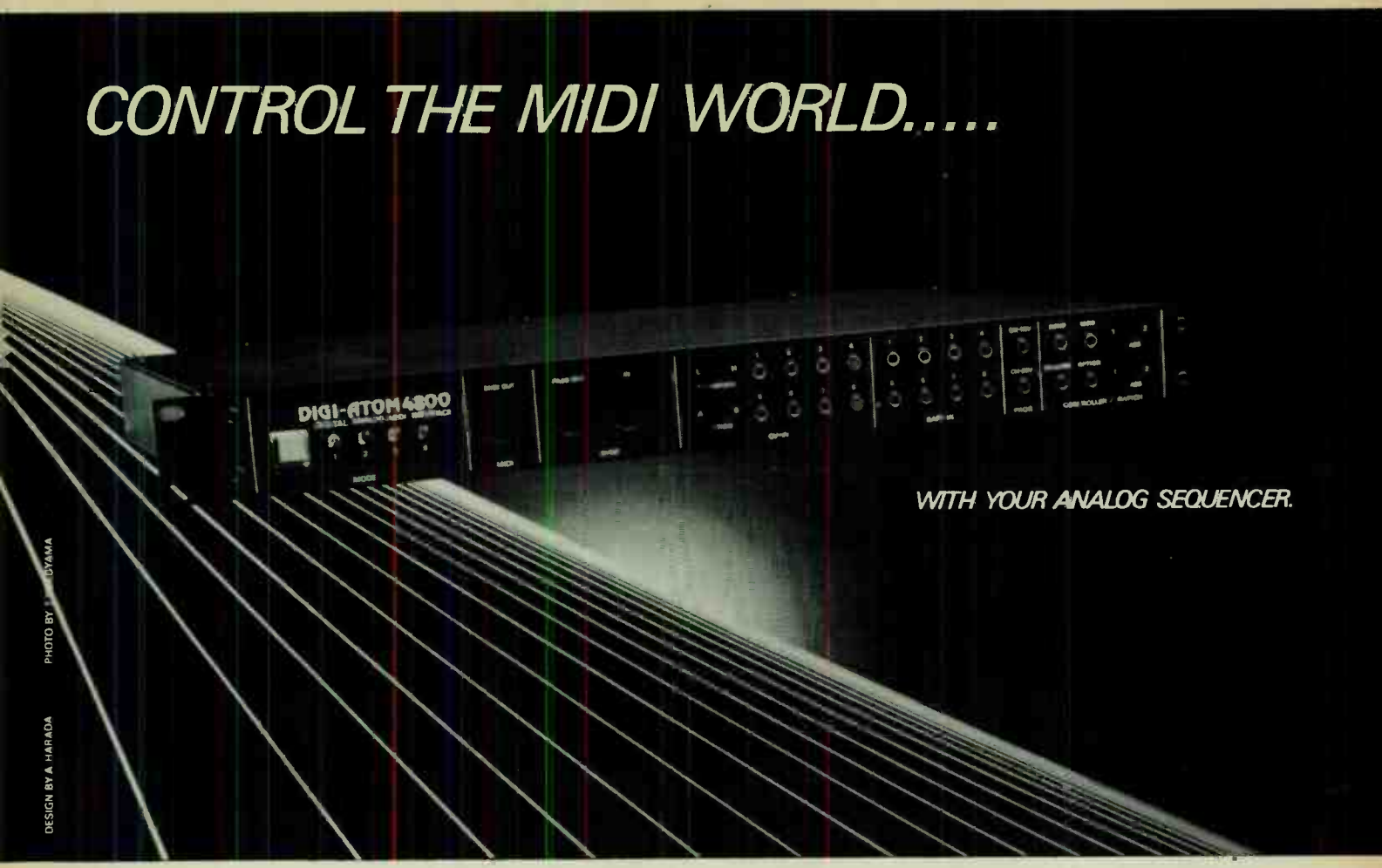
> 'Even the man from Simmons had a worried look on his face as he approached Summerfields' stand . . . Tama are the first manufacturers of 'traditional' drums to enter the electronic field.'

Finally, a word about Polaris. This, as you may recall, is the Chroma's younger brother, a six-voice polyphonic synthesiser complete with 132 memories and a fully polyphonic sequencer. It's now being produced in Japan, and has undergone a drastic control panel colour change (from orange to blue) since it was first unveiled. Rhodes (or CBS-Fender, or Chroma, or whatever you want to call them) seem to have given in over the subject of MIDI, since both it and the standard Chroma Apple interface are incorporated into the Polaris' specification.

At the trade show, the Polaris was being ably demonstrated by the redoubtable Vic Emerson (see interview, E&MM April '84), a self-confessed Chroma freak and a great supporter of all things analogue. He wasn't the only one who was relieved that the Polaris had finally made it into production, exactly a year after it was featured on the front cover of E&MM . . .

RRP is expected to be in the region of £1700. ■

CONTROL THE MIDI WORLD.....



*The DIGI-ATOM 4800 Analog To MIDI Interface lets you connect an analog sequencer (such as the Roland MC-4) to any MIDI synthesizer, to control not only notes, but touch velocity, pitch bend, modulation amount, release, and ....sound program select too.**

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LIVE PERFORMANCE FEATURES

But you don't have to use a sequencer. The DIGI-ATOM 4800 also lets you add exciting live performance features to your MIDI synthesizer. You can plug in pedals, breath controllers, or drum pads for control of velocity, modulation amount, pitch bend, release, portamento (on Yamaha DX synthesizers), or program select.

AND MORE TOO

The DIGI-ATOM 4800 may be able to solve your sync and interface problems too. A Roland type Sync Input lets you synchronize a MIDI sequencer to an analog sequencer. You can also connect your analog and MIDI synthesizers to play simultaneously together. And you can even drive a MIDI Drum Machine from analog pulse or gate signals.

Now expressive musical control can be within the realm of every serious synthesist.

DIGI-ATOM ANALOG TO MIDI INTERFACE 4800

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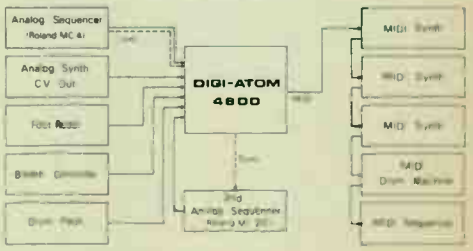

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zypher electronics

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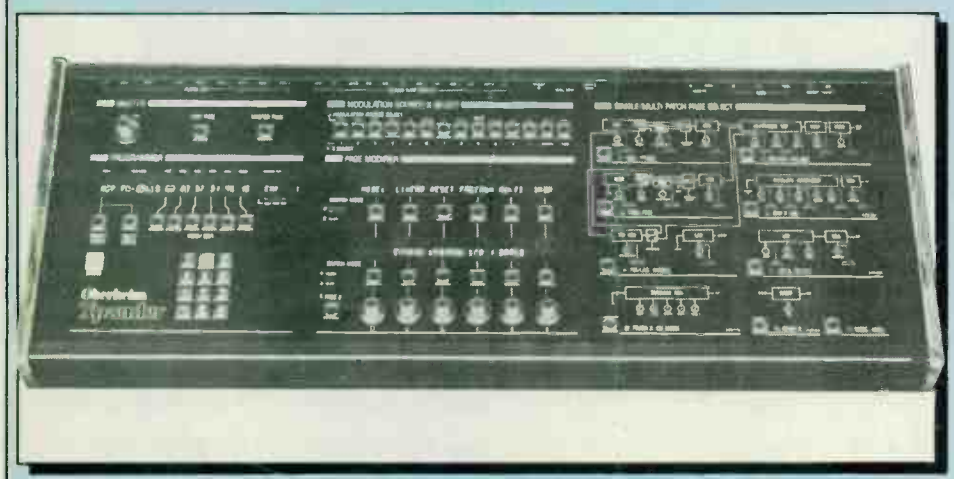
HARDWARE

Oberheim Xpander

The Xpander represents Oberheim's idea of a first class, no-holds-barred modular synthesiser, but does the high price-tag put its fascinating blend of analogue and digital technology out of the reach of the musicians who need it most? *Paul White*



The Oberheim Xpander represents a radical departure from conventional synthesiser design in that it has no keyboard, and takes its playing instructions in the form of control voltages or MIDI code. This is not as strange as it may appear at first sight, as it can be played *via* another MIDI-equipped keyboard, by a sequencer or even by several independent monosynths.

It's this kind of flexibility that makes the Xpander so useful and, as each voice may be programmed to produce a different sound, the eight voices may be configured as a single polysynth, eight monosynths or anything in between.

Clever application of electronic design techniques has enabled the Xpander to retain the flexibility of a modular design without the user having to resort to patch leads, and the makers claim that the unit's design philosophy offers the user more choice and sophistication than is currently available from any other programmable polysynth.

Certainly, the unit's paper specification makes impressive reading. You can't argue with 31 LFOs, 30 envelope generators, 12 oscillators, 18 tracking generators, 24 ramp generators, and no fewer than 90 (yes, 90) VCAs.

Voicing

Each Xpander voice may be programmed independently, and the filter design is such that 15 different modes of operation can be selected, enabling virtually any commercial synth filter to be emulated. Two voltage-controlled oscillators generate the usual array of waveforms, and phase sync may be employed on Oscillator 2, each oscillator having its own VCA.

Additionally, FM synthesis may be adopted by modulating Oscillator 1 with Oscillator 2 under control of one of the onboard microprocessors, and although this is a fairly simple form of FM, authentic, harmonically rich sounds can in fact be created quite easily.

The modulation section is really quite bewildering, as any modulation source may be routed to any destination or combination of same.

Each voice has five envelope generators and these incorporate a delay time function in addition to the usual attack, decay, sustain and release parameters. There are also five LFOs per voice, and these reputedly offer 64 different waveform variations.

There are three five-position tracking generators per voice, and these convert linear inputs to non-linear ones and, used in conjunction with the keyboard, may be used to control the filter tracking. And as if the above selection wasn't enough, there are also four ramp generators and a lag processor so that portamento can be applied not only to pitch but also to modulation sources.

Front Panel

Finished in the distinctive Oberheim black and blue livery, the panel contains all the controls in addition to three information displays based on green alphanumeric LED matrices.

> 'Patch editing is divided into sections, so that when a function is being edited, up to six parameters can be adjusted simultaneously.'

Patch editing is divided into sections, so that when a function is being edited, up to six parameters are available and can be adjusted simultaneously. This is a vast improvement over those polysynths that assign only one variable to a control at any one time, and makes experimentation with sound both easier to achieve and considerably more productive. During editing, the six parameter values and names are displayed on one of the Xpander's three LED readouts, and this information is referred to as a Page. When a new Page is selected the settings for the previous Page are held in memory and the controls are in permanent edit mode, enabling rapid

changes to be made during performance.

All this is made possible by the use of stepped encoders which, although they look like ordinary rotary controls, are in fact much more sophisticated devices that can be rotated continuously, there being no end stops. Moving the knob clockwise increases the parameter value while turning it anticlockwise, not surprisingly, decreases it.

A useful built-in automatic tuning facility enables the oscillators, filters and VCAs to be calibrated under control of the internal microprocessor in a few seconds.

Programming

One hundred voice patches may be stored within the machine, but what sets the Xpander apart from so many other polysynths is that each of its six voices is programmable individually, and any combination of those voices can also be stored in memory, resulting in a vast number of possible combinations. This 'multipatch' memory remembers the control source for each voice, any keyboard splits that have been set up and the volume and assignment of each voice.

The extensive stereo pan facilities are also programmable, and any of the six CV inputs or 16 MIDI channels can be assigned to control any voice of the Xpander. As these assignments are stored in the multipatch memory, a new assignment may be executed simply by calling up a new multipatch program.

If not all the voices are required to operate independently, two or more of them may be layered together to provide a fatter sound, and the keyboard may be split into up to three sections, each controlling a user-specified number of voices. The Xpander manual claims that this allows you to play bass at the bottom of the keyboard, chords in the middle and melody at the top, but no matter which way I add it up, this would appear to require at least three hands, and no spares were included with the unit we checked out.

The split information, along with other assignment data, may be dumped onto either cassette or a suitable MIDI device, enabling a library of sounds and patches to be built up for future use.

To the right of the front panel is the VCO and envelope section, and this is graphically illustrated to assist in the understanding of modulation effects.

Modulation

This is where the Xpander really goes to town. Twenty-seven sources may be routed to any of 47 legitimate destinations, and the amount of modulation and its effect can be either positive or negative as required.

The modulation sources include two pedal inputs on the rear panel of the machine, and two lever sources are assigned *via* the MIDI interface. All five envelopes and LFOs may also be used, and the other sources are ramp and tracking generators, master vibrato oscillator and lag.

When the Xpander is used in conjunction with MIDI, velocity, pressure and release information may be interpreted by the system.

Sound

It's impossible to describe the range of sounds available from this instrument within the confines of the printed page, but what can be said is that it will produce just about any conceivable polysynth sound, plus a good few that you'd never thought of.

Perhaps because the filter configuration is so flexible, all the factory preset sounds are solid and vibrant along the whole length of the keyboard, unlike so many Japanese synths that tend to have woolly bottom ends (like sheep). Oberheim have long been respected for the tonal quality of their filter designs and in this respect the Xpander is a real beauty: you could fiddle with it for days and still find something new.

> 'The Oberheim's extensive modulation facilities enable you to create sounds that simply defy analysis, even before you bring the FM facility into play.'

Most conventional synth sounds are quite easy to analyse when you've had a bit of experience of setting up patches, but the Oberheim's extensive modulation facilities enable you to create sounds that simply defy analysis, even before you bring the FM facility into play.

Although basic, this last-mentioned feature permits the creation of metallic, bell-like sounds with a fair degree of authenticity. Although this invites comparison with the Yamaha DX series, such an evaluation isn't really valid, since FM is only one weapon in the Xpander's huge synthetic armoury. Nevertheless, it's surprising just what you can do using only one modulator and one carrier, especially when these sounds can be further filtered and modified by the rest of the system.

In such a short space of time it's impossible to do much more than scratch the surface of what this instrument is capable of but, fortunately, a detailed (if somewhat dry) handbook is provided with every Xpander. This incorporates a high fact-to-text ratio and so must be read slowly and repeatedly before much of it sinks in, unless you're a particularly fast learner.

There is also a useful addition in the form of a help guide at the end of the manual, and when things aren't going quite as planned, this could help maintain your temper and sanity.

Conclusions

Polysynth ads always tell you that the instrument's sonic horizons are limited only by your imagination and that you should be able to produce an infinite variety of sounds.

If that's true, then the laws of arithmetic are in for something of a hammering with the advent of the Xpander, because it's likely to extend your gear's sound-producing capabilities by a factor of about ten!

The sounds really are good, and in an age when drummers and guitarists are becoming more level-greedy than ever in live situations, it's good to come across a synth that can cut through at both the bottom and top end.

It's also good to see that old-fashioned CV inputs are provided in addition to the thoroughly modern MIDI, and the Xpander's channel allocation system would appear to cover just about every conceivable eventuality. The external trigger input means that the Oberheim may be used with non-MIDI drum machines, and trigger polarities are switchable under software control for maximum interface flexibility.

The facility for dividing the controlling keyboard(s) into zones – combined with the Xpander's formidable range of stereo panning options – should enable users to create huge soundscapes without recourse to a mixer. If you've got a decent sequencer and drum machine, you could almost consider throwing your tape recorder away. You can even set the keyboard zones to overlap, giving layered sounds over some – but not all – of the unit's octave range.

If the foregoing sounds like a stream of almost continuous praise, it's because the Xpander is one of the few instruments that seems to be free of any serious omissions; a piece of hardware whose designers have considered almost every operational eventuality and made provision for it accordingly.

There's simply no escaping the fact that you could have three DX7s for the same money and still have some spare to go to the pictures and buy some fish and chips afterwards (those were the days . . .). As a result, it's unlikely we'll see many Xpanders outside professional circles, particularly when you consider that the machine requires plenty of additional – and high quality – auxiliary equipment in order for it to be used to the full.

If you're in the market for an electronic instrument in this price category, then you'll find the Xpander has no serious competitors that can even approach it for musical and technological versatility, but I'm still left with a feeling of slight disappointment that a specification of this completeness has to carry such a high price penalty. ■

The Oberheim Xpander carries an RRP of £3945 (inc. VAT), and further information is available from the importers, Atlantex Music, at 1 Wallace Way, Hitchin, Herts. ☎ (0462) 31511.

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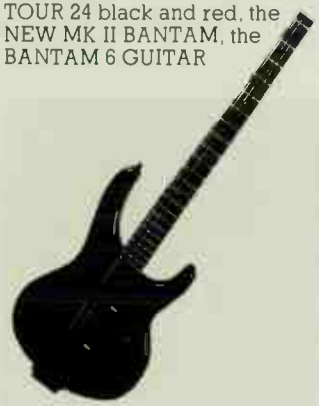

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Digi-Atom 4800 Analogue-to-MIDI converter

Whatever else you may think of it, MIDI is definitely here to stay, and the Digi-Atom is the first interface that enables musicians to use analogue equipment with hardware of the new standard. *Paul White*

The introduction of MIDI has solved a number of problems for the modern musician, but it has also created a few headaches.

Because electronic equipment has become so reliable, there are a great many analogue synths, sequencers and drum machines, all capable of producing musically viable sounds, that will refuse to lie down and die for a long time to come.

Specification

The Digi-Atom enables up to eight CV and trigger inputs to be converted to MIDI code and squirted down a five-pin DIN lead in various different manners, depending on the mode selected. Dynamic information may also be interpreted by the interface, and four additional sockets are provided for converting CVs to modulation, bend, release and 'option' information, the possible options depending on the type of polysynth being controlled. There is no MIDI In connection (the Digi-Atom is a purely one-way device), which precludes syncing to a MIDI drum machine, but a sync input is provided for use with Roland drum machines, enabling the TR606, 808 and even the Bass Line to be successfully used within the system.

Modes

Only three MIDI channels may be addressed by the Digi-Atom, and these are dictated by the Output mode selected.

Mode 1 opens up MIDI Channel 01 and carries four-voice polyphonic information with independent velocity response, while Mode 2 allows eight-voice polyphonic information to be transmitted on Channel 01 but without velocity information. Mode 3 opens up channels 01 and 02, the first channel carrying four-voice polyphonic information with group velocity and the second carrying two-voice polyphonic data, again incorporating group velocity. Lastly, Mode 3 opens up Channels 01, 02 and 03, Channel 01 being four-voice polyphonic with group velocity, and channels 02 and 03 being monophonic, the latter including velocity information.

Construction

Housed in a functional-looking 1U high 19" rack case, the front panel contains the trigger and CV sockets, which accommodate mini-jacks. The current mode is indicated by green

status LEDs, and these may be stepped through by means of the mode selector button.

On the CV In panel are two slide switches. The first of these is labelled Transpose, the L position giving the full MIDI range of 10⅔ octaves, corresponding to 128 keys. The H position sets middle C to code 24, for devices with a more limited pitch range such as the Roland MC202. The second switch (labelled A/B) is used only during tuning calibration, and this procedure is described adequately in the handbook.

> 'The electronics consists of a dedicated microprocessor system which scans the analogue inputs *via* ADCs, effectively converting notes into digital codes.'

After the Mode section come the MIDI out DIN connector and the Sync In DIN socket, which is parallel wired to the adjacent 'Patch Out' socket for chaining.

The electronics consists of a dedicated microprocessor system which scans the analogue inputs *via* analogue-to-digital converters, effectively converting notes into digital codes. These codes are then embedded in MIDI command messages and despatched *via* the MIDI Out socket without any perceptible delay.

There are in fact a variety of different configurations in which the Digi-Atom system may be used, and several examples are outlined in the user's handbook, including patching diagrams. The handbook contains a wealth of potentially useful information, but this is presented in such a way that it could be considered intimidating by someone who has only recently encountered MIDI. The copy that we received had a footprint on the cover and several more inside: could they be a sign of the previous owner's frustration?

Conclusions

This unit is by no means cheap, and the restrictions outlined above must be seriously considered before any firm decision to purchase is made. If all you have is an MC202, there's not much to be gained from buying the Digi-Atom, as it costs about the same as a MIDI sequencer.

The high cost is probably due to lack of confidence on behalf of the manufacturer. If Zypher Electronics are only going to build a few at a time, then the Digi-Atom's price will stay high and sales will be limited. If, on the other hand, they saw fit to adopt the usual positive Japanese approach and produce these units for around £200 in the sure and certain knowledge that they would sell in their thousands, then sell they would, and the benefits of mass production would allow them to make a reasonable profit without having to charge prices that many people consider unacceptable. ■

The Digi-Atom 4800 has an RRP of £799 including VAT, and further information can be obtained from London Rock Shop, 26 Chalk Farm Road, London NW1. ☎ 01-267 5381.

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Audio Electronics System Speaker

A new name in loudspeakers, Audio Electronics Ltd, produce a compact, full range system suitable for PA or keyboard applications. *Paul White*

A photograph of the review model, taken when the speakers carried the now-defunct 'Beat' label.

The days when you could reproduce anything from vocals to bass guitar *via* a box full of general purpose 12" speakers are at an end. Today's discerning audiences have been subjected to a constant stream of well-recorded, (generally) well-played music and have come to expect a high degree of sophistication in sound quality, even when they go out to hear a local band.

In the sixties, even the most successful bands played through appallingly inadequate equipment, but nobody noticed because there was no point of reference: stereo was still for the very rich and most records were played on Dansette portables, themselves only slightly more advanced than the old wind-up jobs.

But back to the present. Virtually everyone now owns or has access to a reasonable domestic hi-fi set-up, while the elaborate sound systems used by top concert bands have raised modern audiences' expectations to a level that is difficult to satisfy.

The invention of the synthesiser has placed still greater demands on loudspeakers, as it's probably true to say that no other instrument is capable of producing sounds that cover such a wide frequency range, meaning that ordinary guitar-type cabinets are totally inadequate for use with electronic keyboards.

What is required is a loudspeaker system that behaves as much like a hi-fi unit as possible whilst at the same time producing the high sound levels required for live performance. To accomplish this in a reasonably-priced, portable package is not easy, but that's what Audio Electronics have attempted with their new range of loudspeakers.

Construction

Measuring about 23" x 21" x 11½", the PA speakers under review incorporate four custom-built, seven-inch drive units and two Motorola piezoelectric tweeters in a ported enclosure. The wooden cabinet is finished (to a very high standard) in a tough but attractive vinyl, and the corners are protected by means of fairly standard plastic corners, the baffle being mounted to give a wide angle of sound dispersion. In accordance with current hi-fi design practice, the inside of the cabinet is filled with long-fibre wool, while the four drive units are protected by steel grilles, acoustically transparent foam being fitted to keep out dust.

This type of loudspeaker performs best when mounted on a stand and, although no fittings are provided as standard, most types of top-hat fittings can be provided and fitted on request. Connection to the cabinet is made *via* standard quarter-inch jack connectors, though XLRs can be specified at no extra cost to the purchaser.

In Use

These speakers are rated at 160W each and useful bass response extends to below 80 Hz, making them suitable for use as a small PA system or for the reproduction of keyboard instrument signals. The quoted efficiency at 1kHz is around 96dB for 1 watt at 1 metre, which is very creditable for a small speaker system and means in practice that more of your amplifier power is converted into sound than would be the case with less well-designed units.

We tested these speakers with a variety of synths and even a set of Simmons electronic drums with good results and, although the bass response does not compare with that of a full-blown concert PA system, the sound is by no means tinny or lacking in punch, while the clarity of sound is a great aid to clear diction.

In this respect, the speakers would make first class monitors for vocals or electronic drums when used in conjunction with a large conventional PA system, and an added bonus is that the smooth frequency response reduces the risk of feedback.

In the normal run of things, speaker systems that utilise piezoelectric tweeters tend to sound harsh or scratchy, but when used to reproduce recorded music, the Audio Electronics speakers sounded surprisingly smooth, and should lend themselves readily to disco use, for example.

Conclusions

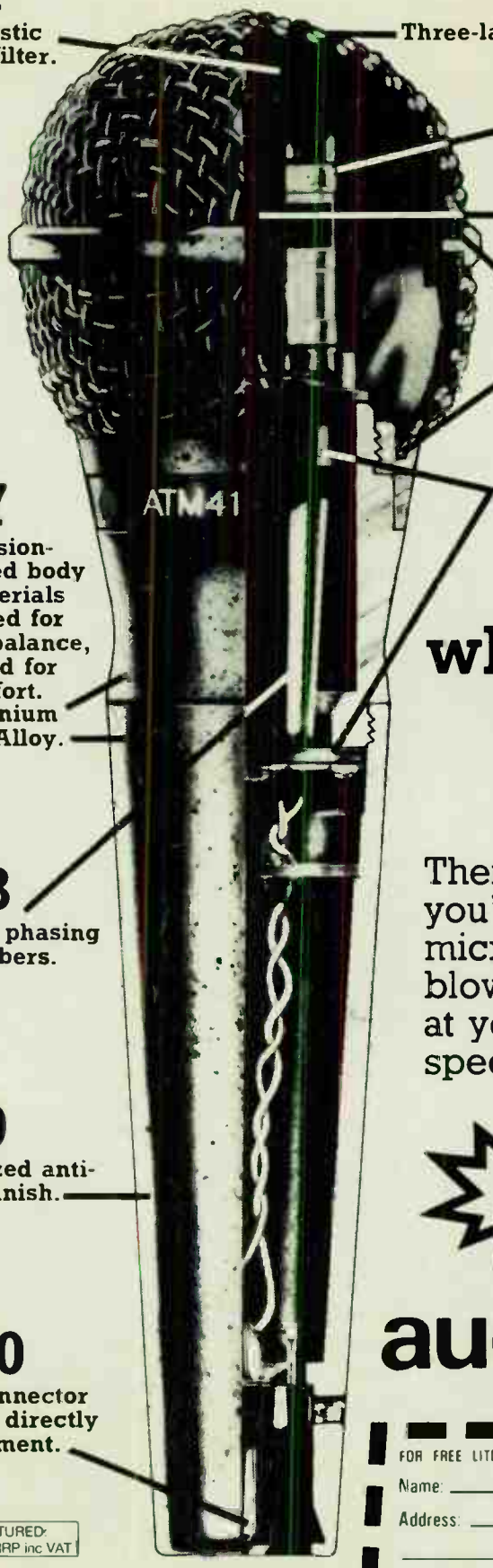
These speakers have been designed from the ground up and incorporate drivers built by Audio Electronics themselves using high-temperature voice coils, wound onto aluminium formers and bonded with modern high temperature adhesives, and it's this kind of attention to detail that sets a good product apart from the rest of the crowd.

It must be said that these speakers compete directly with the American Bose 802 units and, although the two systems' design philosophies differ in several areas, their general specifications are in fact very similar. The Audio Electronics speakers cost about half the price of a typical Bose set-up and as a bonus do not require any special EQ circuitry, so in economic terms they certainly make sense. Their portability and sound quality should endear these units to a variety of users and their construction is such that life on the road should present few problems.

It's gratifying to be able to say nice things about a British product, and when it's actually cheaper than the imported competition what else can you say?

If you're considering updating your keyboard amplification or perhaps setting up a small PA system, you owe it to yourself to give these excellent little speakers an extensive try out. ■

The speakers reviewed cost £396.76 per pair inclusive of VAT and carriage, and further information can be obtained from the manufacturers, Audio Electronics Ltd, Elm Place, Station Road, Rustington, West Sussex. ☎ (09062) 6483.



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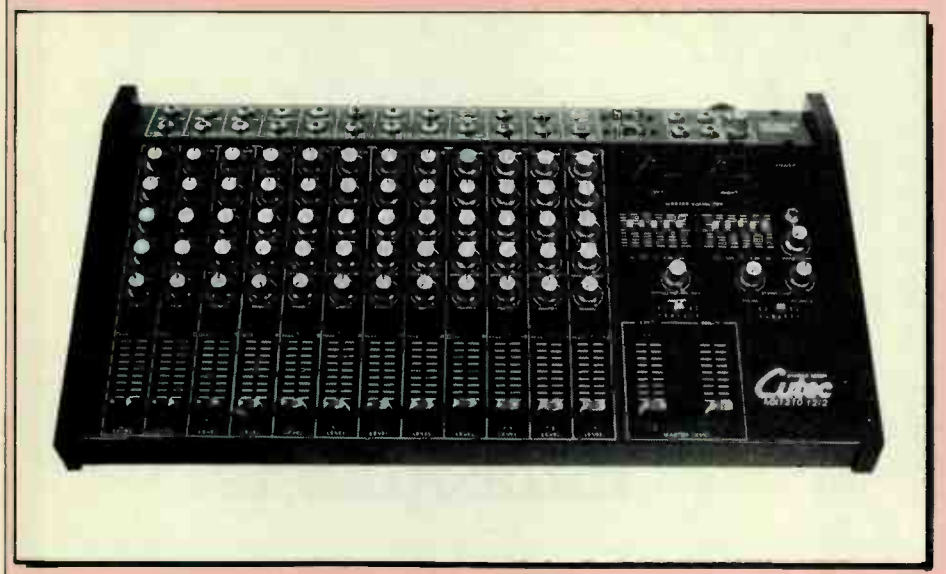
EMM-AT-984

Cutec MX1210 Mixing Console

A multi-purpose mixer that boasts a wide range of facilities and a surprisingly low price tag. *Paul White*

Although only a comparatively recent arrival on these shores, the Cutec brand name is already well established in the field of budget pro-audio hardware, and judging by the time I spent with their new MX1210 console, I'd say it can only serve to enhance their reputation.

The MX1210 is suitable for semi-pro live or recording work, while the provision of two pairs of RIAA-equalised record deck inputs extends its possible uses to production work and creative disco mixing.



Construction

Most of the chassis is fabricated from a single piece of steel, providing a strong but visually attractive exterior, while access to the electronics is through a separate steel bottom cover. Internal PCB construction is tidy if a little unremarkable, but there should be no need for most users to go inside in the normal run of things, since all user-adjustable functions are externally located.

The channel and master sliders are about three inches in length, which is perfectly adequate (perhaps even generous) for a mixer of this type, and all the controls have a smooth feel to them, which inspires confidence.

The cabinet is completed by a pair of wooden end cheeks, and the whole package measures only 620×105×256 mm and weighs a modest 8kg. A case is also offered as an optional extra, and this brings the overall weight up to 13kg.

Controls

Each channel has both mic and line input sockets, but there is no selector switch or input gain control. Instead, gain matching is achieved by means of a three-position slide switch that enables the sensitivity to be set to −15dB, 0dB, or +15dB, according to the type of input signal being used.

The EQ section is a simple bass/treble arrangement giving ±12dB of adjustment at 100Hz and a similar amount at 10kHz. This is adequate for most types of general-purpose work, but more than a little restricting in more demanding situations such as the equalising of closely-miked drums, for example. There are two auxiliary sends, one pre-fade for foldback, the other post-fade for use as an effects send control. The foldback output has a master level control, but the effects send relies on your outboard unit having a controllable input gain if precise level matching is required.

> 'No mixer can be all things to all men . . . but this little unit manages to offer a great deal of flexibility.'

A conventional panpot is incorporated into each channel, and although there is no PFL (pre-fade listen) facility, there is a peak-reading LED on every channel to indicate excessive input gain.

Just below the meters are two five-band graphic equalisers (one for each output channel) and although these are not really flexible enough for exacting room equalisation, they do add greater scope to fine tonal adjustment. A stereo headphone output is provided, this being best-suited to high-impedance 'phones and having its own independent volume control. There is also an effects return level control, and this incorporates a transverse pan slider that enables the effect to be positioned in the stereo output mix.

In Use

The MX1210 worked pretty much as expected, the only real operational drawback being the limitations imposed by the two-band tone control. In terms of noise, the circuitry was no worse than many mixers costing three times the price of this model, and in general problems only occurred when a high gain was applied to the microphone output in an attempt to capture a quiet sound. The phono inputs could also be a little noisy at high levels, and I found it best to turn these right down when not in use.

No problems were encountered using the graphic equaliser section providing that only relatively modest amounts of cut and boost were applied, and the centre frequencies seem well chosen for the majority of possible uses. The sliders have centre detents (a nice touch), and if you're going to be recording live gigs, you'll be pleased to see that there's a pair of phonos for tape connection on the rear panel – also a thoughtful inclusion.

Conclusions

No mixer can be all things to all men – especially at the budget end of the market – but this little unit manages to offer a great deal of flexibility, no matter what you intend to use it for. The layout is particularly sensible, and the positioning of the input and output sockets means that you can always see what you're doing without having to walk round to the back of the console.

In terms of physical appearance, this mixer is one of the most appealing I have come across, and the provision of record deck inputs should attract users from the disco and production fraternity as well as pro musicians and engineers. Because of its small physical size and clear layout, the MX1210 should also make an ideal keyboard mixer, particularly when you take its built-in graphic EQs into account.

Obviously some compromises have to be made in the construction and design of such a mixer, but for the most part these do not make themselves too apparent, and there's no denying that the Cutec represents an attractive and versatile package that meets all the normal requirements for a quality mixer at a sensible price. ■

The Cutec MX1210 carries an RRP of £358 including VAT, and further details are obtainable from the importers, MTR, at Ford House, 58 Cross Road, Bushey, Herts. ☎ (0923) 34050.

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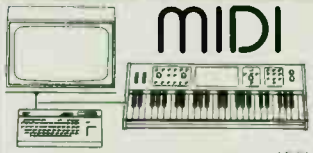

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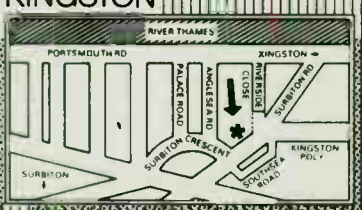

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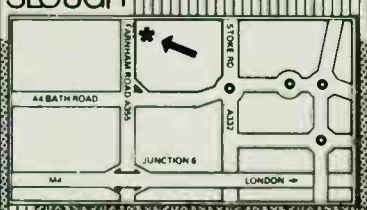

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MicroLink System ML10

for Casio MT200 and Sinclair Spectrum

British computer music pioneers Micro Musical have introduced one of the most cost-effective systems currently available. *Paul White*

The world of MIDI offers a great deal to those able to afford the luxury of a MIDI system, but now an alternative is available which provides polyphonic sequencing for the Casio MT200 home keyboard, using the popular Sinclair Spectrum microcomputer.

The Casio MT200 represents a break from personal keyboard tradition in that it is fitted with a connector that allows Casio's own PA1 adaptor to be plugged in, giving compatibility with any computer having a standard Centronics output.

Originally, this was intended for use with Casio's own home computer, but seeing as this is (a) very expensive and (b) not yet available in this country, the system would appear to have got off to a somewhat shaky start. Even if the above obstacles were not present, further problems exist in that the software as written for the Casio computer is, to put it mildly, rather crude. The program runs in BASIC which makes it slow to use, and all the note values must be entered as data statements, an inefficient and somewhat tedious system which renders any user-friendly form of editing quite impossible.

All the program really does is to send a stream of ASCII codes to the keyboard, which is furtively pretending to be a Centronics-compatible printer and therefore produces music instead of text.

In addition to playing notes *via* the Centronics bus, the machine may be started and stopped, the rhythm machine's six preset patterns selected, and the left-hand auto chord section engaged or disengaged.

Before checking out the system produced by Micro Musical, it's worth looking briefly at the MT200 itself.

The Keyboard

This particular Casio is a four-octave instrument with a small-scale but nonetheless quite usable keyboard, and incorporates eight preset voices, six preset rhythms and the Casio autochord system which operates over the bottom one-and-a-half octaves of the keyboard.

As is typical of organ-based keyboards, none of the factory sounds is a particularly faithful representation of its title, but all are musically viable – great for playing 'Spanish Eyes' with lots of vibrato . . . Similarly, the rhythm section doesn't really sound like any type of acoustic drum kit, being if anything more reminiscent of a bag of crisps stuck in the works of a very large clock but, again, its artificial nature does lend the instrument's output a peculiar appeal.

> 'The Spectrum is one of those computers you either love or hate; dedicated owners swear by them whilst many others swear at them.'

All the sounds may be processed by the MT200's built-in stereo chorus – which on the organ preset gives a fabulous caricature of a theatre organ – and the whole system is eight-voice polyphonic, twin internal speakers being mounted at either end of the control panel for home use or practice.

The Package

In order that the MT200/PA1 combination may be used with a 48K Sinclair Spectrum, Micro Musical have produced a software package and hardware interface, and these are fully approved by Casio who are probably rather relieved at being spared the embarrassment of having to confess to their English customers that the Casio computer is not available.

Taking the system concept further, Micro Musical have produced a wooden desk which keeps the package tidy, and this may be fitted to the stand (which is also included in the price) for home or live use.

Once assembled, the system allows music to be entered from the Spectrum keyboard, and a comprehensive editing facility allows bars to be corrected, transposed, duplicated or moved so that complete polyphonic compositions may be readily created.

When the compositions are satisfactory (up to eight titles may be held in memory), these may be stored one title at a time on tape for future access.

In Use

Once connected up in accordance with the instructions, the system is ready to load from the software cassette provided: this contains four sample tunes to show you what can be achieved by careful programming.

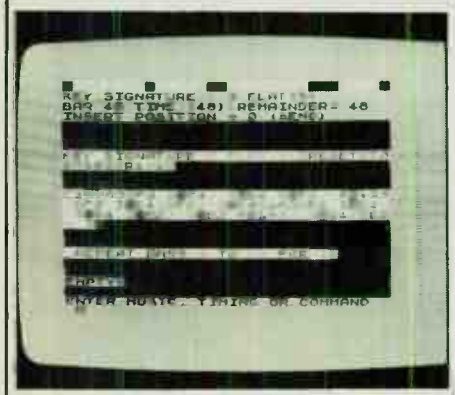
The Spectrum is one of those computers you either love or hate; dedicated users swear by them whilst many others swear at them. Not being a regular Spectrum user, I tend towards the latter category since the mult-function, rubber keyboard takes a lot of getting used to, and the symbols never seem to be where they should be.

The tape is loaded in the usual Spectrum way by typing LOAD" " followed by ENTER, and then pressing PLAY on the cassette machine. A short time later, the program starts by presenting a few pages of introductory propaganda, and after these have been stepped through using the Enter key, the main music entry display appears. Pressing P ENTER at this point rewards you with a rendition of one of the sample tunes, and this repeats until you have read enough of the manual to find out how to stop it: not a pleasant experience unless you're a quick reader!

There is a list of some 30 commands which make the writing, editing, playing and storing of music possible, but since this would make very boring reading in isolation from the system itself, I'll cover the system operation in a more general manner.

Although the owner's handbook was only completed the night before I took delivery of

the system, it is both concise and logical and should present few problems to users.



Programming

Before you begin entering notes, the computer requires that you answer certain questions regarding your music's key, time signature, rhythm pattern, voicing, and so on, after which you may proceed.

According to the Casio PA1 handbook, the four-beat bar may be divided into 96 time divisions but only even numbers may be used. Repeated checking with a slide rule confirms that this really is a bit of a con, since there are really only 48 usable divisions, a fact which Micro Musical at least have the decency to point out.

The time signature may be chosen to encompass just about any rhythm you have in mind, but in a straight four-beat bar, the note values are as follows:

Semibreve	48
Minim	24
Crotchet	12
Quaver	6
Semi-quaver	3

In order that all the variables are set up before the composition starts, these are usually put into bar zero, and the first command is generally a RESET which puts the keyboard into its default condition, ie. as though it had just been switched on. There is a simple list of codes for rhythm type and voice preset, and these are put in next. For example, T00 selects piano tone, T05 selects vibraphone and so on.

Key entry is a bit tricky, as if you are not playing in Cmajor, the computer asks how many sharps and flats are in your desired key and expects you to know: a bit daunting for the non-musically literate.

The rhythm machine may be on or off in any given bar and may be switched to a different pattern during the course of a song simply by including the new rhythm code in the appropriate bar. Voice changes may be performed in a similar way.

When it comes to programming notes, it's best to convert your music into a table of note values first so that these may be entered quickly *via* the computer keyboard. A note is identified by a letter and a number corresponding to its name and position on the keyboard, the keyboard octaves being labelled two, three, four and five, with the top C being C6.

> 'The computer asks how many sharps and flats are in your desired key and expects you to know: a bit daunting for the non-musically literate.'

Once notes have been entered, these must be given a length value (between one and 48 for a four-beat bar) and then, most importantly, they must be given a note-off command: this also has a length value, enabling rests or staccato effects to be created. This facility allows notes to be left on at the end of the bar so that they may be tied over to the next bar and, with thoughtful programming, the music can be given a surprising amount of feel.

It must be remembered that if the auto chord facility is used it takes up four of the eight voices available, and this also applies if you wish to accompany your composition manually on the keyboard, which is only possible if you haven't used up all the eight notes in the program.

Once a bar has been completed, it may be transposed or copied in different locations so that a 12-bar blues, for example, can be built up from only one bar of programming using these commands, and a useful repeat code may be embedded in the bar so that complex arrangements can be built up without using a lot of memory space.

Editing

If a mistake is made, which is almost a certainty, individual bars may be displayed and a cursor system used to identify the offending part. This is then removed using the KILL command and replaced with whatever you think is correct. At the end of each bar, the computer adds up the note-on and note-off durations, and if the total doesn't add up to the correct bar length, it drums its electronic fingers (or digits) until you do something about it. If you enter a wrong command, the computer types up PARDON? Personally, I'm sure I could think of some more suitable responses, but then again, this is a family product.

When the recorded composition meets with your approval, it can be stored on cassette using the XSAVE command and this is given a title or filename not exceeding ten letters.

The loading and verification of files is fairly straightforward and no unforeseen problems were encountered in this area, although you must remember to remove the earphone plug from the cassette machine when recording, in the usual Spectrum fashion.

Conclusions

Many modern music products come with handbooks informing you that their capabilities are limited only by your imagination, a phrase much used by the industry that usually means you'll have exhausted all the equipment's possibilities within a couple of hours.

The Micro Musical package does not, in fact, fall into this category. Its limitations are defined by the sounds available and by the tenacity of the user, as it can take all evening to type in a piece of music.

Given that the system is limited by the specification of the MT200 keyboard and by the fact that sequences cannot be entered in real time from that keyboard, the system works very well indeed, the editing facilities being particularly flexible. The educational value of the system is potentially very high and, if you buy the whole package including the desk and stand, you save something like £22 off the individual component cost and get absolutely everything you need to get things working, except the colour TV.

The Casio keyboard may still be used on its own when required, and no doubt the Spectrum computer will be called upon to play a game of Intergalactic Megadeath from time to time, and this is another aspect of the system's inherent flexibility.

Micro Musical are already considering updates for the system, and these include conventional on-screen musical notation and other refinements. It's also possible that note entry from the Casio keyboard may be added in the future, but no firm decision has yet been taken on this.

It's my hope that Casio will at some time in the future produce more adventurous keyboards that can interface with this system, as the MT200, although undoubtedly good value for money, is not going to satisfy many professional musicians or even discerning amateurs.

Micro Musical have turned what could have been a technological disaster into a flexible and educational composition system, and it's nice to see the British sorting out Japanese problems, instead of the other way round.

The complete package costs £389, but for anyone who already has some of the items required, all the relevant component parts are available separately. ■

Further information: Micro Musical, 37 Wood Lane, Shilton, Coventry, CV7 9BR. ☎ (0203) 616760.

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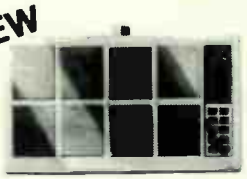

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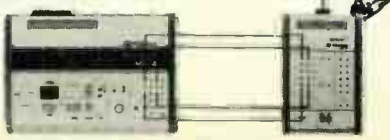

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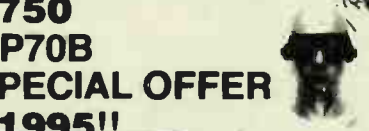

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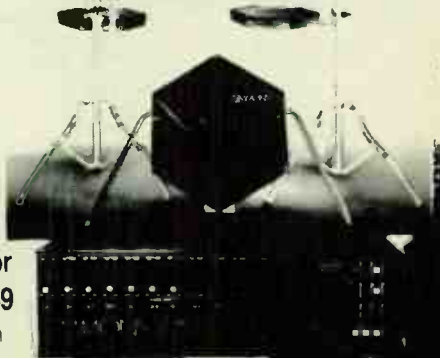

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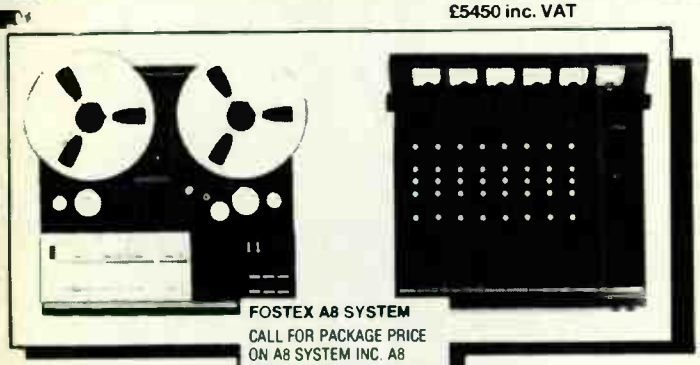

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Roland MPU401 MIDI Processing Unit

and MRC real-time recorder program

A product of Roland Digital Group – the American division of the Japanese parent company, the MPU is a MIDI-to-computer interface that supports MRC, an eight-track polyphonic recorder program, initially for the IBM PC and Apple only. *Katie Robinson*

Standard UART MIDI interfaces leave all data handling and protocol to the programmer, and the MPU401 contains its own processor and gate arrays that make real-time composer programs a good deal easier to write. The serial format and simple UART interface specifications for MIDI help to keep hardware costs low for the prospective computer musician, and as a consequence, most MIDI-to-micro packages rightly place most of the emphasis on the software provided.

Now, the sad truth is that most currently-available MIDI composition programs are unfriendly in the way they allow the user to access MIDI control options, and usually fall short of full implementation. I suspect this is mostly because each supplier wants to be first in the music shops with product of some variety, leaving us with bland and unhelpful programs, hastily re-hashed from test software, and an 'It'll do for now and our next package will be amazing' story.

Software development almost always lags far behind hardware, but in this case there are a lot of knotty timing and memory management problems involved as well. It's a highly skilled task to design friendly programs that allow composition on a number of polyphonic tracks, especially from real-time synth keyboard inputs (surely the most attractive method to the majority of musicians?), and even if these problems are overcome and your megaprogram works, the resulting code will take up a large chunk of precious RAM, severely limiting the amount of MIDI 'event' data that can be stored – a major drawback for anyone interested in writing complex and lengthy pieces of music.

Roland are well aware of these problems, and their answer is the MPU401 MIDI Processing Unit. The MPU contains an eight-bit processor, 2K of RAM (for its own use), 8K of ROM, and specially-designed VLSI gate arrays that take care of all the protocol involved in transferring data between computer and MPU. The ROM contains a control program that manages information held in tables (using the 2K of RAM) to account for real-time MIDI event data on eight polyphonic tracks, timed by the MPU processor. The bottom line to all this is that data is transferred between host and MPU on interrupt to the host processor so that many host functions, notably screen handling and disk I/O, can carry on while the MPU plays back or records event data. So, data can be saved and loaded as required, allowing your compositions to use as many events as your disk system will store.

Hardware

The MPU is supplied in a light grey metal box about 7½" x 4½" x 1½", and weighs approximately 1½lb. At the front edge are seven sockets – MIDI In, MIDI Out 1, MIDI Out 2, Roland five-pin DIN Sync out, and two jack sockets for FSK tape synchronisation (in and out). At the rear is a 25-pin 'D' connector for communication with a micro through the relevant interface. These interfaces seem unnecessarily expensive (approximately £70), as it appears that you need only connect the 'D' type socket's eight data lines, three address lines, Read, Write, Reset, DSR and Chip Select to the relevant pins on the parallel user port of your computer. Also required are 5V, 150mA power supplies (probably) available direct from the user port. It'll be interesting to see if anyone comes up with low-cost alternatives to this arrangement.

> 'The extra two address lines allow one host to run up to four MPUs . . . giving access to 32 tracks and 16 Channels of MIDI!'

Note that three address lines are provided where normally only one would be expected. The extra two lines allow one host to run up to four MPUs using polled interrupts, giving access to 32 tracks and 64 Channels of MIDI! However, before commenting critically on this prospect, I'd like to see them all actually working.

Removing four screws gets you inside the box, revealing a tidily laid-out PCB containing ancillary chips, connectors and so on, plus a 6801-family processor, the square chip containing the VLSI gate arrays, a 2764 ROM and a 6116 RAM. Also included is a tiny metronome 'beeper' to allow count ins to be employed independent of external instruments.

Software

MRC is the eight-track real-time composing program that was shown working on an Apple II + MPU at the recent British Music Fair. Although Roland insist it will be available from launch, there are no operating instructions in this country as yet, and poor old Rick Cannell of Roland had to figure it all out for himself.

Happily, MRC is an excellent example of a user-friendly program: all features are selected from a simply laid-out, single screen menu arrangement by moving a cursor (using the I, J, K & M keys). Placing the cursor over a required feature and pressing Space or Return either selects a function (such as PLAY or RECORD), or allows you to specify a value, as for TEMPO Up/Down or TIME SIGNATURE, which is then displayed on the lower half of the screen. Helpful touches are the straightforward track selection (any track, any channel, any time), the 'percentage memory used' chart at the bottom of the display, and the efficient use of the MPU's timing facilities (far better than standard MIDI) to provide auto-correction to 4th triplets, 4ths, 8th triplets, 8ths, triplets, 16ths and 32nds.

However, only the minimum number of facilities for simple composition have been included, and I hope we can look forward to some more complete packages in the future. Still, it's an excellent start.

Armed with the relevant function values, anybody who has used a multitrack recorder should get the hang of MRC very quickly, though it's a shame the MPU provides no aid for step-time input, as MRC with an editing facility would be a versatile program indeed.

Conclusions

It's very hard to fault the philosophy behind the MPU401. MRC, the computer I/F and the 401 itself *are* expensive as MIDI outfits go, but the relative simplicity of the software and the interrupt-driven operation offer something well above the norm.

As far as musicians are concerned, the choice of IBM PC and Apple as the first available incarnations is a poor one, and it's strongly in Roland's interest to introduce home micro options in the near future: no doubt other companies will oblige very shortly. As always, the main problem is lack of software, especially given the Roland approach of encouragement as opposed to direct supply. I hope they ensure that suitable packages appear, and assuming they do, all I need to know about them is when, because as soon as they're available, I'll buy one! ■

RRPs: MPU401, £160; computer I/F connector, £70; MRC software, £50. All prices are inclusive of VAT, and further information is available from Roland UK, Great West Trading Estate, 983 Great West Road, Brentford, Middx. TW8 9DN. ☎ 01-568 4578.

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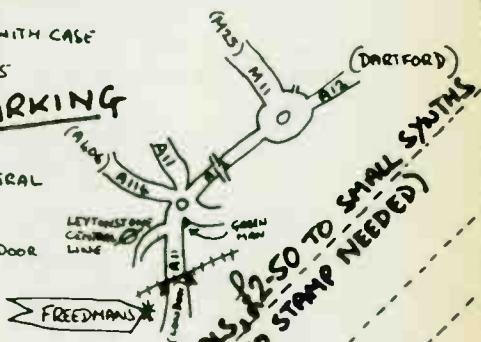

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EXPANDING MIDI

TWO NEW DEVELOPMENTS FROM SYCOLOGIC

London's Syco Systems – best known for their range of imported upmarket computer music systems – have formed a research division, Sycologic. The company's first offerings take the form of an analogue-to-MIDI converter and a memory expansion add-on for the Yamaha DX7.

E&MM Staff

The MX1

Among the few criticisms levelled at Yamaha's DX7 are its shortage of memories (known in DX language as Internal Voices) and its ability to transmit MIDI data on Channel 01 only.

Sycologic have remedied these shortcomings with the recent launch of their MX1 Memory Expansion board.

The MX1 board plugs into the DX7 internally and doubles the existing number of Internal Voices to 128, arranged in banks of 32. Memory banks are selected by using Function 12 and the Data Entry controls, and the LCD indicates which bank is in use. Should a cartridge be inserted, these voices emerge in place of Internal Bank 2, and Internal Voices can be easily transferred or copied between Memory Banks.

MIDI Modes

With the MX1 fitted, the DX7 is capable of transmitting MIDI data on any MIDI Channel (between 01 and 16) using Function 13 (MIDI Out) and the Data Entry controls.

At the receiving end, the MX1 extends the MIDI In features by allowing the DX7 to operate in Omni Mode (ie. recognising and processing data regardless of which channel it belongs to) when Function 8's value is set to 'All'.

The MX1 software complies with the MIDI 1.0 specification (see E&MM May '84 for details of this), which among other things allows one of 128 patches to be selected. Since the DX7 will now hold 128 voices internally, any voice can be selected remotely *via* MIDI, and again cartridge voices are made available in place of Bank 2.

Installation

The User Manual gives clear, concise guidelines for fitting the MX1, but also advises that the operation should only be attempted by qualified service personnel.

The facilities offered by the MX1 should appeal to gigging and studio-based musicians alike, and especially to those who intend linking an array of MIDI products together with maximum versatility.

The AMI

This is a microprocessor-based device which converts the analogue one-volt-per-octave format into digital MIDI codes over a five-octave range, with additional inputs that permit the transfer of information pertaining to dynamics, patch changes, modulation and even sync code. Conversion is strictly one-way: analogue synths and sequencers can drive MIDI synths, but there is no provision for playing analogue machines from MIDI devices.

Construction

Built in a smart custom-built 2U rack case, the AMI contains a small dedicated microprocessor system that runs under instructions from EPROM memory, in which reside the conversion routines for the various different modes of operation.

There are eight CV pitch input sockets on the front panel, eight Gate sockets (+5 to +15V range) and eight 'Dynamic and Control' inputs. These respond to inputs in the range of zero to five volts, but may be used to control note dynamics and other MIDI addressable characters.

Operation

When any of the eight gate inputs is triggered, its associated pitch and dynamic values are digitised and then transmitted as a MIDI 'note on' event. If no dynamic information is transmitted, a default value of half full-range is automatically generated.

The operating panel contains four push button switches (three of which have status LEDs) and a seven-segment numeric display is located directly to the right of these, which indicates on which MIDI channel the AMI is transmitting.

The four pushbuttons are labelled Dual, Mono, Control and Channel. When the Control mode is off, dynamic information is added to note events as follows: Poly mode allows control of eight voices polyphonically on one MIDI Channel, Dual allows control of four polyphonically on two Channels, while Mono – not surprisingly – allows control of one voice monophonically on eight MIDI Channels.

With the Control switch activated, the transmittable controls and parameters vary, again depending on the mode selected. In Mono or Poly modes, eight variables can be transmitted for CVs connected to the Dynamic & Control inputs. These are common dynamics for inputs 1-8, patch change (from 1-64), pitch bend upwards, modulation, after touch, and three parameters specific to Yamaha DX keyboards, volume, portamento, and breath control.

With the Dual mode selected, two entirely separate sets of four parameters can be transmitted, depending on the MIDI Channel selected. The first group consists of common dynamics for inputs 1-4, patch change, pitch bend upwards, and modulation, while the second group comprises common dynamics for inputs 5-8, the remaining three parameters remaining constant.

On the rear panel are two sockets which convert drum machine sync signals into MIDI format: 24, 48 or 96 pulses-per-quarter-note clocks may be accommodated, the necessary division being carried out internally.

The socket labelled 'Start/Stop' is configured to operate with Roland equipment, and a Time Out facility generates a MIDI Stop command if more than half-a-second elapses between clock pulses.

When the interface is powered up, the displayed MIDI Channel defaults to 01 although this may be set by means of the front panel buttons to any integer between one and eight inclusive.

An ingenious calibration system is built in and, after a 30-minute warm-up period, the volts-per-octave and offset may be optimised by means of two presets accessible *via* small holes in the control panel.

It's not possible to say much about this unit other than 'it works' as it is completely user-transparent in operation – exactly what a good interface should be. The controls are sensibly laid-out and work smoothly, and for once the manual is written in clear, concise English: if only there were more pieces of UK-built hardware!

Conclusions

The AMI does everything that can reasonably be asked of it, and all for a price that puts it within reach of the home user as well as the professional musician or studio. It is still rather sad that advances in technology (and marketing?) make this kind of elaborate interface necessary at all, but if you already have a good analogue polysequencer that you're happy with, it's probably cheaper to buy a Sycologic AMI than to sell the sequencer at a loss and buy a new MIDI machine.

The AMI's price is probably as low as could reasonably be achieved for what is a relatively low volume production item, and for the moment at least, there's nothing on the market to touch it in terms of either value for money or facilities offered. ■

The Sycologic AMI and MX1 retail at £399 and £199 respectively, and further information can be had from Syco Systems, 20 Conduit Place, London W2. ☎ 01-724 2451.

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Cactus MkII Electronic Drum Kit

A new, revised electronic drum kit from ex-E&MM contributor Pete Kershaw that mixes analogue and digital sounds. *Paul White*

Since Simmons started the ball rolling in the field of live electronic percussion, there have been several attempts by other manufacturers to break their monopoly, though by and large these have met with limited success.

This new kit from Cactus is a revised version of the model reviewed in E&MM March, and combines digitally-recorded sounds of real drums with analogue voices so that, in theory at any rate, the kit may be used to simulate acoustic drums or to create most of the popular synthesised drum sounds.

The kit comprises up to ten drum pads, complete with stands, a hi-hat pedal and the control module, the latter resembling a small mixing desk. All the pads connect to the control module by means of the XLR-to-jack leads supplied, and the hi-hat pedal also plugs in so that open and closed hi-hat sounds may be obtained by using conventional playing techniques.

Construction

As the photograph shows, all the drum pads are identical with the exception of the bass drum, which is somewhat larger than the others and has both supporting spurs and provision for fixing any conventional kickdrum pedal. The pads have been somewhat redesigned since the appearance of the MkI, the most noticeable difference being the bass drum, which no longer resembles a decorative jelly mould, the embossed cactus being no longer in evidence.

> 'It's a bit weird at first, hitting a rubber-coated frisbee and getting a realistic, expensive-sounding cymbal coming back at you through the speakers.

All the stands are of the type used with conventional acoustic drums, and once assembled, the whole structure is quite secure and should not move during normal playing. The cream-coloured plastic pads are light but quite rigid, and their rubber playing surfaces give a reasonable amount of 'feel' so that few drummers should have problems adapting.

Console

The master console is solidly constructed from steel sheet with wooden end-cheeks. Triggering is accomplished by connecting the pads to the jack sockets on the rear of the unit, but a socket labelled 'digital interface' enables the unit to be driven from a sequencer or computer.

Five of the modules (including the cymbals and the two synth modules) are optional plug-in units, and this means that different combinations may be fitted according to the purchaser's requirements. Each module is fed to the main stereo output, but separate outputs are also fitted so that a mixer may be used to treat each voice individually.

The panel is tastefully finished in dark grey with clear legending in white, the knobs having coloured caps to indicate their function. A stereo headphone output (with independent level control) allows for private practice, and there's also a knob labelled 'metronome level', though this does not function unless fed from an external source.

Cactus MkII Master Console.

Voices

The system as provided for review included snare, bass, three toms, and two synth voicings, as well as ride, crash and hi-hat cymbals.

The snare drum is a digital sample, and a Mix control allows noise to be added: this mixture is passed through a filter with Frequency and Resonance controls. As with all the voicings, pitch, decay and pan are separately variable, each module having an individual volume, pan and sensitivity control, a red LED indicating triggering.

The voices are all touch-responsive, and with sensible adjustment of the controls, a variety of convincing snare drum sounds may be obtained, in addition to a selection of more synthetic tones.

The bass drum has only pitch and decay controls, while a slide switch gives a choice of two digitally-encoded

sounds. Both are punchy and useful, though I would have preferred more click, the sounds being perhaps a mite too bassy. This is purely a matter of taste, of course, and if a mixer is being employed, a bit of EQ should help improve matters.

The three toms are identical, and like the bass drum have only decay and pitch controls. They are tunable over a sensibly wide range, but at very low pitches some clock noise is audible. These sounds are digitally encoded, and sound more authentic than most analogue simulations this author has encountered, and alternative samples may be available in the near future.

In the synth department, the voicings are the familiar blend of noise, pitch and stick click. The noise passes through a variable resonance filter, and both this and the pitch have variable positive or negative sweep controls which follow the decay time setting, all three sound sources being mixable. With a bit of careful manipulation by the user, the synth voices can sound just like Sss . . . you know who.

Too often, cymbal voices are the downfall of electronic drum kits, but in the case of the Cactus, they are digitally encoded and do in fact sound very impressive. The crash and ride cymbals have pitch and decay controls and may be adjusted to sound like just about anything from gongs to finger cymbals.

Similar controls are fitted to the hi-hat, with the addition of a filter incorporating frequency, sweep and resonance controls. The digitally-encoded sound may be mixed with noise, and separate decay controls for open and closed hi-hat are also fitted. In operation, the hi-hat pedal works in much the same way as its mechanical counterpart, a sound being produced when the pedal is depressed in the usual way. The pedal also opens and closes the hi-hats (or at least, the sound of the hi-hat), and with the appropriate settings, this too sounds very realistic. If, on the other hand, your *penchant* is for sounds that are a little out-of-the-ordinary, the Cactus is capable of providing a full complement of these also, providing you're willing to do some experimental knob-twiddling.

Conclusions

One or two minor criticisms aside, this kit performs very well, though in the cosmetics department, the Desert Drums may not appeal to the fashion-conscious drummer. Although the pads work well enough (apart from a little crosstalk between pads mounted on the same stand), they do not look inspiring when compared to some of their competitors. Likewise, the bass drum is a flimsy-looking plastic device which, although mechanically very tough, does not inspire very much in the way of confidence at first glance.

My only gripe about the electronics is the clock noise breakthrough on some of the tom sounds, but this is not particularly loud and would probably not be of much significance in a live situation.

I should perhaps point out that the review sample was one of the first production models Cactus have produced, so there's still time for them to remedy some of these little faults before the kit becomes generally available.

On the positive side, the digital drum sounds are good, the cymbals particularly so, due to some generously long samples. The synth modules are capable of producing all the right noises, while the hi-hat pedal also behaves well, though it's a bit weird at first, hitting a rubber-coated frisbee and getting a realistic, expensive-sounding cymbal coming back at you through the speakers.

There's no reason to suspect that the Cactus will not stand up to life on the road, so if you put your music before flashy appearances, give this kit a try. ■

The Cactus MkII Electronic Drum Kit carries an RRP of £799 (inc. VAT) for a basic five-piece kit, and further information can be obtained from Cactus Consultants, 10 Upcraft Avenue, Edgware, Middlesex.

The Creative Technology Institute

Free from the theological nightmare that was Throbbing Gristle, Chris Carter and Cosey Fanni Tutti have since risen to prominence as one of the foremost exponents of British electronic music, and one of the most prolific producers of videos and associated communications.

Interview: *Dan Goldstein* Additional research: *Chris Heath*

It's probably fair to say that Throbbing Gristle were not the most accessible band to emerge during Britain's independent labels boom in the mid- to late-seventies. Their use of deliberately shocking imagery and bizarre instrumental and vocal arrangements isolated them from the mainstream of electronic music development, despite the consistent emphasis they placed on technological innovation and experimentation.

The band was formed in 1976, when Chris Carter joined Peter Christopherson, Cosey Fanni Tutti, and Genesis P-Orridge, who had formed the nucleus of a prevous band, Coum. TG's first album – perversely entitled *Second Annual Report* – was recorded using two cassette recorders at a cost of £15: the band sold their initial pressing of 785 copies and then gave the master away free to interested friends to exploit.

One of the first bands to experiment so ruthlessly with anarchic tunelessness, they dubbed their product 'Industrial Music for Industrial People', though one critic preferred to describe them as 'the first band to produce an electronic record that sounded like goose farts.'

'To begin with', Chris recalls, 'we had very little of our own recording gear, so we used to hire it all. Genesis and Cosey used to live in the basement of a big old dress factory that had converted into lots of little artists' studios, and we used to keep our own PA down there and a lot of our instruments.

'Whenever we recorded an album, we hired eight-track or 16-track equipment. I remember the first time we hired a 16-track machine, Paul McCartney had been using it the day before at his farm up in Scotland. Everything kept shorting out, and we opened it up and found there was moss growing inside it. Apparently he'd been storing it in a barn!

'Although we were using multitrack equipment, we had a real mish-mash of gear, like mics from Tandys and so on. It was an unorthodox arrangement but it gave us the results we wanted. What we normally did was record the backing tracks using the hired gear at home and move into a commercial studio to mix it, and that worked well.'

> 'I've modified our Boss DE200 so that you can play samples from a keyboard. It's a bit hit and miss which keys will actually trigger, but it *does* work.'

Before playing their last gig (in San Francisco on May 29, 1981), Throbbing Gristle released a veritable barrage of recorded work: every one of their live performances was recorded and released on cassette, while their vinyl offerings included the vaguely commercial *20 Jazz Funk Greats* (nothing of the sort, in fact) and the ranting *Discipline,* as well as numerous soundtracks to films and multi-media occasions.

The Split

It was a concert at London's Lyceum Ballroom back in 1978 that first told Chris and Cosey that they were marching to a different drum from their TG colleagues. When the split finally came, Genesis and Christopherson continued to take Gristle's excesses to further extremes in Psychic TV (see interview, E&MM December '83), the propaganda wing of their bizarre Temple Ov Psychick Youth, but Chris and Cosey opted for a more orthodox career in electronic music.

Cosey: 'We actually started work on the first Chris and Cosey album while TG were on their final tour in America, and when that was over we came back to England to finish it. We sent the finished tape to Rough Trade and they put it out on record as *Heartbeat*. We then made a second album on cassette called *Trance*, but Rough Trade liked it so much they decided to put it out as a record as well.'

Both *Heartbeat* and *Trance* are examples of well-crafted, swirling industrial collages, though the music they contain is generally more accessible than the majority of TG's output in the band's final years. As a further extension of this accessibility, Chris and Cosey recorded a single – 'October (Love Song)' – that was uncompromisingly commercial.

Cosey again: 'Chris was doing some recording in our own studio (which at that time had a TEAC four-track and a Seck four-channel mixer), and suddenly he rushed downstairs and asked me to put some vocals on tune he'd just come up with, so I did! It was a long, fairly slow song, and very, very commercial for us.'

Chris recalls how 'October' progressed from there.

'We took it to Rough Trade as usual, and they loved it. The song was originally just going to be part of another

album, but everyone there was so enthusiastic about it, they told us they wanted to make it into a single.

'Quite simply, they promised us some better recording equipment if we could then come up with a really good version of 'October', and what happened in the end was that they bought us an eight-track Tascam and we borrowed some money off them to pay for a 24-channel mixer: that's still the system we're using at the moment.

'Anyway, we made the single, and it flopped totally, mainly due to bad promo, I think. We decided that from then on we wouldn't go out of our way to be commercial, and the result was *Songs of Love and Lust*.'

Chris's reference is to the duo's most recent LP release, a collection of what this author can only describe as 'electro-pop that is deliberately amateur-sounding', though that hasn't stopped it becoming the best-selling record either of them has ever made. Strangely, *Songs of Love and Lust* has not been so widely licensed abroad as some of their previous recorded efforts, though the reluctance of foreign record companies to take it on has only accentuated the rapidity with which Chris and Cosey have sprung to the forefront of the electronic music scene here in Britain.

Part of the reason for their success probably lies in the fact that, of all the synthesiser-based acts currently doing the rounds of the British music media, Chris and Cosey are one of the most prolific. Their current situation *vis à vis* record deals is a unique one: three different contracts with different companies to produce different sorts of music. They're fortunate, and they know it.

'We are very lucky in a way because we're able to put out different things all the time, instead of having to stick to one predictable style', Cosey reflects. 'There are really two sides to our music: the Chris and Cosey stuff, which is still quite commercial and comes out on Rough Trade, and our CTI (standing for 'Creative Technology Institute') material, which comes out on our own label, Conspiracy International, distributed through The Cartel. Then again, there's our video soundtracks, which are released by Doublevision, Paul Smith's label.'

Having so many different projects running concurrently obviously requires that Chris and Cosey have their own recording facility at home, and their 'Studio 47' has been in almost constant use since the demise of Throbbing Gristle. In addition to the main recording equipment outlined above, the studio contains a vast array of electronic instruments, varying from the everyday to the bizarre.

Chris gives me a brief run-down.

'The main synth is a Roland System 100M, which I've had since TG days. I started off with just a few modules and gradually bought more, and in addition to the Roland stuff, I've also got some Digisound 80 modules that I built myself. The controlling keyboard is just a Roland SH101, but we don't really ever find we need any more, and we also use an MC8 Microcomposer that we've had for ages. Landscape had it before us, and they had the software modified which brought it more up to date: the great thing about it is that it's got a Tape Sync on it, which means you can link it to almost anything – we've got it going with a TR808 drum machine.

'We've also got an old Wasp synth and a Casio MT30 that a guy in San Francisco modified for us for about £40, which was ridiculously cheap for what he did to it. He put infinite sustain on it, harmonic fuzz, and a transpose function that adds two octaves to the keyboard's range: thanks to him, we still use it quite a lot. The next thing we want to buy is some sort of polysynth, but the manufacturers are changing them so quickly, it's difficult to know which one to go for.

The duo's 'instruments' aren't confined simply to keyboards, however. As Chris explained, his latest fascination is with rack-mounting outboard equipment, to extend the capabilities of the duo's recording set-up.

'Most of what we've been buying lately has been rack-mounting effects. ▷

We've got a Roland vocoder and a Dimension D chorus, a Korg SDD3000 digital delay, and a Boss DE200 which we use for sampling. I've modified its trigger input so that you can control it from a one-volt-per-octave keyboard. It needs an inversion circut on the output, otherwise the higher the note you play on the keyboard, the lower the pitch of the sample will be. It's not to any logarithmic scale or anything, so it's a bit hit and miss which keys will actually trigger, but it *does* work.'

Both Chris and Cosey have been involved in artistic projects outside the field of music for some while. In the early days of Throbbing Gristle, the band carried a portable VHS video recorder with them for 'journalistic' purposes, and that fascination for the moving visual image continues in the context of the Creative Technology Institute.

Chris: 'The most recent thing we've done is a video to go with a live album we're releasing on Doublevision. We did the whole thing in a weekend; editing from eight hours' worth of material, shooting some new images, hiring all the gear, and mastering onto U-matic. We had about four different machines in here and one of them didn't work at all – it was a nightmare! Still, we managed it in the end, and cut the album on the following Wednesday. It'll be out in a couple of months, I expect.

'In the past we've used a video suite sponsored by the Arts Council. You paid an £18 annual membership and it only cost £46 a day to use it, whereas most places charge about £500. We couldn't have done any of our recent video stuff without that facility, but the rates are going to shoot up now because they're turning it into a commercial venture, so we're going to have to get some video equipment of our own in the near future.'

The adventures of Chris and Cosey don't stop there, either. As well as taking an interest in investing in some video hardware, they've also just bought a 16mm film camera, the intention being to use it in projects that require film's inherently superior picture quality. The first will be entitled *Time Seldom Visits*, a documentary concerning the history of an old Victorian house in North London. Chris reveals that it's something the duo have had up their sleeve for some while . . .

'We've had the script written for ages, and now we've got to make a portfolio out of it plus some production drawings, to see if we can get funding from somewhere so that we can actually make it.

'We'll be collaborating on it with John Lacey, who's been involved with all sorts of projects since before even TG days. We've made a lot of videos with him, and he also works a slide show to provide the visuals at most of our gigs.'

He *also* records music under the title of 'The Lonely Hammers', and his collaboration with Chris should soon see the light of day on the Conspiracy International label, mentioned above.

At this stage of the interview, I'm more than a little confused by the bewildering array of different Chris and Cosey record releases, both real and planned. Chris clears things up easily enough.

'The first thing on Conspiracy International will be a series of twelve-inch singles, and what distinguishes them from the ordinary Chris and Cosey material is that they'll be collaborations with other people, or they might be Cosey or myself recording on our own.'

Collaborations

Among those musicians teaming up with Chris and Cosey to produce CTI releases are Konstruktivists (playing at this year's UK Electronica), Lustmord (comprising ex-members of SPK), and perhaps most surprisingly, the Eurythmics. How did that unlikely collaboration come about?

Cosey: 'We'd know Dave and Annie for a while, going right back to the days when they recorded in a loft in Camden Town, with low beams you used to hit your head on. We started recording together nearly two years ago, before they'd had any of their chart success, but obviously as soon as that happened, things got done at a very slow pace, and although we've now finished a mix we both like, there's no way of telling whether Dave and Annie will like it as well. We haven't actually seen them since Christmas, and since then we've been communicating by telex, but we're hoping the single will eventually come out in some form.'

In addition to their future multimedia releases, Chris and Cosey are also about to move house: from a non-descript two-up two-down in Tottenham, to a converted church near King's Lynn in Norfolk, part of which will, of course, be dedicated to the re-siting of Studio 47.

'Having extra space will certainly be a help', Chris muses. 'And we're going to try to incorporate some sort of video facility into it, as well as possibly going 16-track. I've looked at the Fostex B16, but I think I'd rather go for a Tascam again: I have a feeling it'll stand up better to constant use (and when he says 'constant', he means *all the time!*), and anyway I prefer dbx noise reduction to Dolby C.'

And once the duo have moved in comfortably and settled all their current recording commitments, they'll be going on the road again, taking their eccentric music to as many of their followers as possible.

Contrary to popular belief, they won't be performing – as they did last year – at the annual UK Electronica festival, but they will have a stand there, proving that in amongst all their current projects, they still have time to listen to the music of others and to hear the comments of their admirers.

Which is more than you can say for most of them . . . ■

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On the INTERNATIONAL track

Photography: Matthew Vosburgh

Thomas Leer, solo synthesist extraordinaire, reveals just how easy it can be to go from Stylophone to Fairlight, and still not have a hit record. *Dan Goldstein*

'I wrote and recorded two songs in 10 hours, because that was the only hiring time I had left. I had a preset Roland drum machine and a bass guitar, but the main instrument on the record was a Stylophone – a bit like the one Rolf Harris used to advertise, only a bit more sophisticated.'

Thomas Leer, who's come a long way since those pioneering days, is explaining the making of his first vinyl release, 'Private Plane'/'International', accomplished on hired four-track equipment and with the minimum of preparation or technical expertise. His voice is quiet – occasionally it rises above a whisper – but assured: resident in London 10 years, he's lost none of his native Glaswegian drawl, probably a reflection of his own fiercely-defended independence.

Truly one of Britain's synth pioneers, Leer has lived through more musical incarnations than he cares to remember, but his flirtation with things electronic began in 1978, when a London punk band he was in – Pressure – split up.

'The band just fell apart, and I realised that I'd be better off working on my own. I'd always been writing songs, in folk bands, soul bands, cabaret bands – you name it – and I decided I'd rather record them on my own.

'There were two things that I particularly liked at the time: the attitudes of the British punk movement (then just post-heyday) and the attitudes of the German electronic bands like Kraftwerk, Can and Faust. What I wanted to do when I started recording was fuse the music of the Germans with the attitudes of punk, and the result was 'Private Plane' – a 'punk electronic' single.'

The single did remarkably well for such a small-scale release (it came out on Leer's own label, Oblique) and a few months later he found himself in demand from Throbbing Gristle (of which Chris Carter and Cosey Fanni Tutti were founder members – see accompanying story). They asked Leer to make an album with fellow-synth experimenter Robert Rental, for release on their Industrial Records label.

'We met TG at a gig of theirs in London, and they offered to lend us a hired eight-track set-up for two weeks. By that time the two of us each had Wasp synths, which were excellent. Almost every sound on that album (which appeared a few months after the recording as *The Bridge*) was made by the Wasps, except for the odd bit of guitar and some tapes.

'It was a help, having eight-track equipment, but the problem was that neither of us had any real idea about how to use it properly. We didn't know how to monitor correctly or get the best sounds out of the gear, and I think that ended up affecting the record. If you listen back to it now, it sounds a bit quiet and limp, whereas it should really have been a lot more dynamic. At the time that sort of thing didn't seem important – we just wanted to get the record done.'

The Bridge is a record of two starkly contrasting sides: the first is full of conventional electropop songs – quite advanced for their day – while the second contains four longer, ambient pieces, notable not only for the range of sounds their creators managed to coax out of their equipment, but also for the extension of tapes and 'found sounds'.

'There's a flow diagram on the back of Eno's *Discreet Music* album that presents his serial loop idea, taking one synth line and modifying it bit by bit, and we used that as the basis of the first ambient track, 'Interferon', varying the length of the loops as we went along.

'There's another track – 'The Hard Way In & The Easy Way Out' – where we recorded *Jukebox Jury* off television. Joan Collins and Johnny Rotten were on it, and when we'd recorded the programme I injected some of their key phrases at random into the track.'

Cherry Red

From a commercial standpoint, *The Bridge* earned Leer sufficient capital to finance the purchase of a Portastudio and a Korg MS20 monosynth: nothing earthshattering, but still an important step in the right direction.

He continued writing music under his own steam, and eventually landed a contract with London independent Cherry Red Records, for whom he produced a 12" EP – *Four Movements* – and an album – *Contradictions* – that took the form of two twelve-inchers.

'I started using some Ultsound electronic drums for percussion', Leer recalls. 'They're actually very good, though I only know of one other guy, Yukihiro Takahashi of YMO, who's ever used them. My music was still very improvised, and for most of the Cherry Red stuff it was a case of turning the tape machine on and banging the drums for about five minutes or so, overdubbing the rest of the song in layers over the top of the rhythm pattern.'

Leer's Cherry Red work contains germs of good ideas that are spoilt only by the limitations of the equipment their creator was using . . .

'Well, I was still working on eight-track, and there just came a time when I got fed up with the basic gear I had available. Cherry Red bought me some better gear – an Oberheim DMX drum machine and a Jupiter 4 – after I'd done *Contradictions*, and I actually recorded a second album for the same company using that equipment, but it was still only eight-track and I just wasn't happy with it. In the end all that came out from those sessions was the single, 'All About You'.

That single was, in fact, the most commercial song Leer had released, and having added it to his copious portfolio, he went about looking for a deal with a major label.

> 'Sampling is easy – anyone can do it – and Page R is nothing so terrible either. If you can use a LinnDrum, you can use Page R.'

'I saw it as being the only way I could get hold of the equipment I needed. I'd decided I had to have a Fairlight, so I had to find a record company that would get me one as part of my advance. There weren't many labels who'd touch it, especially when they found out how much it was going to cost, but Arista realised that it could potentially save a lot of recording time, and after a trial period of three weeks with one to prove that it would be useful, they leased one to me as part of my advance. I've had one for about six months now.

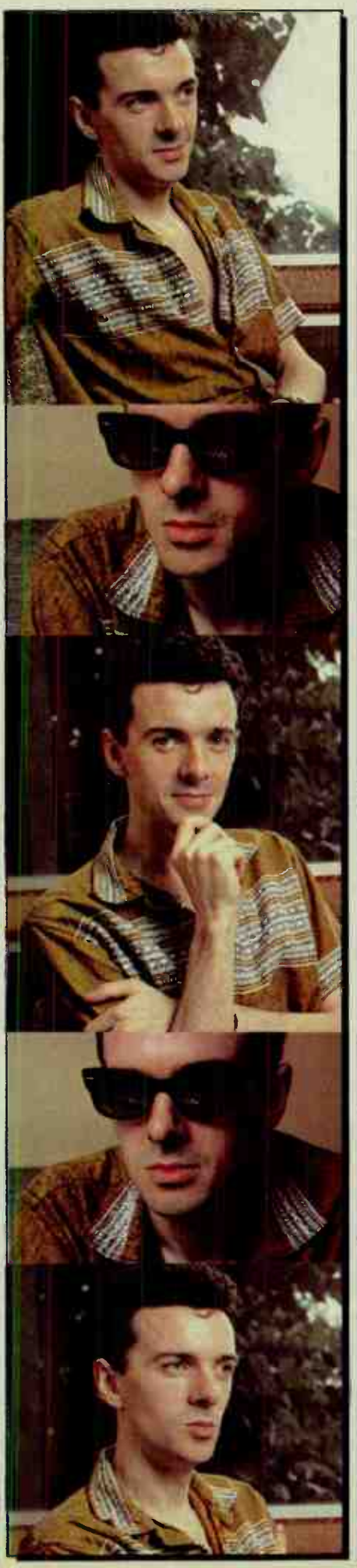
Fairlight

'I didn't find the Fairlight particularly difficult to get to know. When I was doing that first three weeks for Arista, we hired a CMI from Britannia Row, and they sent a couple of guys down here to give me a crash course on how to use it. Sampling is easy – anyone can do it – and using Page R is nothing so terrible either. If you can use a LinnDrum, you can use Page R. The only difficult thing is building up your own sounds within the machine: that can be a very long process.'

The ease with which Leer has adjusted to the grandaddy of computer instruments is reflected by the fact that he's already written his next album three times over, all since the Fairlight entered his Clapham sitting room.

'It's so easy to write things with the Fairlight. It's enabled me to write material in a more orthodox manner, instead of improvising the way I'd done before. I generally sit at the Fairlight keyboard with the drum machine on and work away until something interesting comes up. The actual sounds I write with vary depending on what sort of mood I'm in. If I'm in an aggressive mood, I'll set up the Fairlight polyphonically with a split keyboard, and with a hard aggressive bass sound at one end and something similar – only chordal – at the other. If I'm in a softer mood, the sounds I work with are usually softer: I've modified the standard Fairlight piano voice so that it sounds a bit more Eno-ish, and I sometimes use that for writing.

'I've been sampling all sorts of things ever since I first got it. I mainly sample sounds from radio or records, rather than recording other instruments. What I like about doing that is it gives you half a second or a second of a complete piece of music: it might contain drums, bass, guitar, synth, maybe a whole orchestra, and to me that's a lot more interesting than just playing from one sample.'



Photographer Vosburgh wonders if copyright law could rear its ugly head. What happens if, say, Phil Collins recognises his drum sound on one of Leer's records?

'Oh, I don't think that would be possible, because I change the sound of things so drastically on the Fairlight. I alter the timing, the amplitude, the dynamics, and once you've done all that, most samples end up being totally unrecognisable.

'I recorded one piece here at home that was made up entirely of samples from the radio. I just tuned in one night to a disco programme: I don't know what station it was though it was on AM so it was very poor quality. I turned the Fairlight on and sampled lots of tiny snippets of music. I programmed them all into Page R and got them going in time with a pattern on the LinnDrum, and it turned out to be a nice jazzy instrumental, without me having to play a note!'

> 'Building up your own sounds on the Fairlight is far too complex and time-consuming. That's where something like the PPG scores, I think.'

Complaints Dept

So, Australia's greatest contribution to music since the Sydney Opera House has given Thomas Leer a great deal of artistic inspiration, as well as enabling him to write music in a less haphazard fashion than before. Is there any aspect of the CMI he isn't quite *au fait* with?

'Oh yes. Aesthetically it's well dodgy: they definitely could have worked a bit harder on making it look nice. That's a small point, of course, but on the general working of the thing, there are a couple of aspects that I personally don't like.

'For instance, building up your own sounds is far too complex and time-consuming. That's where something like the PPG scores, I think. I've used a PPG system in the studio and found it a lot quicker to built up sounds on, providing you're used to the way it works. I imagine it's the same with the DX7: provided you know the principles of FM, it should be a lot easier to develop your own sounds than it is on the Fairlight.

'The other thing I don't like about it is the fact that you can't link the two sequencer pages together. There's Page R – which most people know about – and a polyphonic sequencer, Page 9: they work great on their own, but there's no way of getting them to work in sync. I think you should be able to do that, so that you can keep the chords you were working on originally and put new monophonic lines over them, and build up a song between Page R and Page 9. It's also very hard to edit or loop on Page 9, so I've ended up hardly using it at all, except as a sort of notepad to put basic ideas on. It means I have to rework a lot of my original writing ideas so that I can get them on to Page R, but it's the only way I can work it at the moment.'

In an attempt to cure his polyphonic sequencing problem, Leer is about to take

delivery of a Roland MSQ700, which he hopes to link up to a Jupiter 6, itself only recently acquired.

'I got the Jupiter 6 because I wanted something that could generate rich, analogue sounds – the sort of thing the Fairlight isn't very good at. I'd compared it with the DX7, but although that's got a lot of tremendous sounds on it, it occurred to me that it had nothing I can't get on the Fairlight, so I decided it would be better to get a mix of analogue and digital sounds, and that's what this set-up gives me.

'I'm getting the MSQ because I'm hoping it'll take care of the polyphonic sequencing. At the moment I'm using Syco's Conductor card to link the Fairlight with the Linn, and I'm hoping to get MIDI fitted on to it, so that I can use the MSQ in conjunction with the rest of the system. That way I'll have a rhythm section taken care of by the Linn and the Fairlight, and the polyphonic stuff on the Roland gear, which should get round the Page 9 problem.'

The Single

The first fruits of Thomas Leer's new-found association with high-technology instruments have taken the form of a single – 'International'/'Easy Way' – his first product for Arista and by far his most accomplished work to date. Quietly assured and immaculately produced, both songs are signs that Leer's creative spirit has been rekindled afresh, after years of lying dormant under the inadequacies of outdated musical hardware.

Surprised that I'm even aware of the earlier single's existence, Leer explains the lyrical connection between this 'International' and the 1978 impression.

'I've always had this pet theory that the world isn't really controlled by the major governments at all, that the people who really govern us are the men behind the scenes: faceless businessmen in multinational companies who make all the major decisions. They were on the front cover of the first single, and the new one is about the way they control drug trafficking and the effects it has on other people.

'I was originally going to call it 'International 2', the idea being to make several of them as part of a series, but the song turned out to be quite commercial, so the record company got me to drop the '2' bit, on the grounds that not many people actually know about the original.

'The single was recorded at John Foxx's Garden studio, which was a big jump for me because it's 24-track, far bigger than anywhere I'd worked before. I'm working with a producer for the first time – a guy called Paul Hardiman. I chose him because having had a lot of experience working on eight-track and so on, I had very definite ideas about what I wanted, and Paul isn't the kind of producer who takes everything away from you and does it all himself. We work very much as a team: we have a few arguments but generally we each get what we want.'

I remain intrigued as to how the transformation in Leer's sound (from a succession of drab, lacklustre arrangements to a sparkling major label debut) has come about. Were there any specific studio techniques used in the recording of 'International'?

'No, not really. If anything, the single's quite underproduced in a way. Most of it is basic Fairlight sounds, with some string synth overdubs and the percussion player out of Central Line on congas and tambourine. And as far as effects go, we just used the standard Lexicon and AMS reverbs.'

Ambiences

Despite the success of Leer and Hardiman's production formula, they've now left the Garden for the Farmyard, stopping off at R G Jones at Wimbledon along the way . . .

'When we recorded 'International' we DI'd everything, but when we get on to do the album we're going to try some different, more natural ambiences. I think it's a good idea to record a synth's output through speakers and capture some of the ambience of the room or the studio, because I like sounds that are quite open, and you can't get that from direct injection.

> 'I want to be successful, but I'd like to think my songs were intelligent enough to make pop music interesting and worth listening to.'

'We're also going to start using some other musicians. We've already started working with Dave Palmer – who used to be ABC's drummer – and his bass player, a guy called Jeremy Meek, and things have been going very well. There was one thing that wasn't right, though, and that came about because we hadn't really worked out how to record acoustic things along with the Fairlight: there was definitely a clash between the openness of the acoustic ambiences and the closeness of the Fairlight, and it was that if anything that told us we were going to have to work on making the Fairlight more wide-sounding.'

A Fairlight, some reliable session musicians, an agreeable co-producer, and as much studio time as proves necessary. It sounds to me like an almost ideal backdrop against which to make an album, but Thomas Leer still isn't happy.

'At the moment I've got about as much studio time as I need, and the actual amount I'll require will depend pretty much on how much I've got programmed into the Fairlight before I go in. But I haven't yet got to my ideal working situation, which would be to have a studio of my own. I'm not really all that far away from it now, because I wouldn't want an orthodox 24-track set-up. What I'd like to do is build a system that works on a hybrid principle: I'd like to get an eight-track that works on a SMPTE code – like an Otari or a Tascam – to handle all the analogue and acoustic stuff, and the rest of the music would then either be written into the Fairlight or recorded on the MSQ700 using MIDI. That way, I could mix everything straight down onto two-track, effectively cutting out one generation of copying in the form of multi-track tape.

'All I need now is the recording equipment and a proper soundproofed room so that I can be sure the mixes sound right, and once I get to that stage I'll probably give up working in commercial studios altogether, and produce everything myself in my own set-up.'

Leer's long-awaited Arista album – as yet untitled – now looks as though it'll be a mixture of the balladic and the rhythmic, in much the same way as the 'International' single couples a soft, swaying, melodic track with an altogether harsher, more vibrant B-side.

Naturally, he's hoping his recent endeavours will bring him popular success, and has no qualms about making artistic compromises in the attempt to sell records.

'I accept that there is a compromise in releasing things that happen to become commercial, but I never set out to write a commercial song – I find it just doesn't work. Basically, I want to be successful, but I'd like to think my songs were intelligent enough to make pop music interesting and worth listening to.'

And if Leer does achieve that aim, his future could be a lot brighter than a lot of contemporary critics would like to believe, though it's unlikely his plans would include playing a nationwide concert tour ('I just don't enjoy performing, or going to see gigs'), collaborating with Howard Jones ('I don't find much of the electropop very inspiring, though I like the ZTT stuff'), or writing sell-a-million love songs ('the thing with writing songs about relationships is that you can't avoid using clichés, but at least I try and use worthwhile ones').

Still, the man's versatility is such that his output could comfortably encompass writing music for films, directing videos, and producing other bands – all areas he's shown an interest in becoming connected with, even if he's hitherto lacked the necessary time/capital/corporate back-up to get involved too deeply.

And, if his recent track-record is anything to go by, there seems little reason why Thomas Leer shouldn't lend those fields the same confidence and originality that flavours his own, distinctive brand of electropop. ■

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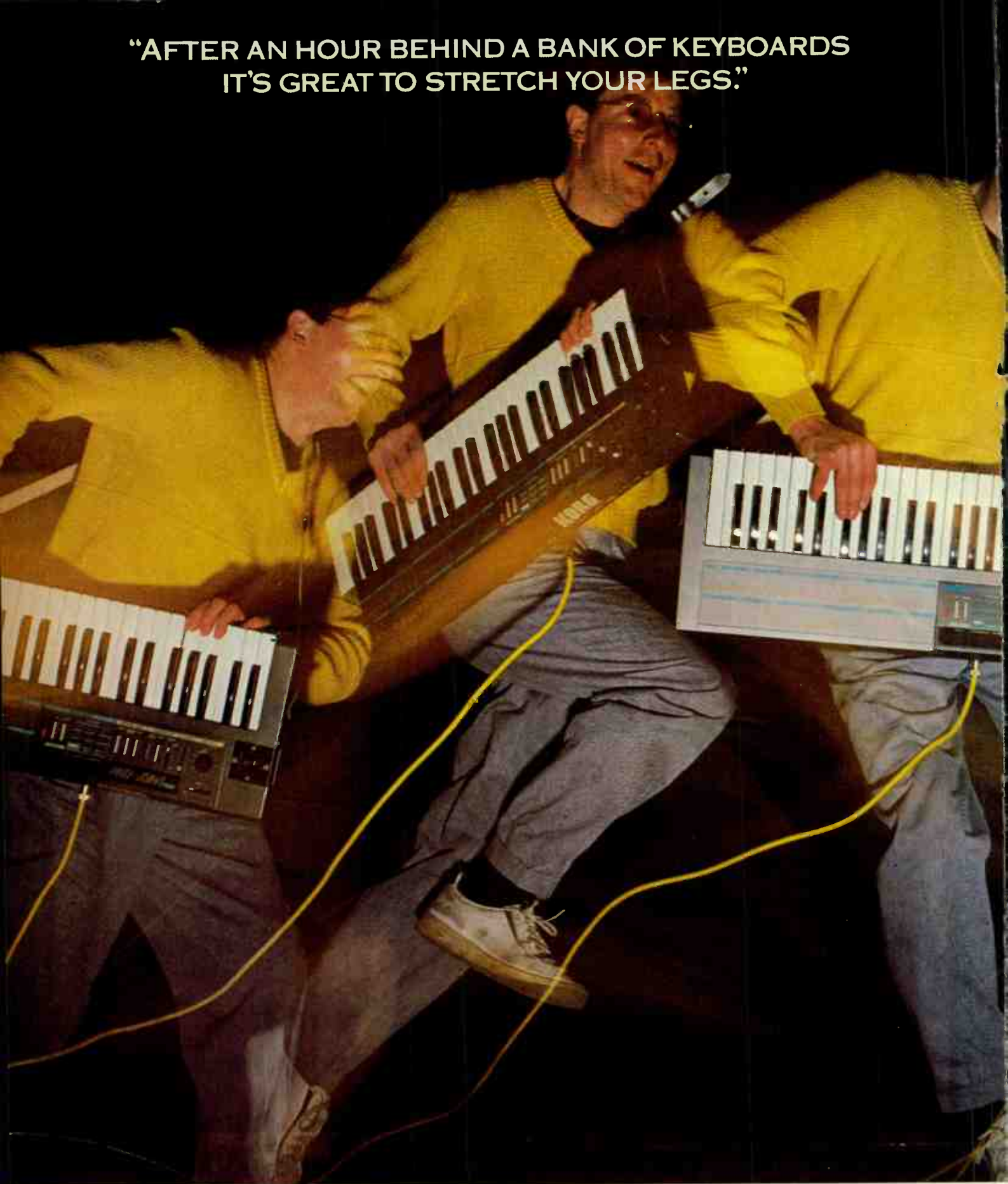

ANDY DAVIS IS ONE OF THOSE UNKNOWN MUSICIANS THAT'S UNKNOWN TO PRACTICALLY EVERYONE BUT MUSICIANS.

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ANDY, THE OBVIOUS FIRST: HOW OLD WERE YOU WHEN YOU STARTED?

I WAS ABOUT THIRTEEN AND I STARTED ON GUITAR. BUT I USED TO BASH ABOUT ON MY MUM'S PIANO TOO, AND MY LOVE FOR KEYBOARDS STARTED FROM THERE.

AND WHO WERE YOUR INFLUENCES?

OH, LOADS – COLE PORTER, STUFF LIKE THAT. BOWIE OF COURSE.

WHEN DID YOU START USING SYNTHS?

I USED TO PLAY KEYBOARDS FOR STACKRIDGE AND WHEN OUR FLUTE PLAYER SAID HE WAS GOING TO LEAVE I BOUGHT A SYNTH TO FILL IN HIS SOUND.

BUT THE GUY DIDN'T LEAVE AFTER ALL.

HOW DID YOU DEVELOP YOUR SOUNDS? WAS IT SIMPLY A MATTER OF EXPLOITING AND EXPERIMENTING ON IT?

YES, I SUPPOSE SO.

I'VE ALWAYS BEEN FASCINATED BY ELECTRONIC NOISES. BUT IN THE EARLY DAYS YOU COULDN'T EXPLOIT A SYNTH THAT MUCH 'CAUSE IT DIDN'T HAVE THE PROGRAMS. IT WAS AROUND THE TIME I GOT MY FIRST KORG THAT I REALLY GOT GOING.

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ON CASSETTE

A look at the latest readers' demo tapes to find their way into E&MM's offices. *Paul White*

Dig Vis Drill *Sheffield*

Four tracks combining the sonic textures of electropop with the angry energy of new wave (now old wave). All the songs were recorded on a TEAC A3440 and an MM mixer, the results being mixed onto a Revox.

The percussion section is built up from Simmons and Digisound modules driven from a Sinclair Spectrum home computer, these being processed by an E&MM digital delay.

Generally, the tracks work very well but seem to lack something in the bass department: I feel a bit of punch is essential to keep this sort of music driving along. Considering the basic keyboards used (Crumar Multiman and Korg 700S), the band's sound textures are good, if a little organy is places.

The band are shortly to be releasing samples of their work in the form of cassettes under the title of Company Classics II – they could be well worth looking out for.

Yahaya Abdullah *London*

A mammoth collection of nine songs under the umbrella title of *Texture on Paper*.

The songs are simple and occasionally a little rambling, but some thoughtful production adds interest and punch. Vocals are heavily treated throughout with stereo flanging effects, lending the music a kind of vintage John Martyn quality, while drum machine backing provides a surprisingly human feel, largely due to thoughtful programming. Much use is made of reversed sound envelopes, various unrecognisable sounds being added to the percussion track to impart an almost surrealist feel to some sections.

If anything, the flanging and chorusing is a little overused, as most of the songs also feature flanged guitar as well, which does give the music something of an air of overproduction.

To counterbalance this, good use is made of delay effects, and some thoughtful stereo panning enhances the drifting quality of the music.

Candy Cubes *Aberdeen*

Snappy, funky pop driven along by an MXR digital drum computer. This cassette represents the fruits of only the band's second visit to a recording studio, and the results are very professional: bags of popping bass and driving percussion, but without the music's creators falling into the self-indulgent rut of jazz-rock fusion.

The combination of synthesisers with guitars gives a far better aesthetic balance than that presented by some of the all-synth productions currently in vogue, and the arrangements of Candy Cubes' two songs ('Another Someday' and 'A Flower') shows a good understanding of what to put in and what to leave out.

Definitely a band to watch out for.

Masque *Winchester*

A Drumulator adds percussion authenticity (?) to these recordings made by a three-piece consisting of vocals, guitar and synths. Rhythm patterns are well thought out and programmed, although the dreaded hi-hat is rather too prominent for my taste.

Singer James Lovegrove's vocals are a curious blend of Bowie and Dylan but, because they've been recorded without the benefit of compressors, they occasionally fall back into the rest of the mix and get a bit lost.

All the music was recorded by the band on their own four-track set-up and, although the finished result is a little on the noisy side, the production is really pretty good.

Although Masque's music does not betray any direct influence, it isn't in fact particularly original, but since when has that ever stopped anybody?

Peter Clark *Aberdeen*

Although Clark's recording equipment is so primitive that he ends up with a noise-to-signal ratio rather than vice versa, his songs are both pleasant and well-balanced. Main instrumentation is a Korg MS10 monosynth and matching SQ10 analogue sequencer, plus an Aria CS350 guitar and a few pedals.

The recordings are bounced between a music centre and an old HMV recorder using, and I quote, 'a cassette recorder mic with a slipper and some toilet roll over it to reduce its tinny response.'

Judging by the level of mains hum (this competes with the noise for first place), Clark must do most of his recording in a power station, but for those who are interested, the three tracks enclosed here are entitled 'Do It By Yourself', 'Tonight', and 'Tamla Notown': definitely this month's commendation for perseverance in the face of quite appalling odds.

He's hoping to upgrade to a wax cylinder in the near future . . .

Kirt *(no address supplied)*

Four songs recorded at 'The Cupboard on the Stairs' during the summer of '83 on eight-track. No further information is supplied, but all the tracks feature synth and drum machine in addition to Kirt's vocals.

The lyrics are rather trite, but all the songs are interestingly constructed, even though they do owe something to the music of Depeche Mode, Yazoo *et al.*

James Vincent *Southampton*

Five songs that all feature Vincent on Roland Juno 6 and SH2, Jen SX1000 and Eko 12-string guitar, with vocals attributed to 'a friend'. Recording revolved around bouncing between two Dolbyless cassette decks described by the artist as 'nasty'.

The first track seems to take this comment a stage further with an intro synth setting that sounds for all the world like someone's pet mouse being caught up in the capstan of one of Vincent's cassette machines, but fortunately this gives way to a pleasant if not outstanding middle-of-the-road composition, with vocals that set the tone for the rest of the tape with their quiet assurance.

All the material seems to be in a remarkable state of preservation given the limitations of the recording method, though it must be said that there is little trace of anything above 4kHz. The songs are all to a uniformly high compositional standard (though a mite dated-sounding for my taste) and I'd say this artist could well be capable of performing minor miracles given some time in a studio with some decent gear.

However, abject poverty would seem to rule out that possibility in this case, unless some benevolent soul in the music business feels like taking an interest. If he doesn't, then I think we should seriously consider introducing a special commendation for perseverance in the face of extreme adversity. ■

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ON STAGE

E&MM highlights two of this summer's most rewarding modern music performances.

Ultravox
Hammersmith Odeon, London

Support band Messengers, who seem to have become a permanent feature of the Ultravox live show (they augment the main band with additional backing vocals, rhythm guitar and keyboards), delivered a competent set of songs. They perform as a duo, using backing tapes to provide rhythm parts and a synthesised backdrop. As these appear to have been recorded entirely with drum machines and electronic keyboards, it seems surprising that they haven't chosen the more modern option of using a sequenced accompaniment. It's interesting to note that while they perform with tapes on their own, their addition to the line-up means that Ultravox have no need for backing tapes to take care of extra vocal and guitar parts.

Ultravox's show began with the doomy introduction to 'Man of Two Worlds', string lines underscored with a heavy sampled percussion sound, itself a regular feature of the band's music. A brave choice for an opening number, as the vocal line features several sustained high notes and the synth solo is one of the most technically demanding that Billy Currie plays.

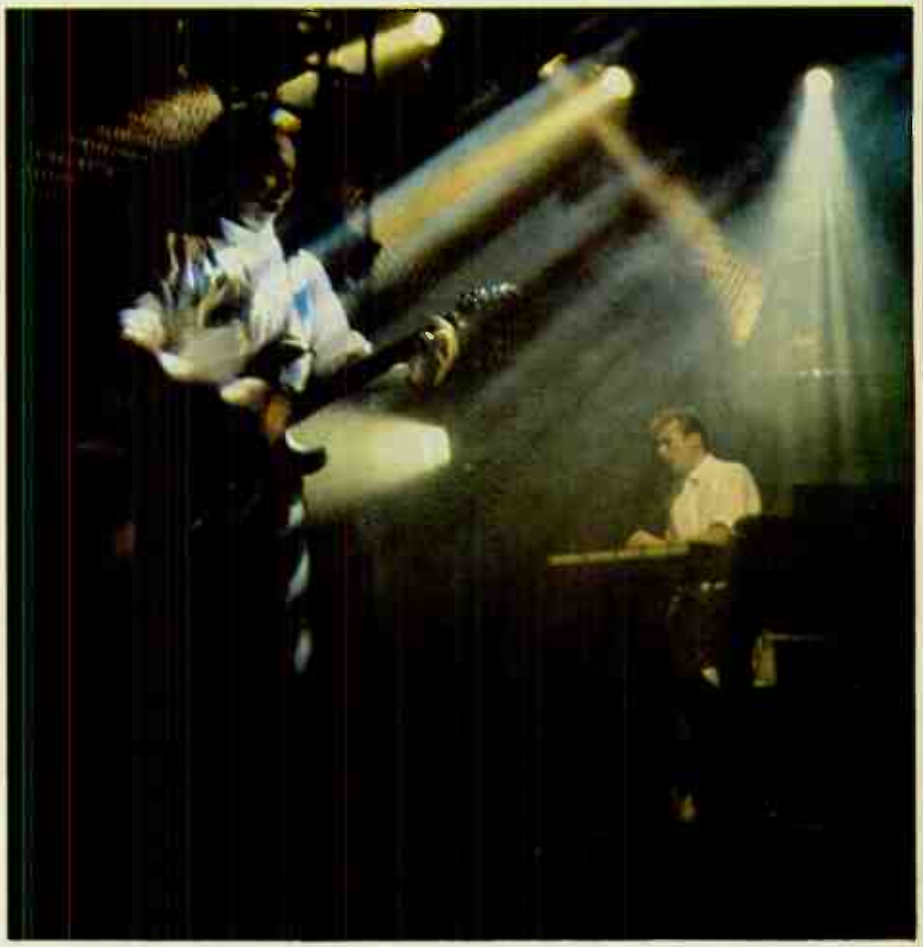
Both were executed faultlessly.

The band plunged without hesitation into 'Passing Strangers' before the final chords of the first number had died away. The delicacy of the middle section contrasted with Midge Ure's manic guitar solo: again, it was a surprise that it came so early in the set when most other bands would save it for a finale.

'Dancing with Tears in my Eyes' was followed by two more songs from the Vienna period, 'Mr X' and 'New Europeans'. Live, the strings-only third verse of the latter made for an even starker contrast with the jagged guitar chords of the rest, a delicate moment within the immense energy of the surrounding songs.

Then came a crop of songs from the new album, interspersed with a few old favourites. 'Heart of the Country' slid gracefully by (harmony vocals *et al*) and after a fascinating bridge passage that saw Midge Ure playing DX7 koto sounds from the Roland G707 guitar (thanks to MIDI) over two sequenced OSCars, Billy Currie picked up the main riff from 'Western Promise': during the course of the song, this was played on OSCar, PPG, Yamaha GS1 and finally (during Ure's Roland guitar synth solo) on Prophet T8.

'We Came to Dance' led quickly into the triggered Emulator vocal line of 'White China', with Warren Cann pushing an SCI Drumtraks to its limit to recreate the tuned bass drum patterns of the recorded version, and thence 'One Small Day' with its astonishing vocal gymnastics.



By now the supply of new songs had been virtually exhausted, and we were into the 'greatest hits' section of the concert. The delicacy of songs such as 'Visions in Blue' and 'Vienna' fitted well alongside the raw power of 'The Voice', 'All Stood Still' and 'Hymn'; particularly effective during these louder numbers was the duelling lead guitar and lead synth. As the set drew to a close, Billy Currie turned in a fascinating solo on the OSCar, making effective use of glide and the duophonic capability.

The set culminated in the traditional four-man drum solo, combining Cann's acoustic drums with the Simmons pads the other three play, finishing the main performance on a high.

The encores matched the best of the old songs – 'The Voice' – against the best of the new – 'Lament' – for which the previously vociferous audience was hushed, hanging on every word and chime. It was an unusual choice for a final encore (and all the more effective for that), and provided the perfect conclusion to a concert that was full of light and shade, power and delicacy. It also proved that MIDI can work most effectively on stage, for all you doubting Thomases out there.

Michael Nyman Band
Bloomsbury Theatre, London

Nyman is a modern composer often grouped in the same musical drawer as the likes of Philip Glass and Terry Riley. His arrangements rely on a similar ensemble of instruments – a curious mixture of electronic keyboards and traditional acoustic instruments, though with a distinct bias towards the latter – but whereas America's 'systems' music depends to a great extent on

repetition for its effect, Nyman's output is more lyrical.

His musical training is one of being a critic rather than a creator, but since his writing career began, his collaborators have included Brian Eno, David Cunningham (*aka* The Flying Lizards) and film director Peter Greenaway, who has used Nyman almost exclusively for some years.

Quite simply, he believes that modern music should be entertaining to listen to as well as thought-provoking to look at, and to prove his point, he and his band recently played a couple of concerts as part of London's Bloomsbury Festival. The first of these was a recital of the music to two of Peter Greenaway's films, *The Draughtsman's Contract* and *Making A Splash*, the two 'soundtracks' being conveniently divided by the interval.

Nyman conducts from the piano, and for the first half of the concert, his grand was supplemented by a Roland Juno 60 mounted above, used in the main for sparkling harpsichord-like tones.

The *Draughtsman's Contract* music has become almost as celebrated as the film itself (with the result that the Bloomsbury's cosy auditorium was filled almost to capacity), and the band's rendition of five of the film's seven pieces was warm and full of character, as well as being perfect almost to the note. Nyman's philosophy allows him and his colleagues to make subtle periodic alterations to the score, and several of these came to light as the concert progressed, adding further vitality to the proceedings.

Musical climax to both the film and the first half of the concert was 'Bravura in the Face of Grief', a long, moving piece with an instantly memorable motif carved out by the string section, on top of which is laid some bubbling brass and a dazzling, finale-making harpsichord. 'Bravura' is a typical Nyman composition, strongly melodic but with a structure that is gracefully subtle: the music changes rapidly but almost unnoticeably.

Unlike *The Draughtsman's Contract*, which was a feature film in its own right, *Making A Splash* was a short piece made specially for Channel Four television, meaning that the music presented in the second half of the band's concert (under the title *Water Dance*) was being heard for the first time in its unedited form: no album version is yet available.

The music as performed at the Bloomsbury Theatre consisted simply of one, extended piece, broken up by a series of four piano chords, played at regular intervals throughout the work's duration. The music in between those chords oscillated between the frantic and the serene, though such is the dexterity with which *Water Dances* has been composed, neither mood seemed to be at all at odds with the other.

It will undoubtedly have pleased Michael Nyman that most of the audience found *Water Dances* instantly accessible, taking it to their hearts and applauding it even more warmly than they did the earlier, better established work, though the band refused the almost continuous pleas for an encore.

All Nyman's musicians contributed to the glory of the occasion, but special mention must be made of saxophonist John Harle (who performed another of Nyman's pieces – *Le Ballet Mechanique*, with his own Berliner Band later on in the festival), of the magnificent playing of violinists Alexander Balanescu and Ruth Erlich, and of the sterling contribution made by synth player Rory Allam: his OSCar monosynth stood out like a sore thumb in the midst of the rest of the ensemble's acoustic instruments, but the machine's subtle bass tones provided the backbone to much of the music's continuity and flow.

All the acoustic instruments were picked up and amplified through a splendid Bose PA system, through which each component could be clearly defined and analysed.

I left the Bloomsbury Theatre with a sense of enormous relief that Britain's 'serious' music scene has such a deserving champion of melody and form, coupled with a feeling of disappointment that he and his band don't perform more often . . . ■

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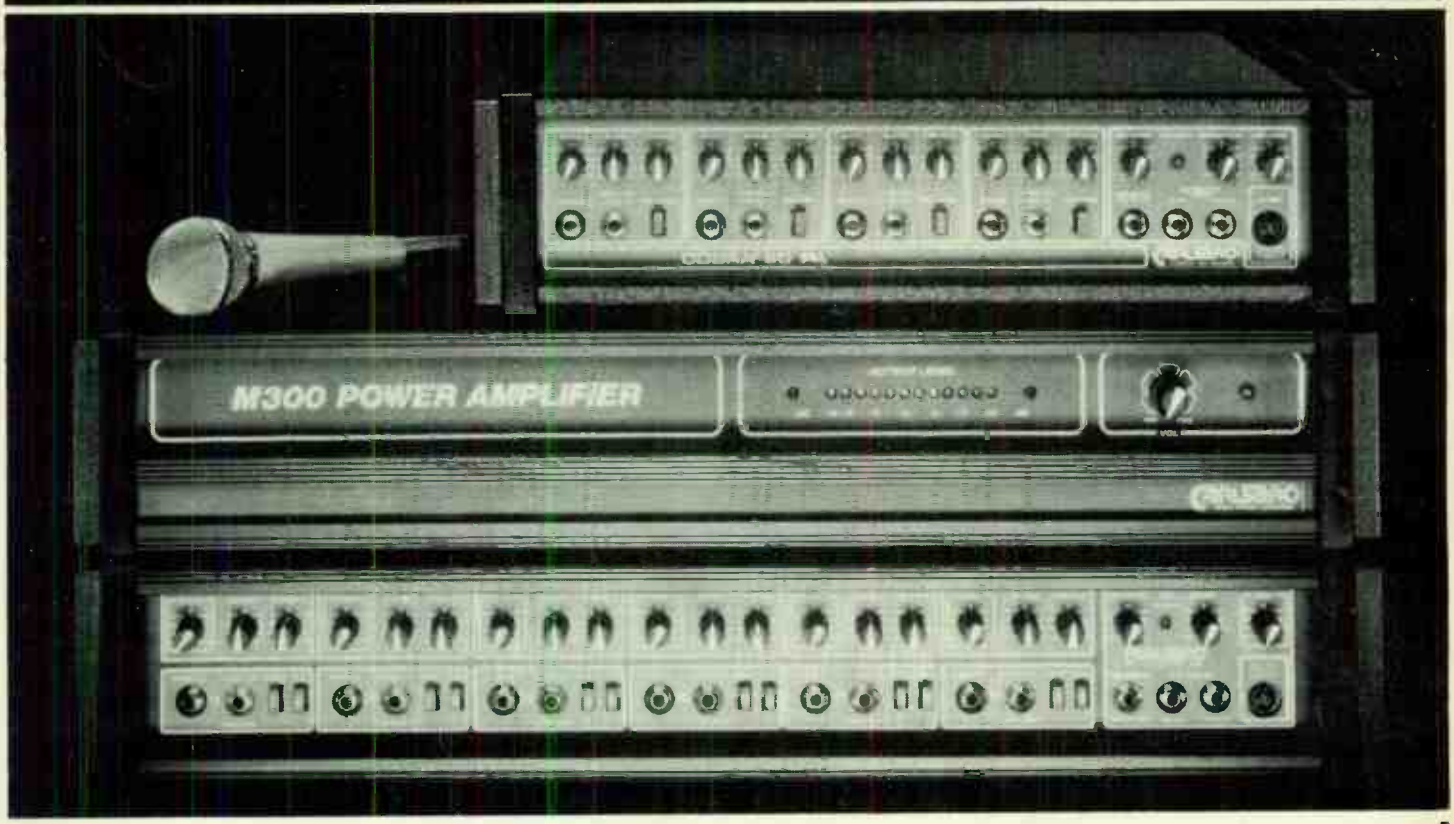

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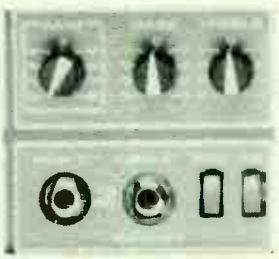
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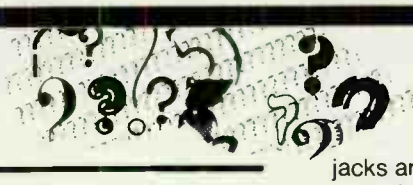


WIN

Korg's new £1000 MIDI keyboard system in E&MM's exclusive two-part competition

This month's second and final competition instalment takes the emphasis off what you can do with your eyes (*viz* last month's spot-the-difference illustrations) and on to how carefully you can read and absorb information.

Below you'll find our review of the Korg EX800 MIDI expander and RK100 remote keyboard. All you need do in order to fulfil this part of the competition is read the review carefully and then answer the questions listed on the entry form: basically, it's a high-tech comprehension exercise, though if you read the text with even a modicum of attention to detail, you shouldn't have too many problems filling out the form with confidence!

So, eyes down, here comes the copy . . .

The EX800

This is an eight-voice polyphonic synthesiser expander module that communicates with the outside world *via* MIDI. Deceptively small, the EX contains all the functions of the self-contained Korg Poly 800, the only real difference being the lack of a keyboard.

Construction

Measuring a very modest 404 x 222.5 x 64.5mm, the EX800 boasts virtually the same front panel controls as the Poly 800, though the layout itself is somewhat dissimilar.

The top half of the panel is taken up by the Parameter Index, a look-up table detailing parameter codes and their respective ranges. Each of the expander's variable parameters is given a code through which it can be addressed by the user, and the Index lists this as well as the range over which the parameter can be adjusted. For example, the level of DCO 1 is addressed *via* code 17, while its value may be set at any integer between zero and 31, giving a resolution of 32 steps.

Below the Parameter Index is the control section, and the most noticeable features of this are the three display windows, behind which are pairs of numeric seven-segment LED displays. These yield information relating to program, parameter and value respectively.

The volume control incorporates the on/off switch, and next along the panel is the tuning control, which enables the EX800 to be fine-tuned to other instruments or synthesisers with which it may be interfaced.

Next is the sequencer which comprises only speed, step and start/stop controls and which, in conjunction with the keyboard, is capable of storing 256 notes polyphonically: these can be programmed in step or real time.

An eight-button numeric keypad is used for programming in conjunction with the 'bank hold' and parameter increment/decrement switches, and this is used to enter patch numbers, parameter codes and parameter values.

Turning our attention to the rear panel reveals a pair of five-pin DIN sockets for use as MIDI In and Out, followed by a jack socket labelled 'program step up'; when a footswitch is connected to this socket, the voice programs may be stepped through one at a time, though only upwards. Mini jacks are provided which allow the connection of a cassette recorder and, using this facility, voice programs or sequences may be stored to or loaded from tape for future use. The internal memory is non-volatile so that the integrity of the voice and sequencer programs is preserved when the expander is powered down. Both sequencer and program write functions have enable/disable switches, and the main output is in stereo to make full use of the built-in stereo chorus effect.

Finally, a DC input socket connects to the mains unit provided; there is no facility for battery operation (unlike the Poly 800) which is fair enough, as the current required by the circuitry would make this a fairly expensive way to operate the expander.

Parameters

Sounds are built up from waveforms provided by eight digitally-controlled oscillators, and these can be configured to operate as eight-voice or four-voice polyphonic generators, in which case each voice uses two oscillators. In the interests of economy, only one voltage-controlled filter is provided, and this has its own envelope generator, as have the two oscillator sections, DCO 1 and DCO 2. All three envelope generators have the usual ADSR parameters but additionally, two *new* functions of 'break point' and 'slope' are provided. These functions allow the decay to be interrupted at a user-defined break point, and either a new decay rate or a second attack rate introduced, respectively. New percussive effects can be created in this manner and, by setting different envelopes for DCO 1 and DCO 2, the voice can be made to change dramatically, so long as a key is held down long enough to allow the second envelope to take effect.

Each oscillator has four octaves or footages, each of which is available with ramp or square waveforms, and these may be used simultaneously in any desired proportion. This is particularly useful for simulating organ sounds: a convincing Hammond voice can be programmed very easily, for example.

Any sounds created may be stored in any of 64 memory locations, configured as eight banks of eight sounds.

The modulation section is fairly conventional and includes delay vibrato, which may be fed to the DCOs or the VCF as required. Noise may be added to the DCOs for voice generation, while the stereo chorus is preset, only on and off controls being accessible to the user.

Either multiple or single triggering may be selected, and the whole unit may be set to respond to any MIDI Channel between 01 and 16. The sequencer clock may be selected to run at the rate set up on the EX800 or to respond to a MIDI clock, but no sequencer trigger input is provided for use with conventional trigger pulses, which is a shame.

Sounds

Given the limitations imposed by a single VCF, the EX800 is surprisingly versatile and, consistent with most recent Korg synths, has a fat filter sound as well as the capacity to generate more abrasive voices when required.

One system present on the Poly 800 but missing from the EX800 is the chord memory feature and, while this in itself is no great loss, it *was* the only way to force all the oscillators into unison, and this is a facility which will be missed on the EX800 as there is no unison mode as such.

As there are no performance controls on the expander, the 'bend' function is implemented *via* MIDI, and this was found to be compatible with most other MIDI products,

including hardware by Roland and Yamaha, but check with your own synth before you buy if this function is one of your prime requirements.

Conclusions

This is a flexible synth capable of providing a wide range of both powerful and delicate sounds. The single filter is a limitation, but it does keep the cost down, and its omission is not as serious as it may at first appear.

To my mind, the real naughties are the lack of a conventional trigger input for syncing the sequencer to a conventional drum machine and the lack of a unison button.

I would imagine that the EX800 would appeal particularly to owners of MIDI pianos or Yamaha DX synths, as its fat textural sounds would make an ideal complement to their existing voice capabilities and the purchase price makes it a very realistic addition to the semi-pro keyboard player's armoury.

Altogether, this is one of the neatest and most impressive synth add-ons that we have yet had the pleasure(?) to test.

The RK100

This is the ideal companion for the EX800, and allows the keyboard player the freedom of the guitarist whilst giving him the means to control any MIDI-equipped synth.

Built on a wooden chassis, the 100 features a three-and-a-half octave keyboard (C-to-E), and a bank of performance controls fitted within convenient reach of the player's left hand. Onboard controls allow the keyboard to be switched to select programs zero to 63, and an LED display shows the current 'bank and program' status for a maximum of 64 patches.

Available in black, white, red or natural wood finish, the RK100 weighs only 4.4 kg and balances in much the same way as a guitar. All except the natural wood models are coated with a tough, thick lacquer which visually resembles perspex.

Modulation Controls

The pitch-bend and vibrato wheels are ergonomically placed on the neck of the instrument and are spring-loaded, unlike the volume wheel which sensibly stays exactly where you set it. A switch is provided so that the modulation wheel may be routed to pitch or filter modulation, its speed and maximum depth being determined by the capabilities of the receiving synthesiser.

Step buttons are also provided so that the program number may be incremented or decremented, and a three-way switch allows the pitch to be transposed up or down by one octave during performance. Additionally, the shift and number buttons can be used to specify a voice patch number directly.

The portable nature of the RK100 means that mains power would be impractical, so the unit normally runs from six AA-type cells which can be either standard or rechargeable.

The only connection is the MIDI Out cable, which has a locking plug to prevent embarrassing disconnections during performances, though it is possible to run the RK100 from an external 9V DC source if on-stage gyrations are kept to a minimum!

Handbook

As with all high-technology instruments, a good handbook is a must and fortunately this offering from Korg lists all the MIDI information required to understand what is going on when you plug the ubiquitous DIN plug into a remote synth.

The RK100 incorporates active sensing, ie. five times every second, the synth asks the RK100, "Are you still there?", and the RK100 answers "Yes!" This is the digital equivalent of the scene in *Cool Hand Luke* where Paul Newman has to shake the bush to prove that he isn't running away when he's out of sight! If anyone accidentally disconnects the cable, the synth will get no reply and will then go into a mode of ongoing silent sulkiness until someone talks to it. Joking aside, this is a preferable alternative to having your last note sustained after the plug falls out . . .

Conclusions

The RK100 is well thought out in terms of both ergonomics and facilities, and the MIDI department behaves well, with no unpleasant surprises. It's probably most at home driving the EX800, as other synths (such as those with more than 64 patches) could present some problems, as could early MIDI synths with suspect software.

Providing that you like the playing position and feel at home with its modulation controls, the RK100 is pretty much user-transparent: its keyboard has a conventional feel and the instrument isn't too heavy to play for long periods of time.

If you want to stand up and be counted, try one out – but don't trip over the footlights! ■

ENTRY FORM PART 2

EX800

1 The EX800 has a built-in sequencer. What is its note storage capacity?

.....

2 Do the EX800's oscillators employ analogue or digital control?

.....

3 What are the two new functions the EX800 adds to the standard ADSR envelope controls?

.....

4 With which function control is the EX800's on/off switch incorporated?

.....

5 Both user-programmed voices and sequences may be loaded from the EX800 to cassette tape. True or false?

.....

RK100

1 The RK100's mod wheel can be used to control two of the receiving synthesiser's parameters. What are they?

.....

2 How many times each second does the RK100's active sensing circuitry receive a transmission from the associated MIDI instrument?

.....

3 What is the maximum number of patches that can be recalled remotely from the RK100's program switches?

.....

4 What is the RK100's overall weight in kg?

.....

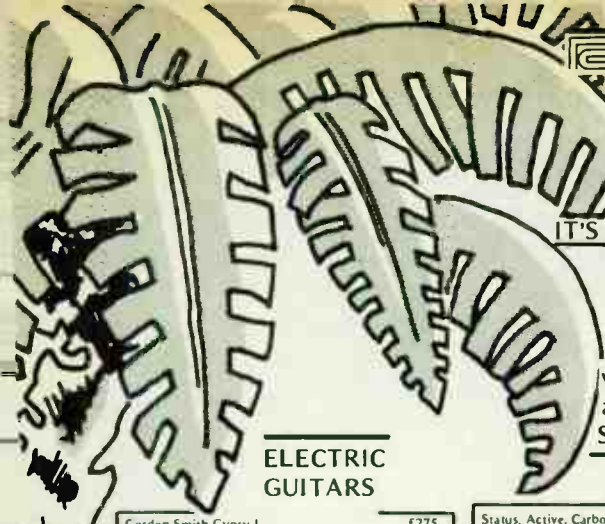
5 All the controls on the RK100 have a spring-loaded action. True or false?

.....

Once you've completed the above set of questions, send this entry form – together with your answers to Part 1, printed in E&MM August – to this address: Rose-Morris Competition, E&MM, Alexander House, 1 Milton Road, Cambridge CB4 1UY.

Make sure BOTH entry forms are fully completed and enclosed.

Closing date for entries is second post, September 28, 1984.



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TO USE A TAPE RECORDER OR NOT?

That is the question! Whether tis nobler to the audience to endure the faults and limitations of computers and sequencers, or take arms against a sea of jack-leads and by opposing, end them!

I'm just a simple gear trader who learned and forgot his Shakespeare in the 5th form whilst wrestling with the problems of puberty and pending 'O' levels. At that time a young gentleman by the name of Buddy Holly was selling an unseemly quantity of black plastic, but met an untimely death due to logistical problems, and I'm sure it's logistics that are killing off (metaphorically speaking) many young groups today (Sorry, "bands" – showing me age again!)

Buddy's problem was very real – he either hired the plane or missed the gig but a lot of today's problems are self-induced. We do at long last, seem to have got over Mega-lomania; I have to report that in Lancaster at least, it is no longer necessary to use 2000 watts in the Brown Cow in order to remain Socially acceptable! But no sooner do we recover from the wattage war, than we get struck down by digitalitus! I had a fella in the shop the other day in an advanced state of anguish due to the fact that he wanted an MSQ700 but could

only afford on MC202. I said "whats" wrong with the MC202? He said "you can only get one song in it and the memory is volatile" (not altogether true but I took his point). I said "So what?". He said "for gigging". Having got over the shock of meeting yer actual live gigger I then discussed the various

merits of MSQ700 and TR909, 6 tracks and Drumtracks, DX7 and BBC B et al and I could see the poor bloke going pale and thinking of selling his house. (we've known people actually do it!). Finally, having discovered he really didn't have any money, I drank what was left of his coffee and tried an experiment. "What would you say," I said, "to a product costing £500 or less, that you may already own, that can store as many sequences as you want, real-time or step, poly or mono and can dump all the songs to cassette!?" "What is it", he gasped, foaming at the mouth. "A tape recorder!", I said. "But that's cheating," he said, and dismissed me for being a smart-ass!

Who's the fool though? Isn't it another case of "the King is in his altogether?" Sure it's cheating, but it's not getting caught that matters! Many a time I've stood at the bar while all around have been praising the voice of the lead singer. They hadn't noticed the Roland 501 space echo and if they had, they'd have thought it was an amp! So why not rack-mount the offending tape-recorder along with the other effects? No-one would notice, much less care!

Let's talk money. You could buy a Tascam 234 for £500 plus, use it for making demos, then rack it for gigs. Four syncronised backing-tapes (or if you prefer – analogue stored sequences) can then be fed from one unit to the P.A. and separately EQed according to venue. Inexpensive goodies such as the MC202, DE200, HC2, TR606, TB303, SH101 JSQ60, JX3P, Korg Poly 800, EX800, the new Korg digital drum machine costing less than £300 etc etc etc, can then be used without the limitation of their memories giving you problems on stage.

One of the commonest objections to this argument is, "What if the tape-recorder breaks down?". But what if your poly-sequencer or computer breaks down? Surely it is less expensive and easier to duplicate a tape-recorder than all the other gubbins; after all, you only need an ordinary stereo cassette deck, equipped with stereo cassettes mastered for emergencies. And (and this is where I do myself out of some sales), you don't always have to buy a PG200 or DE200 or whatever, you can borrow! Any mate will lend gear for recording at home, but they've all gone out when you want to borrow gear for a gig!

Should you decide to actually buy some gear, we recommend ourselves since all the other shops are staffed by organ salesmen, HM head bangers or digital whizz-kids (so are we really but we're cheaper!).

Finally, don't worry – RELAX! This type of advertising will be out of fashion soon and we'll revert to boring old lists of prices – promise!

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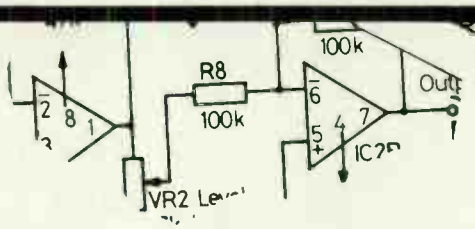
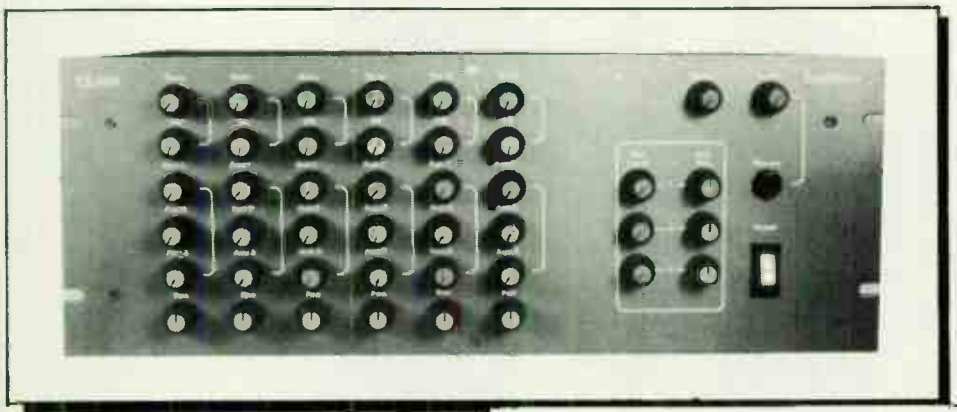


The SynthMix (2)

The conclusion of our keyboard mixer project, with PCB layouts and full wiring details. *Paul White*



Before starting on the constructional details, there are a few ambiguities concerning the power supply that need clearing up, due mainly to problems encountered in translating the circuitry from the original RackPack design.

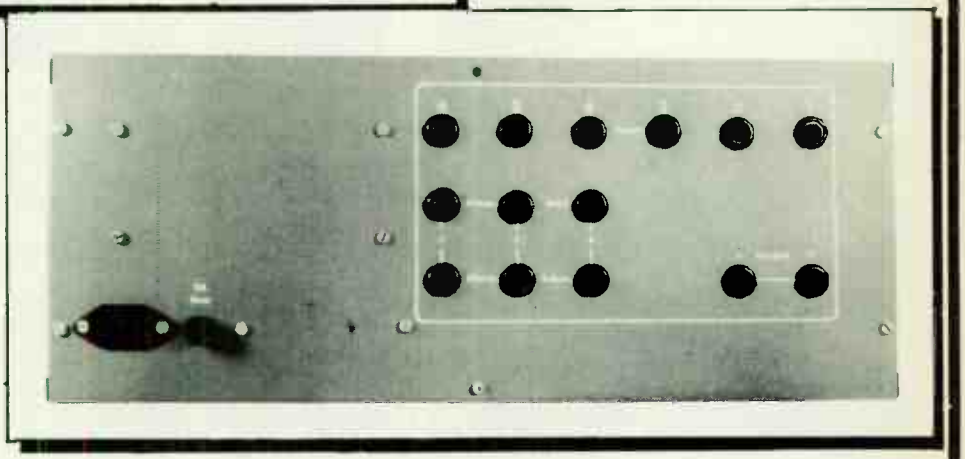
The PCB itself is identical to that used in the RackPack, but the components relating to the power LEDs are now omitted as these are not required. Referring to the PCB overlay, Figure 1, the component values should be REC1 – 2A/100V bridge rectifier; C1, C2 – 2200μF/63V electrolytics; C3, C4, C5, C6 – 0.1μF; R4, R5 – 4K7; RG1 is a 7812 and RG2 a 7912.

The wiring diagram in Figure 6 is correct as it stands, but if an illuminated rocker switch is to be fitted, use a double pole type and check the manufacturer's wiring instructions before connecting up, otherwise the neon may end up being permanently on.

Assembly of the PCBs is straightforward and if the Maplin PCB mounting pots are used, these will fit directly to the boards making the wiring very simple. As always, check that electrolytics and ICs are mounted the correct way round, and I would recommend the use of sockets for all ICs except those used on the headphone amp, where the circuit track is used as a heatsink.

If you have made your own front panel as detailed last month, the PCBs may be fitted to it by means of the pot nuts, after the painting and legending is complete.

Once the PSU has been assembled, it should be tested before connection to the rest of the circuit, and all exposed mains connections should be insulated with rubber sleeving or plastic tape.



As can be seen from Figure 6, most of the wiring consists of bus bars passing through the PCBs, and tinned copper wire is the best material for this purpose.

This should be stretched before use to straighten it so that it can be threaded easily through the necessary holes.

Figure 6 also shows the correct position for each circuit board, and the bus bars should be fitted as follows:

1 Fit the +12V bus bar which passes through the top holes in all boards.

2 Fit the 0V bus bar through the second hole down on all PCBs.

3 Fit the −12V bus bar which joins all PCBs except the headphone board. Refer to Figures 1-5 when wiring to ensure that the connections are correct and that you are using the right holes.

4 Next come the three auxiliary bus bars which pass through the six-channel boards before splaying out to join the auxiliary PCB. Refer to Figure 3 and join these bus bars to the points labelled Aux bus 1, 2 and 3 respectively.

5 The left and right busses pass through all the PCBs except for the headphone amp board; there is no connection to the auxiliary PCB, but two holes are drilled to allow the wires to pass through.

It's important to fit the two 100μF electrolytic capacitors to the power buses as shown in Figure 6, and these should be at least 16 volts working. The headphone amp is wired to the master PCB with insulated flexible wire, and the connections are from the top of the two sections of the ganged master gain pot to the left and right inputs on the headphone amp board.

All six inputs, the two outputs and the auxiliary send and returns are wired using coax-to-jack sockets on the rear panel and the earth or screen connection should be made to the 0V track which runs up the back of each PCB (see Figure 6).

The prototype was built using a conventional transformer, and this had to be screened as a certain amount of mains hum was noticeable at ▷

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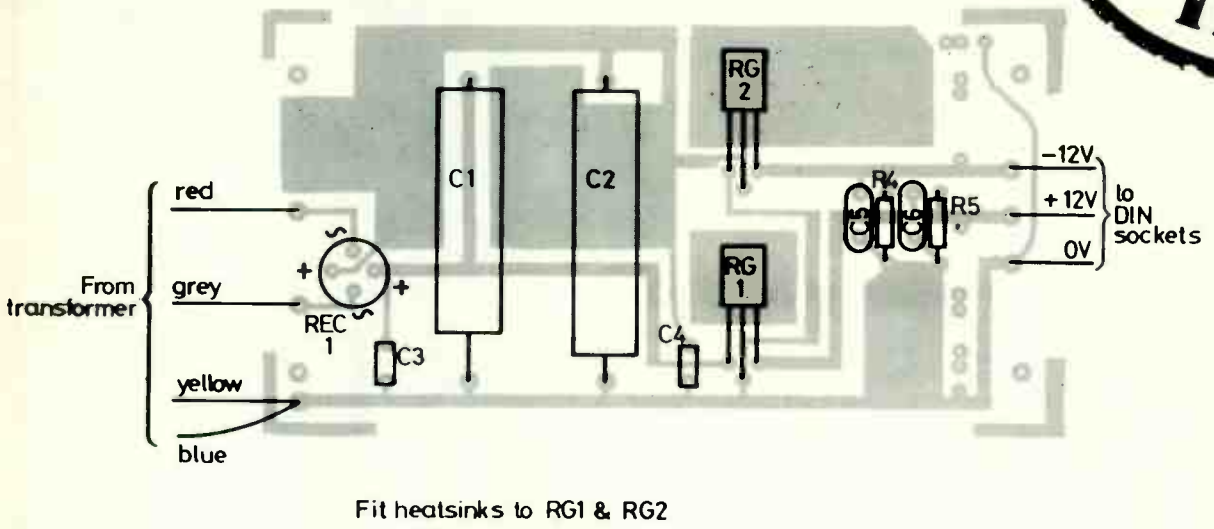
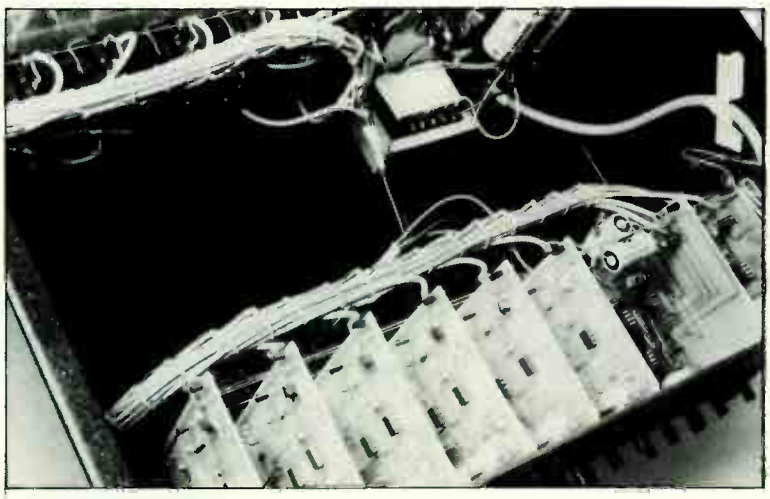


Figure 1. SynthMix power supply PCB component overlay.



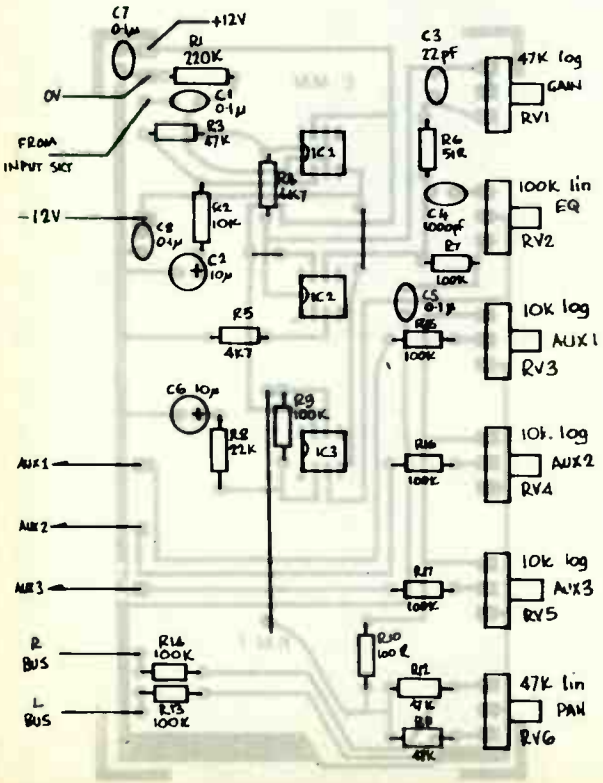


Figure 2. Channel PCB component overlay.

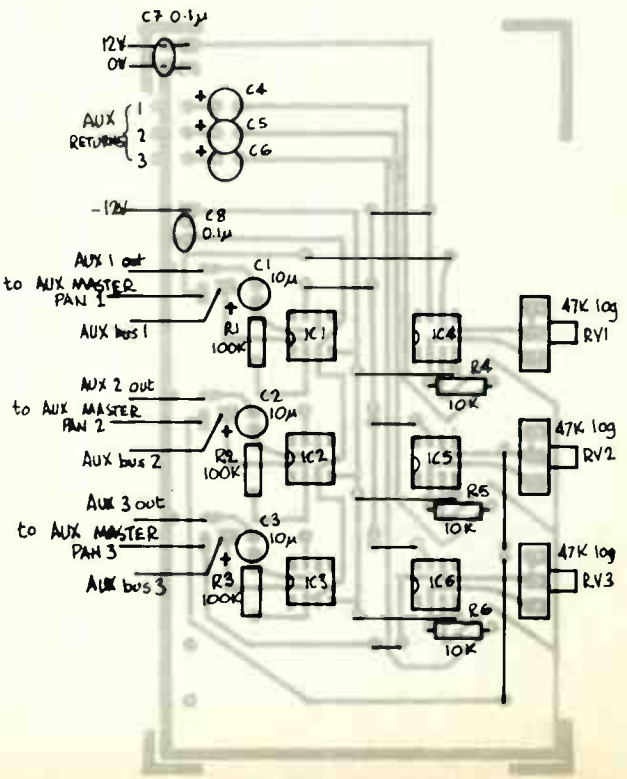


Figure 3. Auxiliary PCB component overlay.

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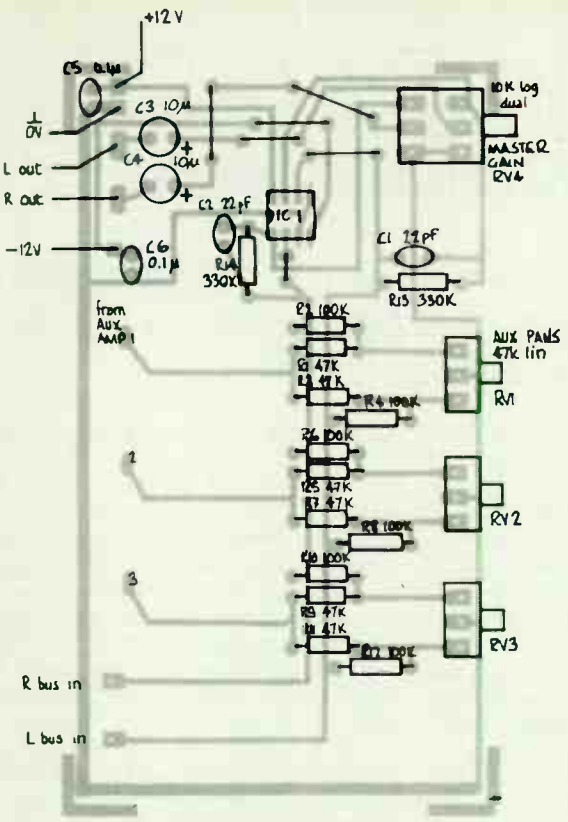


Figure 4. Output and aux pan PCB component overlay.

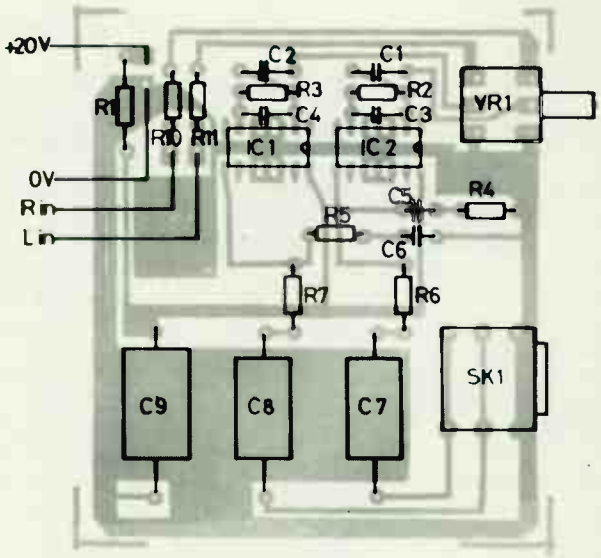


Figure 5. Headphone amp PCB component overlay.

high master volume settings. A far better alternative is to use the toroidal transformer specified in Figure 6, and this is available from Maplin, as indeed are all the other components. No additional screening should then be necessary in the transformer department, but it does make a small further improvement if the leads to the front panel mains switch are screened, the screen being connected to the chassis at one end only.

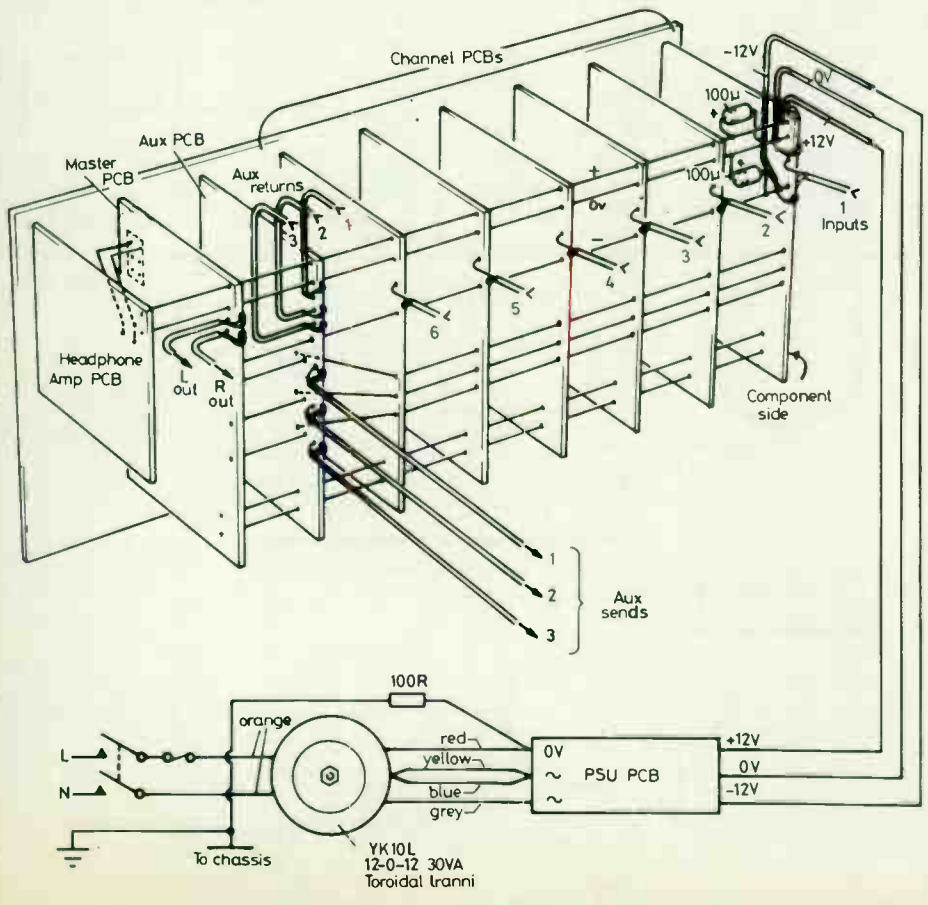


Figure 6. SynthMix internal layout and construction.

Figure 6 clearly shows the PSU wiring, and it's best to check that the power supply still provides +/– 12V when connected to the rest of the circuitry, preferably with the ICs unplugged first time round.

Testing

When all the ICs have been refitted and it's been confirmed that there are no power problems or elusive wisps of smoke, the unit may be tested with an audio signal.

Plug in two suitable power amplifiers and turn all the volumes to minimum before switching on, and don't forget to connect some speakers! There should be little or no background noise at this point, and if all is well, plug in a suitable keyboard instrument so that the level controls, EQ and pan functions can be tested. Check out each channel separately and then connect an effects pedal to auxiliary send and return 1 to verify the auxiliary functions, thus ensuring that the auxiliary level and pan controls work properly. Repeat this test for Aux 2 and 3, and if everything is working OK, test the headphone output, taking care to start off with the headphone volume set low.

At this point, the covers may be fitted and your SynthMix is then ready for use. ■

Pricing details for the complete SynthMix project will be announced in a forthcoming issue of E&MM. Meanwhile, a range of 19" rack-mounting cases – suitable for housing all present and future rackable projects published in both E&MM and its sister magazine, Home Studio Recording – are available direct from our Mail Order Dept at the editorial address. Top and side covers of the boxes are finished in textured black, while the front and rear panels are unpainted, allowing the user to finish the case in any suitable colour. Prices are as follows: 1U high – £9.95; 2U – £14.95; 3U – £16.95; 4U – £22.95, all including VAT and carriage. Please make cheques/POs payable to Music Maker Publications Ltd., and allow 28 days for delivery.

MODULAR SYNTHESIS

Using Sequencers with Modular Systems

Most synth players know all about what sequencers can do in conventional keyboard set-ups, but few are as aware of the possibilities a modular approach to sequencing can open up. *Steve Howell*

This month sees the continuation of the ongoing saga of how to go about sequencing with a modular synthesiser. Last month we looked at basic usage of simple digital and analogue sequencers for multi-voice, polyphonic sequencing, but the intention of this month's workshop is to explore more unusual applications, as it's here that the fun really starts. The possibilities for control are so much greater than on smaller instruments because of the access the user has to all the parameters on even the smallest of modular systems.

Programming Rests

Those of you who are equipped with modest little analogue sequencers may well have run into problems trying to program rests or gaps into your sequences. This, of course, is a fairly straightforward procedure on digital sequencers where there's a button marked 'REST' or something similar for this very purpose and there are also some analogue sequencers that allow you to switch out steps in the sequence, but this facility is the exception rather than the rule and is usually reserved for the expensive models.

Rest programming gives you much greater sequencing flexibility, especially when multitracking or, as with last month's examples, when you are using more than one monophonic sequencer for polyphony. Figure 1(a) shows a patch for rest programming with an analogue sequencer using the second CV channel to trigger the envelope generators. Whatever its make, your synthesiser will require a voltage to 'fire' the EGs, so it's best to program the CVs in Channel 2 so that some are above the required trigger level and some are below. Whenever the CV is greater than the required level there will be a note and vice versa.

Last month we saw that, despite their limited event storage, analogue sequencers score over their digital counterparts in that real-time interaction is possible with the sequence when it is running, and this is one example where this feature comes into play. By raising and lowering the CVs on Channel 2, you can drop notes in and out as you wish in an improvised manner, thus giving the impression of quite long sequences. This is certainly preferable to the tedious eight-note sequences that trundle on aimlessly over the entire side of (too) many synthesiser music albums, and yet scores over the use of a microcomposer in that (a) you don't have to spend ages programming and (b) the results will be spontaneous as opposed to pre-programmed.

'But', I hear you cry, 'why can't I use the second CV channel to control the speed of the sequencer's voltage-controlled clock?' The answer is simple – because you won't be able to sync the sequencer to anything else such as another sequencer, a click-track, drum machine, or whatever. Using the method already described, you still have access to the sequencer's Step input so that synchronisation can be easily achieved.

One point to bear in mind, however, is that the EG's sustain level and decay/release times must be kept to a minimum to give short, staccato sounds, otherwise you'll hear the VCO(s) move to the next step during the release cycle whenever there is a rest programmed for that next step. This can be useful, though, as it allows you to program tied and slurred notes into your sequence if you deliberately set the EG controls fairly high and, again, these tied notes can be introduced at will by tweaking Channel 2's CV levels when the sequence is running.

This technique can also be usefully employed to trigger another synthesiser voice, as shown in Figure 1(b). Here, the main sequence is provided by Channel 1, but Channel 2 is used to trigger the second synthesiser voice at preset gaps. Once again, by fiddling with Channel 2's CV levels you can make that voice sound whenever you like. Naturally, you'll have to tune Channel 2's synth so that it's in tune with the main sequence, and this can then be used to add a variety of on- and off-beat accents to the main sequence. Alternatively, you could use a non-pitched or noise source as the basis of your sound.

(Note: Those of you who are using Moog

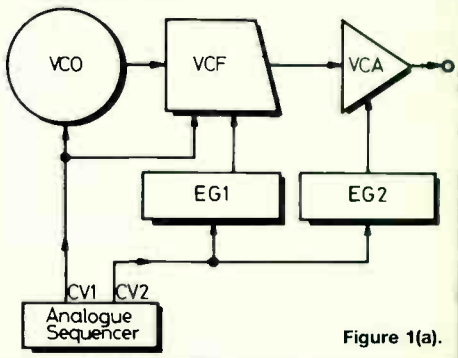
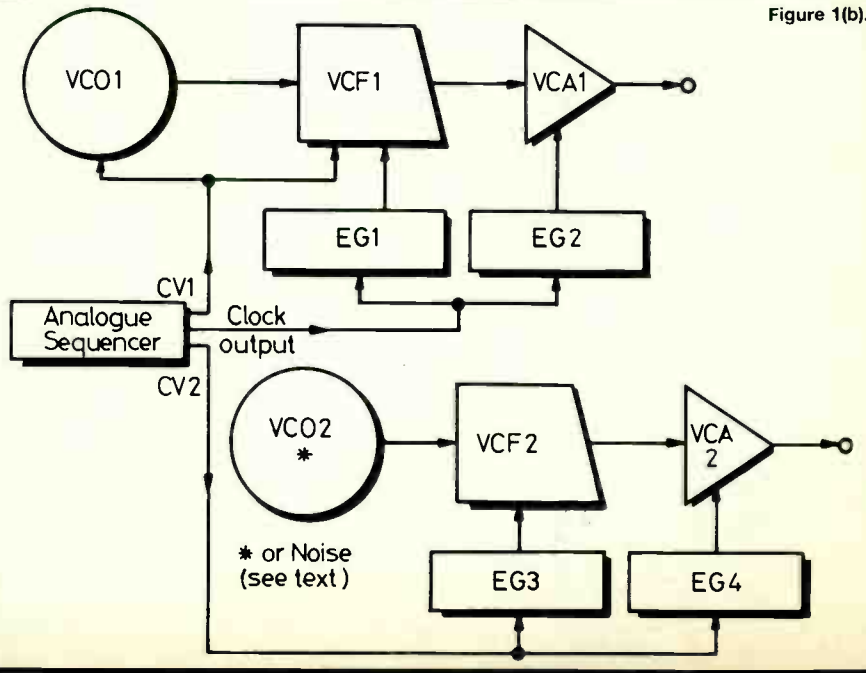


Figure 1(a).

Figure 1(b).



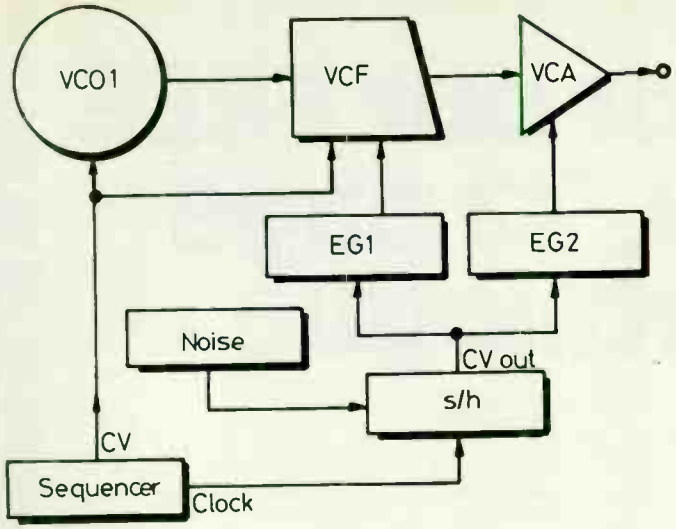


Figure 2(a).

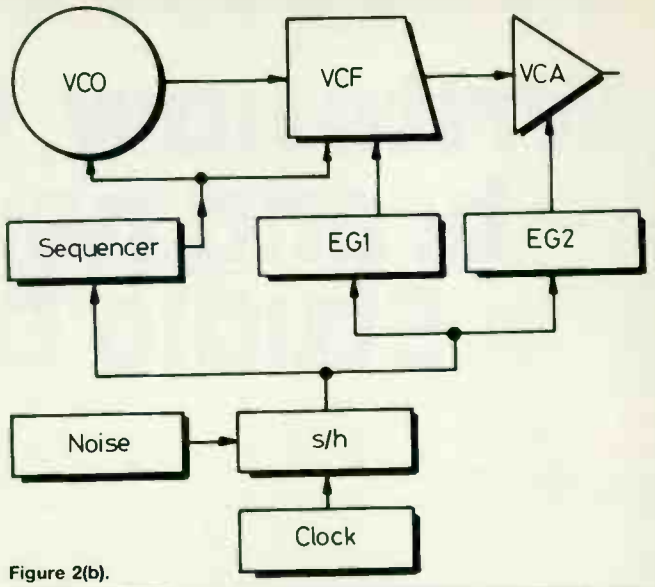


Figure 2(b).

or Korg synthesisers will have to bear in mind that your equipment requires a trigger voltage different to that of most other synths. With Moogs, you'll have to set Channel 2's CV to give 12 volts for a rest, whilst 0 volts will trigger the EGs. Korgs, on the other hand, require a negative going pulse for a note to sound so Channel 2's CV has to be routed via an inverter.)

Sample and Hold

An extension of this technique (which has in fact been touched upon before in the article that looked at percussive sounds but which can be used just as effectively for pitched voices) is to use a sample and hold device to trigger the EGs randomly.

The patch is given in Figure 2(a) and you'll soon see that in this case the sample and hold is stepped through by the sequencer clock output. The random output is then routed to the EG trigger input so that whenever the random voltage rises above the trigger threshold level, the note will sound accordingly. Using this technique you can set up some fascinating effects in which notes suddenly appear at random, though their pitch has been pre-programmed into the sequencer.

One extension of this is to use the sample and hold to step the sequencer in a random manner (Figure 2(b)) so that, as well as the notes triggering at random, the sequenced notes also *appear* at random. This technique is more suited to accompanying a foundation sequence as a counterpart, and can sound particularly effective when the sequences are overdubbed and the sequencer and sample and hold are triggered by a click-track off tape. Alternatively, this patch could be used as part of a multi-voice sequencer set-up, with everything being triggered from a master clock from, say, a drum machine. Care must be taken to program notes into the randomly triggered sequence so that when notes eventually trigger, they don't clash with the main sequence. The total effect of this can be very interesting, as notes appear at random but dead on-beat. If this is multitracked a few times and then mixed down into a wide stereo image, notes will appear to 'bounce' from left to right.

Whilst on the subject of sample and hold devices, it might be a good idea to look at another technique that makes use of these (extremely useful) pieces of equipment. They have, in fact, been covered in past episodes so I won't dwell too long on them.

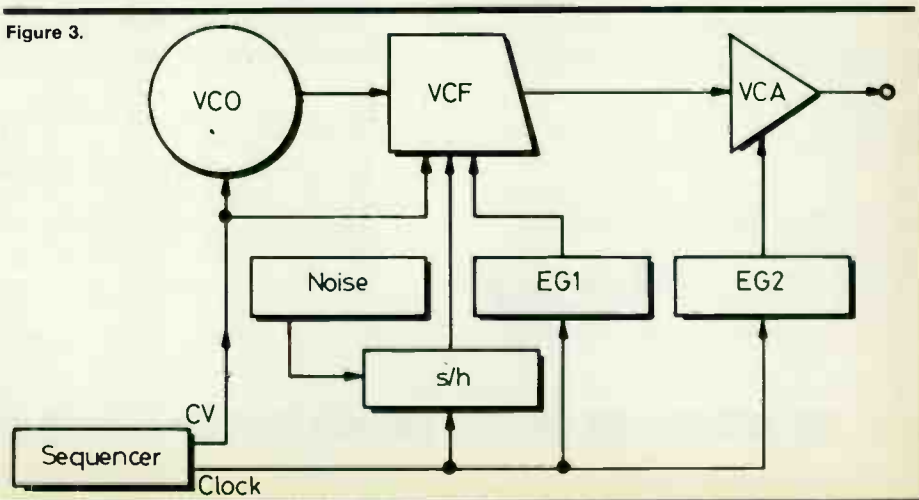
Referring to Figure 3, you can see that the CV output from the S/H is routed to the CV input of the VCF. You will also see that the S/H is being stepped by the sequencer (though this could be a master clock) so that for every step of the sequencer there is a random change in voltage from the S/H. This should enable you to create a variety of melodic and rhythmic sequences in which each note has a different tonal character. With high resonance settings on the VCF the tonal change will be quite drastic, but with low resonance settings the effect will be rather more subtle and, as well as tonal change taking place, there will also be an impression of level change, thereby creating random accents. This can transform an otherwise simple (boring?) sequencer pattern into something considerably more interesting and, using a fast tempo, you should be able to create powerful and dynamic rhythmic structures.

Feeding the white noise output of the noise generator into the audio input of the VCF should give the impression of the noise only sounding when the VCF is 'open' which will, of course, occur totally at random. In addition by routing the synthesiser into an echo unit whose echo speed is set to match the tempo of the sequencer the effect can be made more unusual still (especially when run in stereo), and by multitracking this technique, some incredibly complex polyrhythms can be set up.

There's no reason, of course, why the S/H shouldn't be routed to some other voltage-controlled device. My suggestions are the CV input of a synced VCO, the VCA, the PWM CV input of a VCO, or possibly the CV input of a voltage-controlled flanger or phase shifter, if you have these devices at your disposal. Whatever you choose to do with your Sample and Hold facility, beware. A lot of its possible uses have become terribly clichéd in recent times, so take care to avoid these as far as possible.

All this by no means concludes the possible applications of sequencers in a modular system: next month we'll be looking at some other techniques which should give you an even greater sonic vocabulary to play with. ■

Figure 3.



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BUILD IT

Dual Voltage-Controlled LFO

An easy-to-build – yet exceptionally versatile – dual VCLFO has recently been introduced in kit form by Digisound Limited as part of their modular synth system. *Charles Blakey, Pete Blakey, and Simon Bailey*

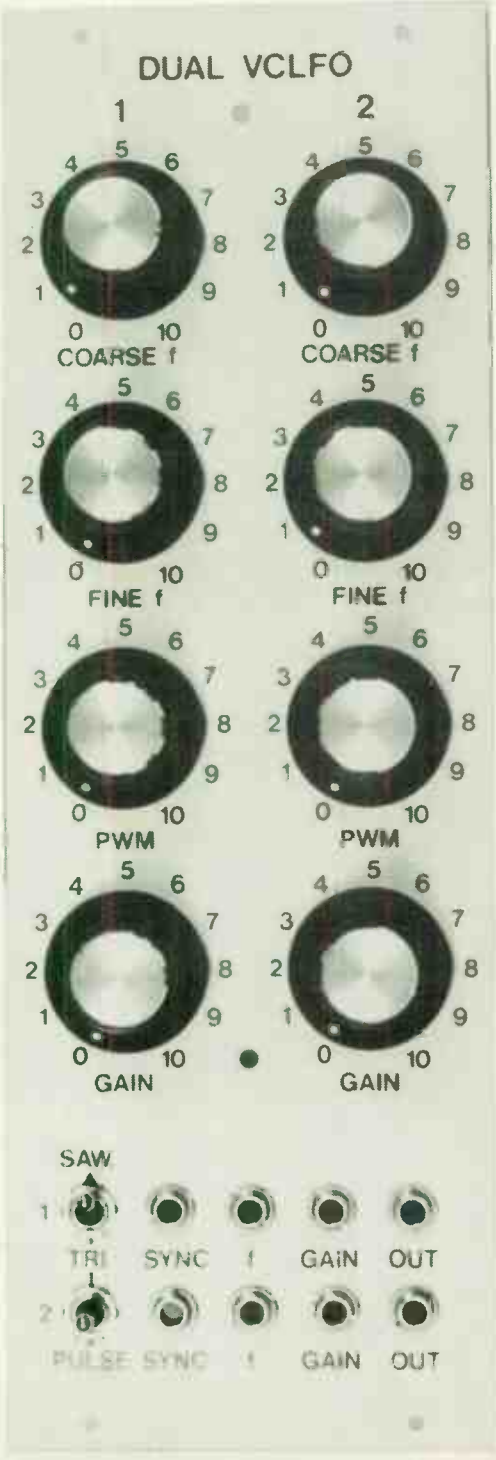
This article describes a dual voltage-controlled low frequency oscillator providing a wide range of features not normally available from conventional designs. These include a frequency range in excess of 50,000:1, and typically this is greater than 150Hz down to less than one cycle every 10 minutes. The frequency of each VCLFO is adjusted using coarse and fine potentiometer controls and it may also be swept by an external control voltage. Three output waveforms are provided; triangle, sawtooth and pulse, with the latter being adjustable from almost 0 to 100% duty cycle. The output waveforms are nominally 0 to +10V at full gain, but each oscillator has a voltage-controlled amplifier in its output path to control the gain, either manually or with an external control voltage.

The design utilises a CEM 3374 Dual Voltage Controlled Oscillator and a CEM 3360 Dual Voltage Controlled Amplifier, both from Curtis Electromusic Specialities Inc. The CEM 3374 allows two modes of synchronisation. On one side, a positive edge causes the oscillator to reset and start from zero, which is valuable for a wide range of sweeping and synchronisation effects, while on side two, a positive edge causes the waveform to reverse direction, and can therefore be used to provide more complex modulating waveforms.

Circuitry

The complete circuit diagram for the Dual VCLFO is shown in Figure 1. Apart from synchronisation, both the oscillators are identical, so our discussion will be confined to VCLFO 1, derived from pins 1 to 9 of the CEM 3374 (IC2).

The 3374 contains two completely independent precision voltage-controlled oscillators. Each has an exponential control input (pins 7, 12) as well as a linear control input at pins 8 and 11. Triangle (pins 5 and 14) and sawtooth (pins 2 and 17) waveforms are simultaneously available on the chip, and the timing capacitors are connected to pins 6 and 13. In order to provide all these features on a single IC, the temperature-compensating circuitry incorporated into the CEM 3340 VCO has been omitted. The CEM 3374 does, however, contain a temperature sensor, which outputs (from pin 10) a nominal 2V5, having a temperature coefficient of +3300 parts per million per degree Centigrade. This output voltage is commonly required as a reference voltage for many digital-to-analogue converters, so using it as the reference and deriving the exponential control voltage from the same DAC results in excellent oscillator stability.



The synchronisation input at pin 3 allows the output to reset to zero while the sync at pin 16 causes the waveform to reverse direction. The CEM 3374 operates with a positive supply in the range of +10V to +16V and a negative supply between −4V5 and −7V. To comply with these requirements, a −5V supply to pin 1 is derived from the −15V supply, using the regulator IC3.

Turning now to the main circuit, IC1 is used for the external sync inputs, which respond to a positive-going pulse from about +1V5 to +15V. The inputs are arranged so that synchronisation occurs on the positive edge of the pulse. C8/R5 (C9/R6) differentiate the output from IC1 and also provide current limiting to the sync input pins on IC2.

The exponential frequency control input at pin 7 has three inputs: an external control voltage with a nominal one-volt-per-octave scale *via* R19, a coarse control using RV3 and R21, and a fine adjustment using RV5 and R23. The input's polarity is such that a positive input increases frequency.

Two general points are worth noting at this stage. First, 5% tolerance resistors have been used throughout, and so accurate scaling is not available and there is likely to be some variation between two separate VCLFOs. Accurate components were not considered worthwhile in the absence of temperature compensation and in the context of most typical LFO-type applications. Secondly, the minimum specification for frequency sweep on the CEM 3374 is 50,000:1, and the design utilises this range (and more, if available) to the full. The result of the latter is that if both rotary controls are set fully clockwise (highest frequency) and a voltage is applied to the external control input, the output frequency is likely to increase, but this may be a long way from the expected one-volt-per-octave. Thus the external input should be kept within the designed frequency range of between 150Hz and 1 cycle per 10 minutes.

The timing capacitor C16 (C17) in the standard design is a 100nF polycarbonate, and changing this component will alter the frequency range. A lower frequency limit (higher capacitor value) is not recommended since the total range may be reduced as a result.

The linear input (pin 8) is used to inject a reference current into the IC *via* R27, and for this low frequency application the current is kept at a very low level. For a typical VCO application, R27 would be 3M0 and C16 would be 1n0. Components R29, C12 and C18 are for compensation purposes.

Waveform outputs for the VCLFOs are selected by means of a switch – S1 for VCLFO 1 – and a current limiting resistor is

selected in relation to the output level of the waveform. The 0 to +10V sawtooth goes to S1 *via* R7, while the 0 to +5V triangle goes *via* R9. The triangle output is also used to generate a pulse waveform using the comparator IC4A. Varying the comparator's reference with RV1 allows the pulse width to be varied from about 0% to almost 100% duty cycle. The output of the comparator ramps between about +/−13V, and the negative portion is removed (or limited to about −0V6) by diode D3. The pulse then goes to S1 *via* R15.

The waveforms are switched to a CEM 3360 Dual Voltage Controlled Amplifier (VCA). This IC is of the current-in, current-out type and has both exponential and linear control inputs. Linear control has been chosen in this design since the user should find it easier to judge output level if this is linearly proportional to the input. The manual control input (RV7) may be bypassed, and a 0 to +10V external control voltage will adjust the gain over the full range.

A useful feature is that the CEM 3360 requires a few millivolts of control voltage, either from RV7 or externally, before the output level begins to increase. Thus the VCLFO may be left connected to a VCO or other sensitive module without fear of modulation breakthrough when the gain control is set to zero, and in fact it's this high level of performance that has resulted in the widespread use of the 3360 in synthesisers and other equipment.

Construction

The PCB component layout is shown in Figure 2, and is quite straightforward and unambiguous.

The main points to watch at this stage are the orientation of ICs, diodes, electrolytic capacitors C1 and C5 and the −5V regulator. One other point to observe is that the location for C8 and C9 have holes to accommodate other sizes of capacitors. Ensure that C8 and C9 are installed so that they bridge over the gap, ie. use the holes nearest to IC1.

This project was originally designed to be constructed on to a standard 9" by 3" rack-mounting panel for incorporation into an existing modular synthesiser system. However, the PCB would be quite suitable for inclusion in an existing synthesiser, or it could be used as a stand-alone item for use with any positive going voltage-controllable device. In the latter cases a suitable +/−15V power supply will be required.

Quite a lot of wiring is required and the connections to the potentiometers, switches and jack sockets are shown in Figure 3. The lettering and so on shown in this diagram indicate that a wire must be taken from that point to the PCB having the same identification mark – refer to Figure 2 for the latter.

The jack sockets illustrated in Figure 3 are of the type supplied by Digisound Limited. The top connecting tab is the connection made when a jack plug is inserted, while the lower connection is broken on insertion of a plug. There is also a ground tab underneath the socket, and we recommend these are connected to the 0V line so that the module can be used with equipment which may be powered separately.

Moving on to the switches, ensure that a wire link is installed between pins 2 and 4 and keep to the orientation shown. Once assembly has been completed, check the wiring carefully as well as the component placement and orientation of the PCB. You should also examine the foil side of the PCB to check for solder splashes and bridges which may be shorting tracks together. Try to keep the underside of the PCB as clean as possible, especially around C16 and C17 since the capacitor charging and discharging currents are exceedingly low and will be affected by solder flux or any other extraneous matter. These will not affect the operation of the VCLFOs, but may well influence the lowest frequency attainable.

After careful checking (some of the parts are expensive!), the unit may be powered up and put into operation since there are no adjustments to make.

In Use

This unit is an extremely versatile design, and as such could be used to replace existing LFOs and control many synthesiser parameters.

In particular, LFOs are commonly used for a wide variety of modulation effects, and a dual VCLFO (as described here) is particularly suitable for the recently popularised technique of FM synthesis. Finally, the addition of synchronisation techniques allows extremely complex modulating waveforms to be generated. ■

The Dual VCLFO is available from Digisound Limited, 14/16 Queen Street, Blackpool, Lancs FY1 1PQ, at a price of £34.50 inclusive of p&p and VAT. The kit includes all components detailed in the parts list and a PCB.

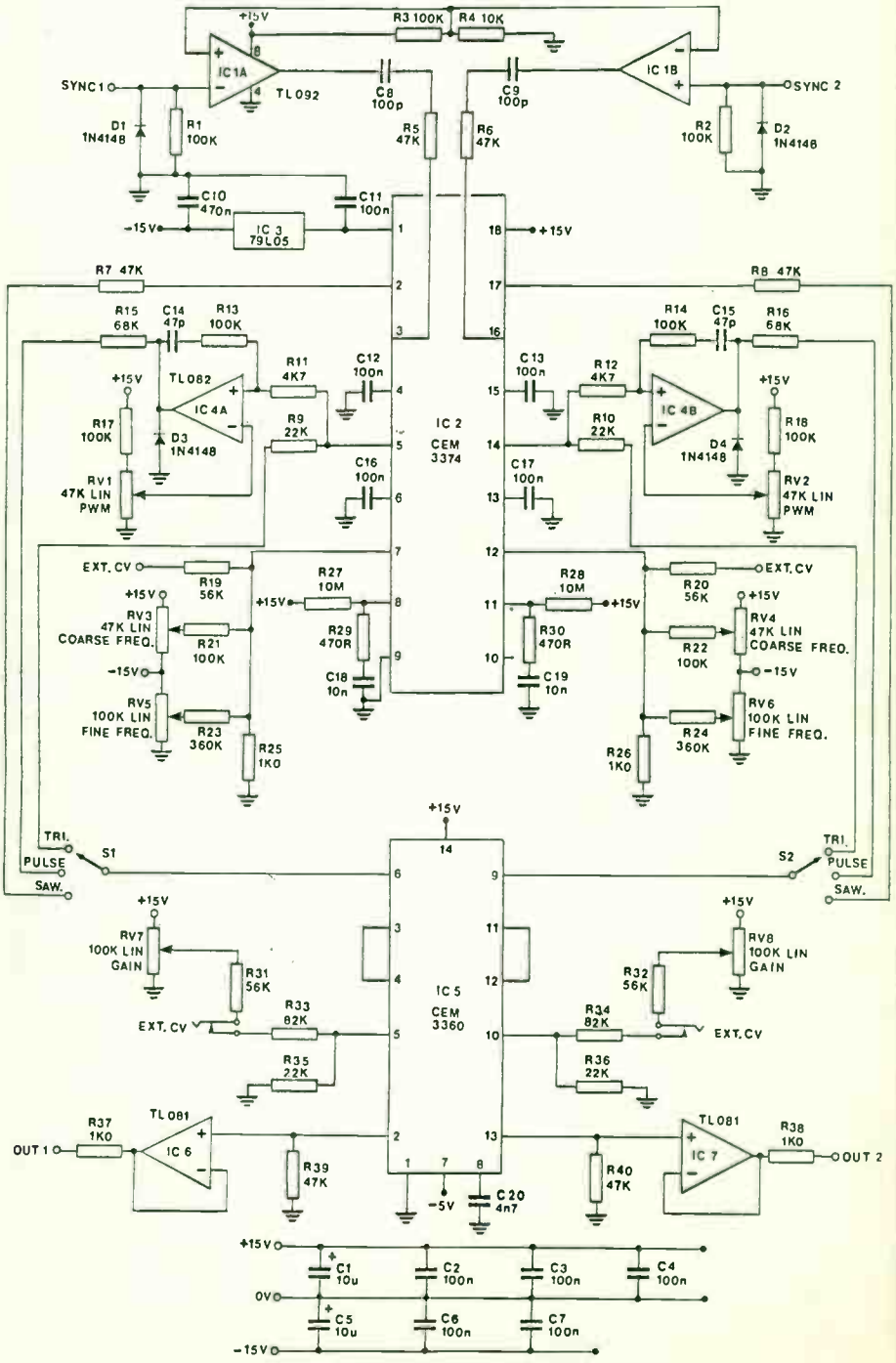


FIGURE 1. DUAL VCLFO CIRCUIT DIAGRAM

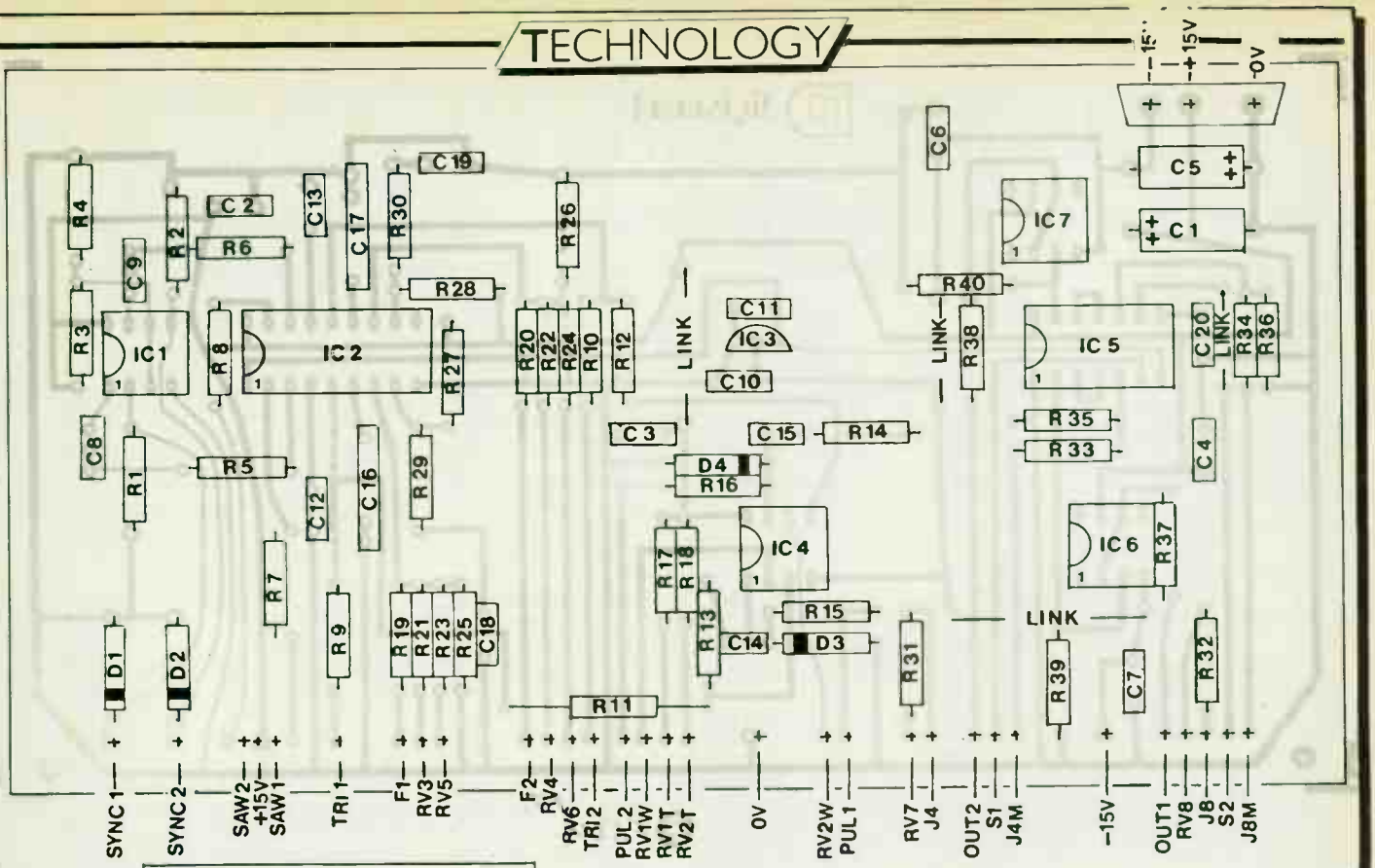


Figure 2.

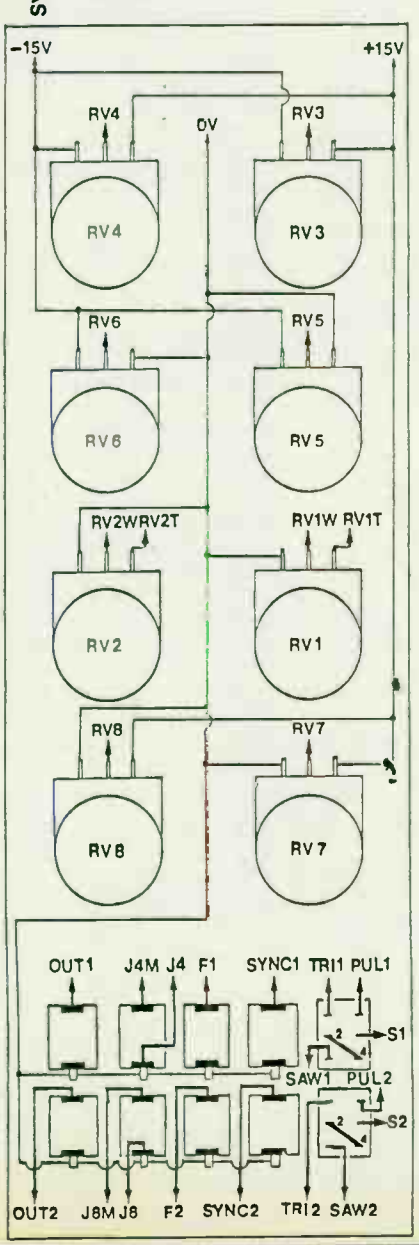


Figure 3.

Parts List

Resistors
(5% 1/4W carbon film)

R1,2,3,13,14,17,18,21,22	100K
R4	10K
R5,6,7,8,39,40	47K
R9,10,35,36	22K
R11,12	4K7
R15,16	68K
R19,20,31,32	56K
R23,24	360K
R25,26,37,38	1K0
R27,28	10M0
R29,30	470R
R33,34	82K

Capacitors

C1,5	10µF axial electrolytic
C2,3,4,6,7,11,12,13	100nF polyester
C8,9	100pF ceramic
C10	470nF polyester
C14,15	47pF ceramic
C16,17	100nF polycarbonate
C18,19	10nF polyester
C20	4n7 polyester

Potentiometers, Switches

RV1,2,3,4	47K lin. rotary
RV5,6,7,8	100K lin. rotary
S1,2	1p3W sub. min. toggle

Semiconductors

IC1	TL092
IC2	CEM3374
IC3	79L05
IC4	TL082
IC5	CEM3360
IC6,7	TL081
D1,2,3,4	IN4148

Understanding the DX7

Part six introduces the joys of sub-algorithms and explains how programming errors can lead to sounds of unexpected quality. *Jay Chapman*

Welcome back! We can now continue our exploration of programming the DX7 by modifying existing voices. In case you didn't follow last month's extravaganza, we're in the middle of trying to set up a 'power chords' sound based on ROM 2B, program 7, otherwise known as 'SYN-CLAV 3'. Don't forget that I'm not trying to copy a guitar sound exactly but instead trying to get the gut-wrenching effect of power chords – this voice should be played *loud!*

Where were we? Well, we'd got rid of the random Amplitude Modulation effects by considering in detail the DX7's LFO control and routing. We'd also made the general envelope shape more acceptable and freed Operators 5 and 6 and the feedback loop, to give us some flexibility in modifying the voice.

First off this month, a quick note about the Keyboard Rate Scaling values which I mentioned I set to 1 rather than the SYN-CLAV 3 value of 7. Don't forget this is a parameter that applies individually to all six Operators, so you have to set it for each Operator separately.

Sub Algorithms

We now come to one of the most important points in any exploration of DX programming. Note first that the idea discussed below applies equally well to programming from scratch, but the position we are in with the 'power chord' voice is fairly typical as an example. Have a look at Figure 1 – particularly the boxed-in sections in each algorithm. You should notice that the boxed section is the same in all of the algorithms shown. The algorithm used in SYN-CLAV 3 is number 2, which is exactly the same as Algorithm 1 (shown in the figure) except that the feedback loop is around Operator 2 instead of Operator 6. The important point here is that since we're not using Operators 5 and 6 or the feedback loop (for the moment at least) the boxed sub-algorithm is totally responsible for the current sound. This means that we can substitute any of the algorithms that have this sub-algorithm and get the same sound, but with a different potential for modification.

Usually, it's fairly easy to spot which algorithms have the common sub-algorithm you're currently interested in. Sometimes you need to look a little more carefully though – in this case, for example, algorithm 13 isn't all that obvious without a second glance! I'm not suggesting this idea as the only way forward, but it *is* a simple and logical progression and will let you step through a lot of the possibilities without getting confused as to what you're doing.

The algorithms shown in Figure 1 are not all those containing the sub-algorithm we're interested in. See if you can spot the others from the diagrams on the DX7 front panel – there are 12 of them in all!

Before we start to explore the possibilities presented by some of these 12 different algorithms, it's worth looking a little more closely at the algorithms themselves. In Figure 1, for example, all algorithms but number 6 use our 'spare' Operators (5 and 6) in applying some modulation to part of the boxed sub-algorithm. Note that in every case, the sub-sub-algorithm (!) consisting of Operator 2 modulating Operator 1 is completely untouched. In fact, this is true for all of the 12 algorithms containing our sub-algorithm – this may well be something to do with the fact that the two Operators that are missing on the DX9 would seem to be DX7's Operators 1 and 2.

The significance of the last paragraph is as follows. Currently we have two audible components in the dismembered SYN-CLAV 3 sound. This should be obvious because the boxed sub-algorithm, which is all that is in use at the moment, has two carrier Operators. Since all the related algorithms we're considering only apply the spare Operators 5 and 6 to the component consisting of Operators 3 and 4 (except algorithm 6 which creates a new component), we will not have tried any modifications to the other current component consisting of Operators 1 and 2.

Moving Parameters

Since the two current components of the boxed sub-algorithm differ, we should get different results from modifying the 'Operators 1 and 2' component than we would from modifying the 'Operators 3 and 4' one. 'That's all very well,' I hear you say, 'but how do I get Operators 5 and 6 to modify the 1 and 2 component without rewiring the odd Yamaha microchip or two?'

The answer is quite simple but, unfortunately, rather tedious! You exchange the two components by setting Operator 1 to Operator 3's parameters and *vice versa* and Operator 2 to Operator 4's parameters and *vice versa*. Now read that last sentence again, slowly!

Note that you can swap the envelope generator parameters by copying (using the orange STORE keypad) Operator 1's EG parameters to Operator 5 (since it's not in use), then 3's EG parameters to 1 and then 5's to 3 – you then do 2 to 5, 4 to 2, and 5 to 4. You then take two Aspirin and lie down in a darkened room!

The above really isn't too difficult, if you keep your head. If you save the dismembered SYN-CLAV 3 into a spare voice slot before you start the combined waltz and tango described in the last paragraph, then it won't be so bad if you mess something up in the middle. Another possibility is to start from a VOICE INIT and set the parameters you're interested in, in this case old Operator 1 as new Operator 3, 2 as 4, and so on, from a listing of the voice parameters which you have laboriously recorded by hand (aagh!) or your computer printed out for you in about 20 seconds . . .

While we're talking about moving Operator parameters around, we can look at some more algorithms which we'll be able to use whilst still starting from the (effect of) the boxed sub-algorithm.

Have a look at Figure 2. The first thing you'll notice is that none of the algorithms shown have our sub-algorithm as boxed in Figure 1.

Let's take a closer look. Algorithm 22 has some three quarters of our sub-algorithm in that Operators 1, 2 and 3 are connected correctly. Operator 4 has moved over to become a carrier rather than modulating Operator 3, but if we move Operator 4's parameters across to Operator 6, the sub-algorithm (shown boxed in Figure 2) consisting of Operators 1, 2, 3 and 6 is now the equivalent of 'our' sub-algorithm, so we can add Algorithm 22 to our repertoire.

Algorithm 19 isn't quite so helpful, as two sets of Operator parameters would need to be moved, ie. 4 to 6 and 3 to 4. Algorithm 23 is even more painful since four sets need moving, and this would probably represent

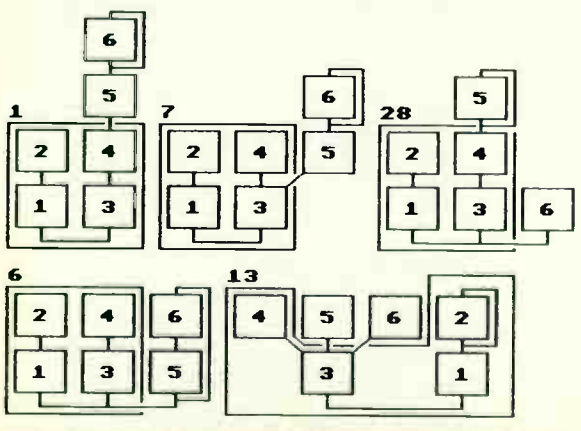


figure 1 – spot the sub-algorithm

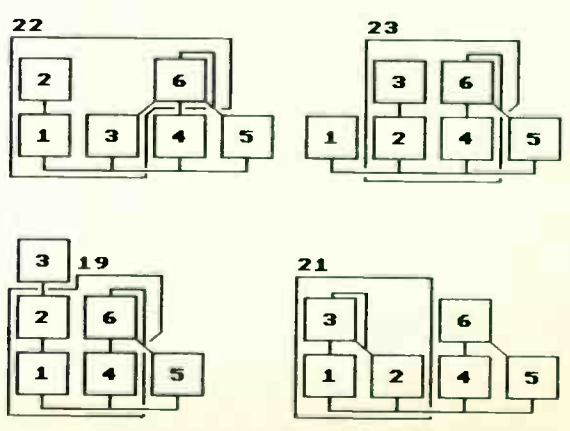


figure 2 – MAKE the sub-algorithm

more work than would be considered worthwhile. In both of these cases, you'd need to decide which of your two original components, Operators 1 and 2 or 3 and 4, would be given the opportunity of using the feedback loop. Note that Operators 4 and 5 can each substitute for the other, and that either could have been included in the box for both of these algorithms.

Finally in this section, let's consider Algorithm 21. The boxed sub-algorithm shown in Figure 2 is obviously not equivalent to 'our' sub-algorithm, but in other circumstances it could well be. If Operators 2 and 4 had essentially the same parameters – which they don't in SYN-CLAV 3 – then they could be replaced by the single Operator, in this case 3, which frees one Operator for further use. Operator 2 in this case corresponds to Operator 3 in 'our' sub-algorithm, of course.

OK, we've now discovered a considerable number of algorithms from which we can continue programming. The point of this exercise is to discover how to make the sounds we want by logically trying all the possible sub- and sub-sub-algorithms in sufficient combinations, thereby gaining the experience we need. With time, you should find you start to know instinctively which algorithm or sub-algorithm to try in order to add a particular component to a sound.

Now, if you think all this sounds a little tedious and complicated, you're quite right. Those of you with experience of analogue synthesisers have probably already followed a similar route with different hardware. Things are perhaps more complex this time but the results, as you well know from the Yamaha supplied pre-programmed voices, are definitely worth the effort.

Power Chords

Let's get back to the voice I wanted to make and start using some of the algorithms we've discussed. As a first example, I want to add a solid bass growl under the dismembered SYN-CLAV 3 sound. This is an attempt to emulate the combined sound of power chords on a guitar, with the root note of the chord played hard on a bass guitar. The technical description of the bass sound is Baarrrooom!

Listen to the two components of the current sound in turn by toggling first Operator 1 and then Operator 2 off. The Operator 1 and 2 sub-sub-algorithm is responsible for the high end, and the 3 and 4 component for the bass end. Since I want to fatten up the bottom end and get the baarrrooom effect, my first thought was to alter the harmonic content of the 3 and 4 component (or bass end) and set up some harmonic movement.

I chose Algorithm 13, for two reasons. First because no Operator parameter copying was required – lazyness rules OK! – and secondly (and of far greater importance at this stage in the proceedings), because our two spare Operators can both be used to modulate Operator 3 directly, which allows two simple and direct modifications to the sound that are essentially independent of each other. In other words, I tried to keep the confusion factor as low as possible!

There are, of course, umpteen different ways to proceed from this point. In Figure 3 you can see all the main parameters for the six Operators, with 1 to 4 as already discussed and 5 and 6 as I set them after a couple of minutes of playing around. Tastes differ, of course, and this sound may not be to yours, but I was quite happy with it for so little effort! Before we move on, let's be sure we know exactly what's happening here.

Operators 5 and 6 have different frequency values (2.00 and 3.75) so their frequency modulation effects will be different. In particular, Operator 6 at 3.75 – whilst distantly related harmonically to the fundamental pitch of the note – is so far removed as to give a quite clangerous tone, used at the start of the note (see Operator 6's envelope parameters) to give some 'bite'. To check out the effect of Operator 6, toggle it on and off in the usual fashion, and to hear it in splendid isolation, toggle off Operators 1, 2, 4 and 5: it sounds fairly bell-like when a single note is played but pretty grotty when played as chords!

Operator 5 is used to give some harmonic movement during notes and should remind you of the 'wah' sound in the cheap synth voice discussed in an earlier article. Again, you can hear what it does by toggling it on and off, and in isolation by toggling Operators 1, 2, 4 and 6 off.

Keyboard Level Scaling

The combination effect of 5 and 6 gives the Baarrrooom effect I wanted at the bass end of the chords. However, the same effect causes the notes above middle C to be too harsh and strident, and would also have messed up the effect of the overall amplitude envelope shape, leaving the notes fading out on a high buzzing sound which I didn't find particularly appealing, though you may think otherwise!

Keyboard Level Scaling (KLS) allows us to reduce or increase the effect of an Operator's output by 'squeezing' or 'expanding' the amplitude range of its envelope generator. We can say where we want the effect of KLS to start from in terms of its break point on the keyboard. You can see from Figure 2 that this is C3 for both of Operators 5 and 6. Both right curves are negative to compress the envelope shapes to the right of the break point and therefore reduce the effect by differing amounts, corresponding to the Depth values of 20 and 60, for Operators 5 and 6 respectively. These values were found by experimenting until enough of the modulation effect was lost from the treble notes. The choice between −LIN and −EXP is made in the same manner.

While trying to work my way toward the voice I could hear in my head (no – I'm not cracking up – I mean the Power Chords voice) I went on to try a selection of the algorithms shown in Figures 1 and 2. Sometimes by accident, a modification to a sound leads not towards the voice you're trying to find but in a totally different direction. I find this happens quite often when I'm attempting to use some sub-algorithm which I think will add a certain something to the current voice, and with a slight change of parameters something different and much better happens instead!

If this happens to you, don't be afraid to go off at a tangent and follow up the new effect to find out how it works – it may well be another useful effect to add to your FM repertoire! In the following example, I'd decided to use algorithm 6 to give an extra component to the SYN-CLAV 3 sound and I also wanted to investigate the effects possible with the feedback loop around both modulating and carrier Operator. As you will see if you compare the Operator 5 and 6 parameters from Figure 4 with the original dismembered SYN-CLAV 3 voice, hardly anything has changed except the frequency parameters.

```
+--+
|OP|
+--+-+---+-----+-----+-----+--+--+--+--+--+--+--+--+-----+--+--+--+--+
| 6|R|   |  3.75 |  0  |71|38|41|99|99|70|50| 0| C 3 |-L|-E| 0|60|
| 5|R|   |  2.00 |  0  |30|32|20|99|99|99|54| 0| C 3 |-L|-L| 0|20|
| 4|R|   |  0.50 | +4  |95|16|15|30|99|85|96| 0| A -1|-L|-L| 0| 0|
| 3|R|OFF|  1.00 | +3  |70|32|20|99|99|95| 0| 0| A -1|-L|-L| 0| 0|
| 2|R|   |  1.00 |  0  |80| 7|21|30|99|85|80| 0| A -1|-L|-L| 0| 0|
| 1|R|   |  1.01 | -4  |70|32|20|99|99|95| 0| 0| A -1|-L|-L| 0| 0|
+--+-+---+-----+-----+-----+--+--+--+--+--+--+--+--+-----+--+--+--+--+

   |MODE/|FREQ |FREQ |DET- |1 |2 |3 |4 |1 |2 |3 |4 |BREAK|L |R |L |R |
   |SYNC |COARS|FINE |UNE  +--+--+--+--+--+--+--+--+POINT+--+--+--+--+
   |     |     |     |     |    RATE    |    LEVEL    |     |CURVE|DEPTH|
   +-----+-----+-----+-----+------------+-------------+-----+-----+-----+
   |       OSCILLATOR      |          E. G.           |KB LEVEL SCALING |
   +-----+-----+-----+-----+------------+-------------+-----+-----+-----+
   |     |     |     |     |            |             |     |     |     |
   |17   |18   |19   |20   |21          |22           |23   |24   |25   |
   |     |     |     |     |            |             |     |     |     |
   +-----+-----+-----+-----+------------+-------------+-----+-----+-----+

+--+
|OP|
+--+-----+-----+-----+--+--+--+--+--+--+--+--+-----+-----+
| 6|  1  | 90  |  1  |  |  |  |  |  |  |  |  |     |  P  |
| 5|  0  | 99  |  1  |  |  |  |  |  |  |  |  |     |  O  |
| 4|  1  | 96  |  7  |  |  |  |  |  |  |  |  |     |  W  |
| 3|  1  | 99  |  2  |50|99|75|99|50|50|50|50| C 3 |  E  |
| 2|  1  | 99  |  4  |  |  |  |  |  |  |  |  |     |  R  |
| 1|  1  | 99  |  2  |  |  |  |  |  |  |  |  |     |  C  |
+--+-----+-----+-----+--+--+--+--+--+--+--+--+-----+  H  |
   |KEYB.|OUT- |VELO-|1 |2 |3 |4 |1 |2 |3 |4 |KEY  |  O  |
   |RATE |PUT  |CITY +--+--+--+--+--+--+--+--+TRAN-|  R  |
   |SCAL-|LEVEL|SENSE|    RATE    |    LEVEL    |SPOSE|  D  |
   |ING  +-----+-----+------------+-------------+     +-----+
   |     |  OPERATOR |          PITCH E. G.      |     |NAME |
   +-----+-----+-----+---------------------------+-----+-----+
   |     |     |     |                           |     |     |
   |26   |27   |28   |29                         |31   |32   |
   |     |     |     |                           |     |     |
   +-----+-----+-----+---------------------------+-----+-----+
```

Following a tip from Dave Bristow, I tried setting the carrier (Operator 5) to an inaudible fixed frequency so that you hear Operator 6's (the modulator's) frequency *via* the FM sideband effect. By experimenting (not forgetting the feedback loop) I ended up with the voice detailed in Figure 4, OTTA-TMOSPH (OverTheTopAtmosphere – well . . . you can't call every voice SYN-LEAD 56). The point here is that I haven't ended up with a Power Chords sound at all! – but try the bottom two octaves of the keyboard for a *superb* lead synth sound which I'm much happier about than the one I was trying to find!

DX9 Owners

If you own a DX9 rather than a DX7, some of the experimentation techniques discussed will still apply, though obviously you have fewer bits and pieces to play with. For all those people out there who've been asking for some clues on how to modify DX7 voices for the DX9, you may be able to convert, or at least approximate, some DX7 voices by considering sub-algorithms in the manner discussed in this article.

I'll leave you all madly experimenting until next month . . . ■

Formed only a few months ago, the DX Owner's Club has gone from strength to strength in that time and now has over 300 members within its ranks. Facilities offered include a quarterly newsletter and discount prices on DX-related equipment, in conjunction with Yamaha and several other manufacturers. For further details, write to Tony Wride, DX Owner's Club, 28 Balk Top, RAF Dishforth, Thirsk, North Yorkshire.

OP	R	FREQ COARS	FREQ FINE	DET-UNE	1	2	3	4	1	2	3	4	BREAK POINT	L CURVE	R CURVE	L DEPTH	R DEPTH
					RATE				LEVEL								
6	R	3.00		+3	93	16	17	30	77	51	88	0	A -1	-L	-E	0	0
5	F	4.073Hz		0	94	17	15	40	99	87	79	0	G 0	-L	-E	0	50
4	R	0.50		+4	95	16	15	30	99	85	96	0	A -1	-L	-E	0	0
3	R	OFF 1.00		+3	70	32	20	99	99	95	0	0	A -1	-L	-L	0	0
2	R	1.00		0	80	7	21	30	99	85	80	0	A -1	-L	-E	0	0
1	R	1.01		-4	70	32	20	99	99	95	0	0	A -1	-L	-L	0	0

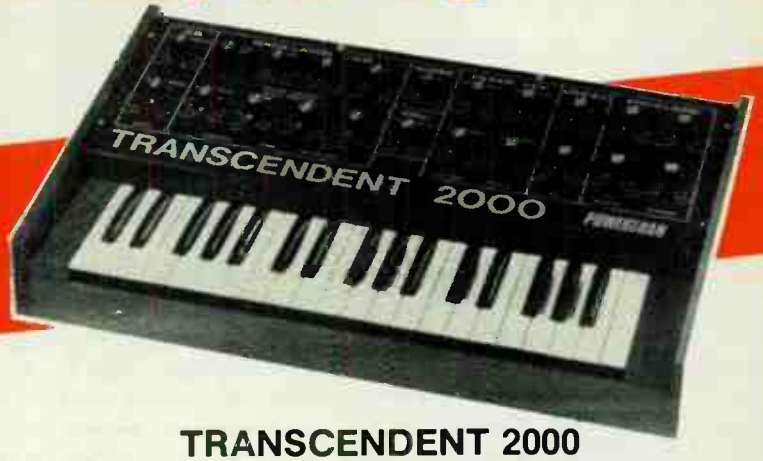
MODE/SYNC | OSCILLATOR | E. G. | KB LEVEL SCALING

17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25

OP	KEYB. SCAL-ING	OUT-PUT LEVEL	VELO-CITY SENSE	1	2	3	4	1	2	3	4	KEY TRAN-SPOSE	OSC KEY SYNC	NAME
		OPERATOR		PITCH E. G.										
6	0	99	0										0	
5	0	99	0										0	
4	1	96	7										0	
3	1	99	2	50	99	75	99	50	50	50	50	C 3	0	
2	1	99	2										0	
1	1	99	2										0	

26 | 27 | 28 | 29 | 30 | 31 | 32

You can make it if you try



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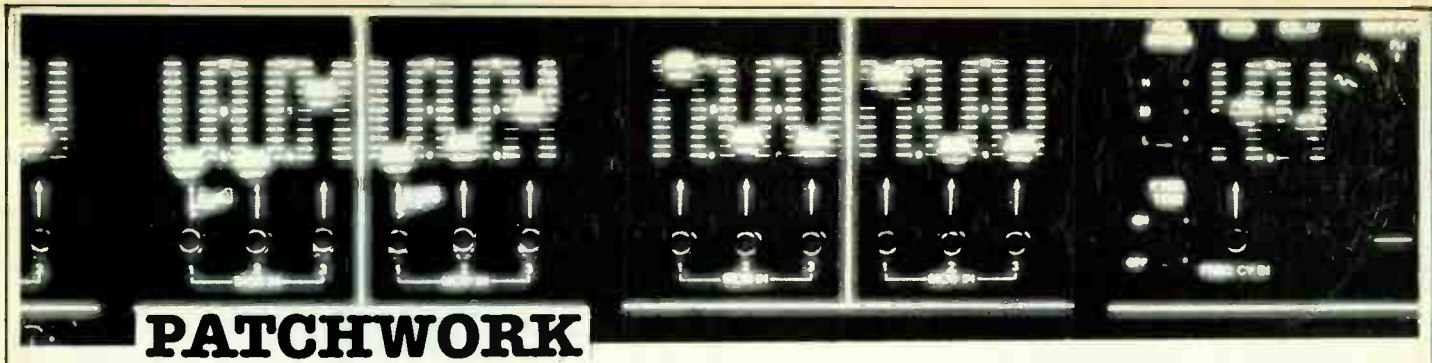


PATCHWORK

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

Last month's hint to send patches for as yet unfeatured synths has prompted sufficient readers for us to produce the feature with no patch for the Yamaha DX7, which certainly makes a change. Patches for every type of synth are always welcome, so send your favourite sound settings (preferably on an owner's manual patch chart including a blank one for artwork purposes, plus a brief description) to: ***Patchwork,* E&MM, Alexander House, 1 Milton Road, Cambridge, CB4 1UY.**

JEN SX1000 — 'Solara' — Tim Xenon, Norwich

Perhaps the cheapest monophonic on the market, the SX1000 Synthetone possesses just one VCO but is nevertheless capable of providing some surprisingly useful sounds, aided and abetted by two envelope shapers.

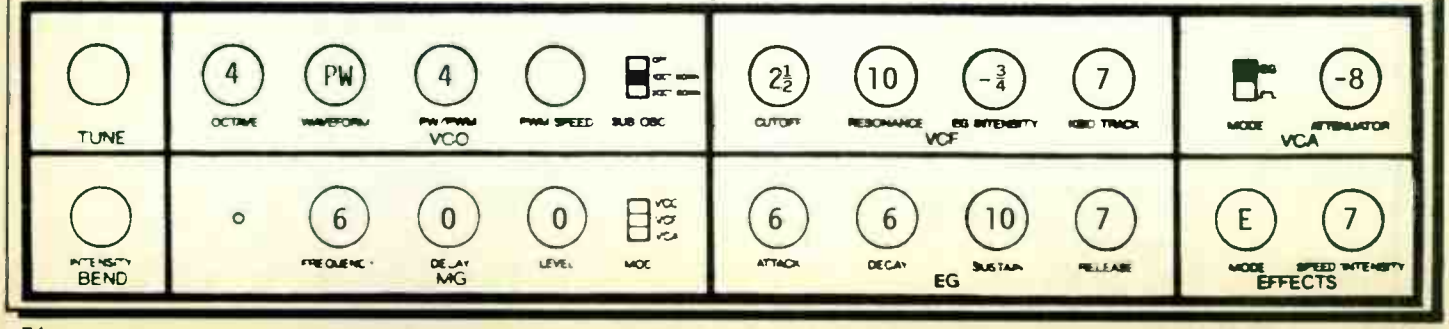
Just one of five patches submitted by Tim, *Solara* is a bright, organ-like sound that particularly impressed us, though we liked it even better when the LFO amount was reduced from 7 to 3, and the VCA release time increased from 2 to 4.

VCO		**LFO**		Decay	2
Tune	0	Speed	8	Sustain	7
Octave	4	**Noise**		Release	4
Vibrato	2	Noise	Off		
Waveform	Square or Pulse	**VCF**		**VCA**	
		Frequency	5	Output Volume	4
Pulse Width	50	Resonance	2	Attack	1
Pulse Width Mod	5.5	LFO	7	Decay	4
Level	10	Envelope Level	9	Sustain	8
Glide	0	Attack	1	Release	2

KORG POLYSIX — 'Synth Choir' — A Horrell, Bristol

An impressive and mellow choir patch has been manipulated on the Polysix by A Horrell, and should prove useful for atmospheric background chords. The bass end can be cleaned up by reducing the Resonance setting to 5, and a perhaps more realistic vocal envelope implemented by reducing the sustain from 10 to 5. This allows the sound to 'settle' in much the same way a voice does when it latches on to the exact pitch after an initial slight wavering (here represented by the Attack and Decay slope). Human vocalists rarely hit perfect pitch first time!

Cut Off and Release settings are best tweaked to taste, and bear in mind the potential for adding some subtle vibrato or tremolo effects as the sound fades for additional authenticity.



YAMAHA CS30 — 'Rhythm Sequins' — Ann Carroll, Dublin

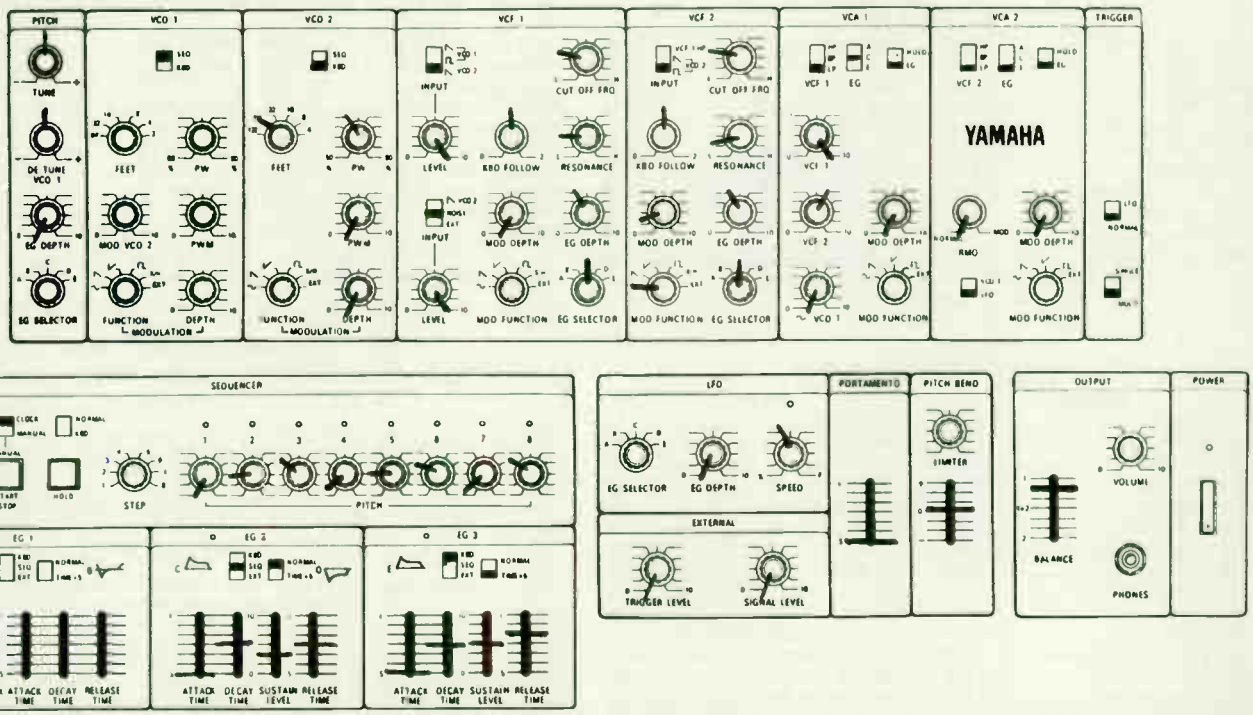
Yamaha's versatile (but sadly no longer produced) CS30 has been cleverly set in this patch to provide what can only be described as an 'auto rhythm section'. The built-in eight-step analogue sequencer is utilised to control the accents of a simple pulsing rhythm rather than to provide a melody.

Ann suggests setting the controls as shown and then fine-tuning the sound, beginning with the Noise (ie. turn all volume controls down except for the Master, Noise, and VCA1). Start the Sequencer and rotate the eight controls, beginning, if you like, with Step 1 only. Note that at about 2 the sound should resemble a bass drum 'thud', and at 4, more of a snare shot. Practically no sound is produced with the control turned fully anticlockwise, which may prove useful for programming rests. At this stage, check VCF1 for optimum settings. The sequencer pitch controls can then be manipulated to provide simple rhythm patterns: basic one-bar pattern in 4/4 would be 2/0/4/0/2/0/4/0/.

Once the rhythm is set, add VCO2 at VCF1. Notice that VCO2 is made to pulse by the sequencer, and that the higher the sequencer control is set, the more accent the pulse is given.

Remember that the sequencer can be programmed to act as a half bar (two sequences per bar), one bar, or two bars (one beat per sequencer pitch control). Thinking of it in those terms should help if you want to link the synth to an external drum machine or sequencer. However, you should also remember that although the noise will be affected by the control being set at 0, VCO2 will still be triggered and the Clock Speed will need to be adjusted accordingly when the sequencer is set to be anything other than 'one bar'.

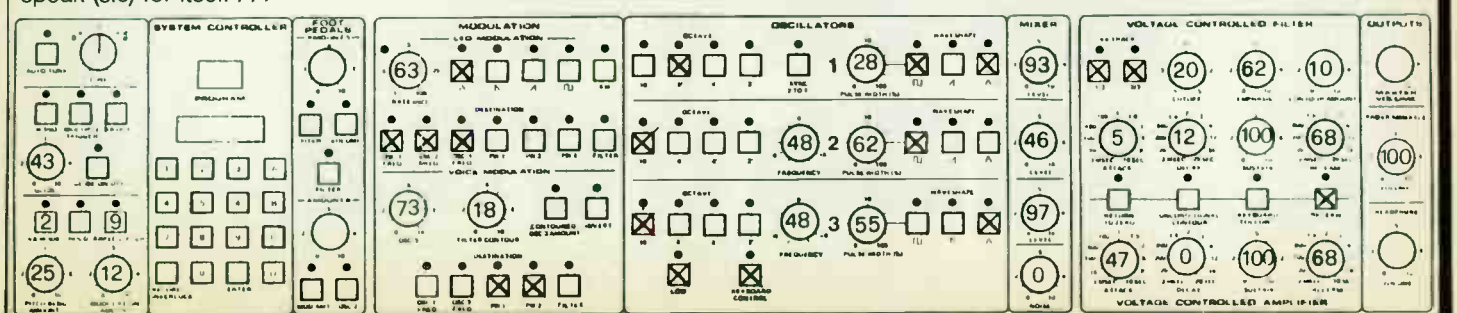
The pitch of the rhythm pattern (VCO2) is triggered from the keyboard. VCO2 is set to 'fade' slowly by EG3, and its envelope is accented by the sequencer at VCF2.



MEMORYMOOG — 'Human Chorus' — Ghiozzi Maurizio, Italy

Another newcomer to *Patchwork*, the MemoryMoog is considered the grand master of Moogs. Ghiozzi's patch is programmed to reproduce a human chorus, and he adds that it's necessary to keep the Octave key in the −1 position, and to play from C2 to F5 on the keyboard.

Not having a MemoryMoog lurking in the depths of our studio (hint hint, Moog people!), we'll have to let the patch speak (sic) for itself . . .



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COMPUTER MUSICIAN

Once again, it seems I'm going to have to give some reasons for an editorial re-organisation within CM. All part of being involved with such a fast-moving industry, I suppose. Anyway, this month sees an expansion for the *Computer Musician supplement*, so that it now encompasses all articles relating to software reviewing and writing, as well as educational features like Jim Grant's *Fairlight Explained*.

'But what about new computer music hardware?' I hear you cry.

Well, the rule now is that if they incorporate conventional 'stand-alone' synths as part of their design, they'll appear in the Hardware section at the front of E&MM, while if they're based exclusively around computers (eg. the Yamaha CX5M system, which we hope to be publishing a full appraisal of next month) you'll find them here in *Computer Musician*.

Sooner or later, someone will produce a really cheap MIDI keyboard. And by cheap, I'm talking about less than £100. Indeed, the RS232 interface on the Casio MT200 makes it but a gnat's whisker away from this goal. As they say, 'we have the technology . . . '

But what's missing at the moment is the right sort of attitude to the pricing of music software. To see why, let's take the case of someone who's just acquired one of these new, imaginary MIDI keyboards. Let's also suppose that he's the proud a sub-£200 micro. Well, how do you suppose he'll feel if he's asked to pay £150 or more for a handful of chips in the form of a MIDI interface and some rather lackfustre software to run everything?

A bit miffed, I'd have thought.

The side of the MIDI standard that needs to be nurtured is that which takes it away from the hot-bed of rock commercialism into the home and school, but that'll only happen if a sensible pricing policy is adopted. The problem, of course, is that everyone looks at the big boys of the computer music field for guidelines, where more often than not prices represent the cost of lengthy software development programs aimed at pushing five-year-old technology to the limit.

It seems to me that as technology leaps ahead, more should be available for less. That's certainly well illustrated by the development of Yamaha's FM synths from the £30,000 GS1 to the £1300 DX7. And on the same tack, there's the prospect of E-mu bringing out the Emulator II for roughly the same price as its predecessor, but with all the software and hardware enhancements made feasible by a few more years of technological advancement.

So, returning to MIDI software, let's see a pricing policy that honestly reflects the months rather than years of software development, and, above all, one that atempts to attract, rather than ostracise, the casual micro user interested in music.

David Ellis

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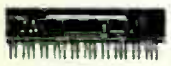

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David Ellis

Expanding Universes

As part of their grand plan to conquer the musical sensibilities of civilisations across the Galaxy, **Syntauri Corporation** are now planning a 500Gigabyte RAM card for the Apple IIz.

Syntauri's current advertising campaign, appearing twice-nightly on all 90 independent satellite stations across the USA and Europe, centres around the construction of a computer-holographic representation of a pair of musical staves that stretches from their home base, Syntauri City in Southern California, to their light years-distant namesake, the star system alpha Centauri. They further say that they've given up trying to communicate with dolphins since the latter started asking for royalties on their performances . . .

Seriously, though, those Syntaurian folks have now released (admittedly more than a year late) their Meta-Expander add-on for the Metatrak software. For just $200, you get software which bank-selects notes out of a Synetix RAM card for consumption by Metatrak. The Synetix card (which they describe as a 'flashcard' – presumably because it flashes big bytes at you as fast as you can blink) costs extra – $295 for a 144K card (storing 10,000 notes) and $495 for a 288K card (storing 21,000).

But God help you if you make a cock-up on the 10,000th note. The problem is that Metatrak's booboo-tracing abilities go no further than a simplistic fast-forwards emulation of a tape recorder. Shame those guys at Syntauri haven't heard of autolocators. . .

Mind you, I can't help thinking that the real answer to mass note storage and playback is to spool the notes as and when they're needed from a floppy disk. After all, you wouldn't really buy a 288K RAM card for your word processor simply to be able to store a 21,000 page document. . . Oh well, some might, I suppose.

For more info, contact Syntauri at 1670 South Amphlett Blvd, Suite 116, San Mateo, CA 94402, USA (☎ 415-574-3335), or Computer Music Studios, 62 Blenheim Crescent, London W11 (☎ 01-221-0192).

Sequential Sequel

Well, there's good news and there's bad news on the **SCI** front.

The good news is that the company have released their 910 expansion software for the Model 64 sequencer. The main additions to its repertoire of functions are the means for programming the Six-Trak polysynth from the micro, with the computer's screen display showing all 35 control parameters at once, and what SCI call the 'Super-Patch Mode', which allows the Six-Trak's keyboard to be split into three sections.

The bad news is that the Model 64 is undergoing a change of heart. As you'll recall, the Model 64's saving grace is that software is resident in ROM, so there's no loading-up delay. The move that's being mooted is to whip out the ROM from the cartridge, and then sell the Model 64 as a dumb unit with software on disk. This way, updating software is obviously much easier than if you're

adding on to the already pre-existing ROM software (as with 910). But against that, there's the not insignificant matter of the amazingly tedious Commodore disk drive slowing down creative proceedings, and the likelihood that the price of the Model 64 will go up, ie. a combination of marginally less for the dumb interface and rather more for the software.

Yet another case of swings and roundabouts. . .

Music and MOEP

The **Capital Region Information Centre** (CRIC), part of the Microelectronics Education Program, tell us that they're putting together a booklet aimed at music teachers and students entitled *Microcomputers and Music Education*. The aim is to introduce the subject in a general way and also to provide a list of the useful software and hardware currently available.

All that entails a good deal of searching around, so the booklet's author, Nick Pickett, would welcome details from any reader about any item of software or hardware that connects micros and music in a potentially useful way.

Missives should be sent to the aforesaid at the Music Department, Middlesex Polytechnic, Trent Park, Cockfosters, Herts.

MusiCalc

Another variation on the VisiCalc theme, perhaps? Well, actually this program from the aptly named **Waveform Inc.** has absolutely no connection with that progenitor of clones. In fact, MusiCalc is a program for the Commodore 64 that comes nearer than most to making the SID chip earn its keep. A nicely interactive display gives the user slide controls over such synthetic essentials as ADSR envelopes, transposition, pulse wave width and level, filtering, and LFO modulation. On the music entry side, the program is basically a three-channel real-time sequencer with a sort of two-dimensional matrix display to show the notes unfolding on playback.

To complicate matters, however, there are a number of different bits to the software. The starting point is the MusiCalc 1 Synthesiser and Sequencer, which basically does what the above paragraph suggests, once you've parted with $74.95. Like another Californian company who believe in the modular software approach, Waveform are fond of their hyperbole. I'd take their promise of 'a synthesiser controlled by one of the most sophisticated step sequencers ever devised' with a generous helping of hypertension-promoting sodium chloride.

Anyhow, MusiCalc 2 ScoreWriter ($29.95) adds on the ability to 'turn your improvisations into sheet music automatically'; MusiCalc 3 Keyboard Maker ($24.95) enables you to 'create your own custom keyboards' (I'm pretty sure that means from the QWERTY keyboard but with different tunings); MusiCalc Template 1 and 2 ($24.95 each) provide African/Latin Rhythms and New Wave/Rock scores and patches; and Colortone Keyboard and MusiCalc 4 ($199.95) add a real keyboard to the system.

So, if you want to find out whether MusiCalc 1 is the 'awesome musical device' that the advertising copy proclaims, you've the option of sending for a $5 demo disk or cassette (of the digital rather than audio variety, for which you'll obviously need a Commodore 64) from Waveform Inc. at 1912 Bonita Way, Berkeley, CA 94704, USA (☎ 415-841-9866). ■

OMDAC UPDATE

Some Spectrum software – and a couple of hardware modifications – for E&MM's DAC computer peripheral, with more to come next month. *Jim Grant*

In E&MM June '83 we published a computer peripheral project, the OMDAC. To recap, this was a general arrangement consisting of an ADC, an eight-way multiplexed DAC, eight output drivers suitable for synth triggers and four digital In/Out channels for clocks, switches and so on.

In addition to the constructional project several demonstration programs for the Acorn Atom were listed. The Atom is now an obsolete machine, almost entirely overshadowed by the BBC and Electron. Fortunately, the OMDAC is completely compatible with the Sinclair Spectrum, but unfortunately the original article did not include any Spectrum programs. To correct this omission, and to encourage reader response, we have written a useful 'Patch Change' program for the Spectrum.

Although the program is shown in two parts, the machine code and BASIC, the BASIC listing contains the machine code in the DATA statements at the beginning of the program. Since the BASIC program is highly modular, with each subroutine performing a distinct task, it is straightforward to trace program execution for different commands.

There are four commands displayed at the bottom of the screen, and these are shown in Table 1. Pressing 'C' on the keyboard causes the displayed command to flash, and the Spectrum next expects a number between 1 and 8 inclusive. When a valid number is supplied, the program immediately opens a link between the ADC and the selected control voltage channel. The current conversion is rounded and scaled to give a maximum of 63, and if the DAC is correctly calibrated will result in a voltage range of five octaves and one tone in semitone steps. When a different channel is selected, the last conversion is stored and continually output as a voltage through the old channel.

So far, the program does much the same as the Atom version: however, there are extra features. Pressing 'P' causes the command Panel to flash, and the Spectrum again expects a number between 1 and 8 inclusive. If you imagine each screen of eight channels as a patch (CH-1 to VCO-1 freq, CH-2 to VCO-2 freq, CH-3 to VCF ref, say) then selecting different Panels allows up to eight patches to be resident in the Spectrum.

To demonstrate this, BREAK the program and GO TO TEST (line 1510). The Channels will be filled with artificial data generated by the program: CH-1 to CH-8 of Panel 1 will be 0 to 7 respectively, while CH-1 to CH-8 of Panel 2 will be 8 to 15, and so on.

When 'S' (SAVE) or 'L' (LOAD) is pressed, the selected command will flash and the Spectrum will wait until the key is pressed again. If it is, a prompt appears for a filename and the eight Panels with Channel data are Saved or Loaded as bytes in the usual Spectrum way. If the same key is not pressed again, the command is aborted.

Assembler Program

The second program is an assembler listing of the machine code held in the DATA statements, lines 170-260. This short but very important program takes care of the Channel multiplexing, and can be included as an I/O subroutine in many OMDAC programs. Each time it's called by a RANDOMIZE USER 32344 statement, it fetches consecutive values from a table held in RAM (whose base address is 32256) and outputs them *via* the DAC to their corresponding channels.

The routine is best called fairly often to refresh the output sample and holds and prevent them from drifting. An outside limit would be about 10 seconds between scans if no discernible pitch occurs from VCOs connected to the control voltage channels.

Considering the importance of the machine code in the program, I think it's worth examining its action in detail. The program is quite simple and can be divided into three sections as listed below.

1) Initialise constants
2) Scanning loop
3) Delay subroutine

The section that requires the most programming care is the loop, and in particular the part which deals with changing the channel address. The output channel is controlled by a CMOS 4051 (1 of 8 switch). This has three address lines to close a uniquely selected switch and a control line to open all switches regardless of the address. It's a useful chip, and there are many to be found in programmable synths such as those made by SCI. However, it does possess one annoying fault: when the switch address is changed, for the briefest instant all the switches are connected together thus corrupting the voltages held on the sample and holds. The problem is aggravated by changing the address at high speed, which is exactly what the machine code does.

A partial solution is to bring the control line HI (open all switches) before changing the address and to bring LO afterwards. This cures most funnies except for the worst case when all address lines are changing, ie. from the 111 code to the 000 code at the end of a scan. A simple way round the problem is to change only one address line between adjacent channels, and this can be achieved by scanning the channels in Grey code order. This explains the need for two lookup tables in the listing: lines 600 to 670 show the channel order for the control line LO, while lines 680 to 750 show the order for the control line HI (just add 8, remembering that it's HEX).

For those who are unfamiliar with Grey code, keep calm, it's nothing complicated. It's simply a way of generating a binary sequence so that only one bit changes between adjacent numbers, and is often used in mechanical binary encoders to minimise errors when the code changes. If more than one bit changes, perhaps due to some part being out of alignment, then the error can be detected and flagged.

BINARY	GREY CODE
000	000
001	001
010	011
011	010
100	110
101	111
110	101
111	100

The delay subroutine is to give the sample and holds a chance to charge to the DAC voltage and settle down before the address is changed.

Modifications

Finally, it's been found that the conversion dither of the ADC can be reduced quite significantly by the inclusion of two 1uF capacitors, each used to decouple digital noise from the reference voltages. Solder – on the track side – one of the capacitors directly across RV4 between the wiper and ground and the other one between the wiper of RV1 and ground. Make sure that the polarity of the capacitors is correct: the minus side goes to ground.

```
  50 REM ----------------------
  60 REM -  SPECTRUM OMDAC  -
  70 REM -     BY J.GRANT   -
  80 REM -      JAN 1984    -
  90 REM ----------------------
 100 REM
 110 CLEAR 32248
 120 POKE 23658,8
 130 OUT 255,128
 140 FOR C=32344 TO 32417
 145 REM
 150 REM MACHINE CODE
 155 REM
 160 READ N: POKE C,N: NEXT C
 170 DATA 6,0,17,154,128,221,33
,145
 180 DATA 128,14,223,28,237,121,
42,0
 190 DATA 128,221,126,0,135,111,
126,14
 200 DATA 159,237,121,221,126,0,
14,223
 210 DATA 237,121,205,138,126,26
,237,121
 220 DATA 19,221,35,4,62,8,184,3
2
 230 DATA 221,201,197,6,128,0,15
,253
 240 DATA 193,201,0,1,3,7,15,31
 250 DATA 63,127,255,11,10,14,15
 260 DATA 13,12
 270 LET START=1350
 280 LET TEST=1510
 290 LET BASE=32256
 300 LET DRAW=1040
 310 LET CHANNEL=510
 320 LET DESELECT=810
 330 LET RET=590
 340 LET ADC=730
 350 LET LOAD=850
 360 LET COM=1010
 370 LET KEY=1260
 380 LET SAVE=790
 390 LET IADC=450
 400 LET PANEL=1100
 410 LET SELECT=670
 420 LET RET1=1240
 430 LET F=0
 440 GO TO START
 445 REM
 450 REM IN ADC
 455 REM
 460 RANDOMIZE USR 32344
 470 LET CC=INT (IN 31/4)
 480 PRINT #1;AT 1,4;CC;" ";
 490 IF CHD-CC<>0 THEN LET CHD=C
C: LET K=OCH: GO SUB ADC: POKE (
BASE+(OP-1)*8+(OCH-1)+8),CC*4
 500 RETURN
 505 REM
 510 REM CHANNEL
 515 REM
 520 PRINT #1;AT 1,8; FLASH 1;"C
HANNEL";
 530 GO SUB IADC
 540 LET K=CODE INKEY$-48
 550 IF K<1 OR K>8 THEN GO TO CH
ANNEL
 560 IF K=OCH THEN GO TO RET
 570 LET T=K: LET K=OCH: GO SUB
DESELECT
 580 LET OCH=T  LET K=T: GO SUB
SELECT
 590 PRINT #1;AT 1,8;"CHANNEL"
 600 RETURN
 605 REM
 610 REM CH DESELECT
 615 REM
 620 LET X=2: LET CH=K
 630 IF K>4 THEN LET X=12: LET C
H=K-4
 640 LET Y=8*CH-6
 650 PRINT AT X,Y;"CH:";K
 660 RETURN
 665 REM
 670 REM CH SELECT
 675 REM
 680 LET X=2: LET CH=K
 690 IF K>4 THEN LET X=12: LET C
H=K-4
 700 LET Y=8*CH-6
 710 PRINT AT X,Y; INVERSE 1;"CH
:";K
 720 RETURN
 725 REM
 730 REM PRINT ADC
 735 REM
 740 LET X=4: LET CH=K
 750 IF K>4 THEN LET X=14: LET C
H=K-4
 760 LET Y=8*CH-6
 770 PRINT AT X,Y;CHD;"  ";
 780 RETURN
 785 REM
 790 REM TAPE SAVE
 795 REM
 800 PRINT #1;AT 1,27; FLASH 1;"
SAVE";
 810 GO SUB IADC: GO SUB IADC: G
O SUB IADC
 820 LET I=CODE INKEY$
 830 IF I=0 THEN GO TO SAVE
 840 IF I<>83 THEN PRINT #1;AT 1
,27;"SAVE";: RETURN
 850 INPUT "FILE NAME ";N$
 860 SAVE N$ CODE BASE+8,64
 870 GO SUB COM
 880 RETURN
 885 REM
 890 REM TAPE LOAD
 895 REM
 900 PRINT #1;AT 1,22; FLASH 1;"
LOAD";
 910 GO SUB IADC: GO SUB IADC: G
O SUB IADC: GO SUB IADC
 920 LET I=CODE INKEY$
 930 IF I=0 THEN GO TO LOAD
 940 IF I<>74 THEN PRINT #1;AT 1
22;"LOAD": RETURN
 950 INPUT "FILE NAME";N$
 960 CLS
 970 LOAD N$ CODE
 980 CLS
 990 LET F=1: LET T=CHD
1000 RETURN
1005 REM
1010 REM COMMAND LINE
1015 REM
1020 PRINT #1;AT 1,0;"ADC:    ";
AT 1,8;"CHANNEL";AT 1,16;"PANEL"
;AT 1,22;"LOAD";AT 1,27;"SAVE";
1030 RETURN
1035 REM
1040 REM PANEL DRAW
1045 REM
1050 FOR M=0 TO 20
1060 IF M=0 OR M=10 OR M=20 THEN
 FOR N=0 TO 31: PRINT AT M,N;"■"
;: NEXT N
1070 PRINT AT M,0;"■";AT M,8;"■"
;AT M,16;"■";AT M,24;"■";AT M,31
;"■"
1080 NEXT M
1090 RETURN
1095 REM
1100 REM PANEL
1105 REM
1110 PRINT #1;AT 1,16; FLASH 1;"
PANEL";
1120 LET I=CODE INKEY$-48
1130 GO SUB IADC
1140 IF I<1 OR I>8 THEN GO TO PA
NEL
1150 IF I=OP THEN GO TO RET1
1160 LET OP=I: PRINT AT 0,19; IN
VERSE 1;OP
1170 LET T=BASE+8*(OP-1)+8
1180 POKE BASE,T-256*INT (T/256)
: POKE BASE+1,INT (T/256)
1190 LET T=CHD
1200 FOR K=1 TO 8
1210 LET CHD=INT PEEK (BASE+8*I-
K-1)/4
1220 GO SUB ADC: NEXT K
1230 LET CHD=T
1240 PRINT #1;AT 1,16;"PANEL"
1250 RETURN
1255 REM
1260 REM KEY SCAN
1265 REM
1270 REM MACHINE CODE CALL
1280 GO SUB IADC
1290 LET K=CODE INKEY$
1300 IF K=67 THEN GO SUB CHANNEL
: GO TO KEY
1310 IF K=80 THEN GO SUB PANEL:
GO TO KEY
1320 IF K=74 THEN GO SUB LOAD: G
O TO START
1330 IF K=83 THEN GO SUB SAVE: G
O TO KEY
1340 GO TO KEY
1345 REM
1350 REM START
1355 REM
1360 BORDER 0: PAPER 0: INK 7
1370 CLS
1380 GO SUB DRAW
1390 FOR K=1 TO 8: GO SUB DESELE
CT
1400 LET CHD=INT PEEK (BASE+7+K)
/4
1410 GO SUB ADC
1420 NEXT K
1430 IF F=1 THEN LET CHD=T
1440 PRINT AT 0,13; INVERSE 1;"P
ANEL:1"
1450 LET T=BASE+8
1460 POKE BASE,T-256*INT (T/256)
: POKE BASE+1,INT (T/256)
1470 GO SUB COM
1480 LET OP=1: LET OCH=1: LET K=
1
1490 GO SUB SELECT
1500 GO TO KEY
1505 REM
1510 REM TEST FILL
1515 REM
1520 LET D=0: FOR C=32264 TO 323
27: POKE C,D*4: LET D=D+1: NEXT
C
1530 LET START=1350
1540 GO TO START
```

◁ OMDAC/Spectrum BASIC listing.

OMDAC/Spectrum assembler listing. ▽

```
0010          ORG   7E58H
0020 TBLE     EQU   7E00H
0030 DAC      EQU   159
0040 MUX      EQU   223
0050 CNT      EQU   8
0060 ;
0070 ;              "INITIALISE SCAN"
0080 ;
0090 STRT     LD    B,0
0100          LD    DE,LKUPH
0110          LD    IX,LKUPL
0120 ;
0130 ;              "BEGIN SCAN"
0140 ;
0150 LOOP     LD    HL,(TBLE)
0160          LD    A,(IX)
0170          ADD   L
0180          LD    L,A
0190 ;
0200          LD    A,(HL)
0210          LD    C,DAC
0220          OUT   (C),A
0230 ;
0240          LD    A,(IX)
0250          LD    C,MUX
0260          OUT   (C),A
0270 ;
0280          CALL  DELAY
0290 ;
0300          LD    A,(DE)
0310          OUT   (C),A
0320 ;
0330          INC   DE
0340          INC   IX
0350          INC   B
0360 ;
0370          LD    A,CNT
0380          CP    B
0390          JR    NZ,LOOP
0400          RET
0410 ;
0420 ;              "DELAY FOR S/H"
0430 ;
0440 DELAY    PUSH  BC
0450          LD    B,80H
0460 NEXT     NOP
0470          DJNZ  NEXT
0480          POP   BC
0490          RET
0500 ;
0510                "GREY CODE"
0520 ;              "LOOK UP"
0530 ;
0600 LKUPL    DEFB  00
0610          DEFB  01
0620          DEFB  03
0630          DEFB  02
0640          DEFB  06
0650          DEFB  07
0660          DEFB  05
0670          DEFB  04
0680 LKUPH    DEFB  08
0690          DEFB  09
0700          DEFB  11
0710          DEFB  10
0720          DEFB  14
0730          DEFB  15
0740          DEFB  13
0750          DEFB  12
0760          END
```

Next month's E&MM will feature details of further hardware modifications that adapt the OMDAC for use with the BBC Model B microcomputer, while additional software is also in the pipeline. Meanwhile, OMDAC PCBs are still available from the E&MM Mail Order Dept at the editorial address, price £5.95 each including VAT and carriage. The June 83 back issue containing parts and construction details is also available at £1.30. Please make cheques-POs payable to Music Maker Publications Ltd, and allow 28 days for delivery.

Passport Designs MIDI/4

Software and Interface

Passport Designs' first foray into the world of MIDI comes in the form of hardware/software packages for the Apple and Commodore 64. *David Ellis*

Passport Designs' MIDI Interface and accompanying software.

The problem with the whole of the MIDI software industry is that too many well-established companies have their heads in the sand when it comes to taking the MIDI specifications by the neck and wringing some sense out of them. On top of that, so-called 'garage companies' are now springing up with wild abandon, offering several $100-worth of instant MIDI software but no guarantee that you'll ever actually see the product – R&D sponsored by the consumer, in other words.

Well, I certainly wouldn't put Passport Designs into either of those categories. They're a respected firm with good products (the Soundchaser system and its attendant software), and if my memory serves me correctly, Passport were also one of the 12 companies that attended the original MIDI meeting back in January 1982. So all in all, it's fair to say that they've had plenty of time to put their collective thoughts into practice, and their track record leads to certain expectations of quality and ingenuity.

As their first stab in the direction of MIDI, the modern music world's most fashionable acronym, Passport have gone for the two most popular personal micros in the States – the Apple II/IIe and Commodore 64 – providing the necessary interface cards ($195 each) for the aforesaid, plus some four-track real-time sequencing software ($99). For the purposes of this review I've been looking at the Apple version, but it can be taken for granted that what's critically true for the version on this micro applies equally to that on the Commodore 64.

Hardware

Like every other Apple add-on under the sun, the Passport MIDI card plugs into one of the expansion slots on the motherboard. So, if you've just acquired your brand-spanking-new Apple IIc (which foregoes the pleasures of such expandability) for the purpose of running MIDI software, you're stuck – to put it mildly.

And like every other MIDI card in the land, the chips on the card are exactly what you'd expect to find – namely an opto-isolator, a 6850 ACIA, and a handful of gates. In addition, there's also a 6840 timer chip on board to make up for the lack of this *chez* Apple II. Finally, three solid wires wend their way from the card to end in three heavy-duty (makes a change) five-pin DIN sockets, ie. MIDI In, MIDI Out, and Drum Sync In/Out.

So, hardware-wise, no surprises from the Passport stable – except perhaps the cost: $195 does seem overly expensive for something as basic as this, especially considering that there's only one MIDI Out provided. As a point of interest, the manual also suggests that Yamaha's Apple MIDI card could be used in place of Passport's own. However, as Yamaha still don't seem to have made up their minds when (or whether) this'll be released, or indeed its price, this may not be such a viable alternative.

The excellent if ingratiating (typical Passport house style) manual guides you through the process of setting everything up, and includes a diagram of how you might connect up multiple MIDI keyboards. Therein lies the wishful thinking, of course: if only every keyboard actually had a MIDI Thru! And even if they had, if only they could be relied upon to work properly (the DX7 and JX3P being the principle miscreants in this respect). The manual then goes on to say: 'set all synthesisers to MIDI Channel 01. (For more details see your synthesizer manual.)' Shame if your synth is stuck on Channel 01 for all eternity (the JX3P, for instance) . . .

> 'The only way the four tracks can be played with different sounds is to have four MIDI keyboards, which you don't need me to tell you is an expensive business.'

Booting-up the MIDI/4 disk rapidly puts you and the main 'format' screen in the picture. To all intents and purposes, this side of MIDI/4 looks rather like Passport's much earlier four-track sequencing software for the Soundchaser computer music system. However, there are some pretty big differences beneath the surface.

Software screen display examples.

Software

In contrast to Passport's previous software, the disk that MIDI/4 comes on is well copy-protected, so the days of making multiple copies of the software in case the cat does something unfortunate on what it thinks is plastic earth (it has happened) are over, alas. On the other hand, the disk does incorporate Passport's favourite speeded-up version of Apple's DOS 3.3 disk-operating system, the excellent Diversi-DOS, so all that waiting frantic minutes for programs and scores to be loaded up thankfully disappears into the mists of time. Also, a spare disk is provided just in case your precious plastic spirals off into the sunset in emulation of an errant UFO.

Looking at the similarities first of all, there are four software tracks which can be switched individually between three modes. These aren't MIDI modes – we're talking about record, play, or off here, which is all a little confusing if you expect the tag 'mode' to signify something to do with MIDI etiquette. Next along in the columns is the channel, and this time, this does refer to the MIDI Channel. This defaults to Channel 01 (surprise, surprise), but obviously any of the 16 available

from the MIDI protocol can be plugged in place for all four tracks. Last but not least, there are columns for the preset number and a note pad area for reminding yourself of the keyboard destination of the tracks.

Underneath all that lot, a handful or so of parameters keep the old brain informed about the tempo (wide-ranging), the drum sync status, any odd transpositions that have got left behind, the loop and click-track options (simply on or off), and whether or not you want to use aftertouch. The drum sync works in such a way that switching the sequencer on or off makes a drum machine perform (or not) on cue. Like all good and obedient servants, this caters for all manner of masters of the beat, including 96 pulses per quarter-note (Oberheim), 48 (Korg and Linn), or 24. The option for adding aftertouch when recording makes a good deal of sense. It's all very well doing truly wonderful things with your DX7 in the way of modulation index bendings, but try and record that as aftertouch and you'll get a touch of that 'I wonder where my memory went?' feeling.

Best to leave that for when the Sinclair QL is fully debugged and kitted out with a MIDI interface and 0.5Mbyte RAM pack. Well, we can but live in hope . . .

Practical Parameters

Soldiering on with the Apple's 48K of memory gives a fairly respectable 5500-note storage: OK, but not 'enormous', as the manual seems to think. Recording on a track is simply a question of making sure your keyboard's MIDI Out is connected to the Apple's MIDI In (worth pointing out as it has been known for the less technical amongst us to connect MIDI In to MIDI In and Out to Out – well, you can see the logic of it, can't you?) and then pressing a few keys to set one of the tracks to record. Pressing the space bar stops and starts the sequencer – again, just as easy as the Soundchaser four-track sequencer.

Now, where all this starts to depart from Passport's earlier software is in what can be done to a track once it's been recorded. Before, if you'd forgotten to add that essential hook or twiddle, your only option was to re-record the whole track. Not now. The MIDI/4 software allows you to overdub more notes or control changes (like pitch-bend and vibrato) on the other three tracks and then bounce all four tracks together onto just one. This merge feature is an important addition to Passport's real-time sequencer, but it does carry one major penalty, and that's the fact that all those merged notes can only be piped down one MIDI channel: monotimbral polyphony, in other words.

Of course, having freed three of the four tracks by the merge operation, you're then in a position to put down new lines, merge these, and then pipe them off down a different MIDI channel to a different keyboard. But as with any bouncing-down operation, it's vital to sort out your parts into those that share the same keyboard and preset and those that don't. And remember that merged tracks can't be separated once the dirty deed is done!

Life isn't all sweetness and roses this time round, though. For instance, the MIDI/4 sequencer operates solely in Poly mode, so the only way the four tracks can be played with different sounds is to have four MIDI keyboards, which you don't need me to tell you is an expensive business. Next, the 'punch-in' editing feature incorporated in the sequencer doesn't allow you to punch-out, so correcting a solitary goof entails re-recording everything that comes after it as well. Talk about infuriating!

Conclusions

Well, that just about sums up the state of play with MIDI/4.

It has plenty of good points and a few that are bad, including sticking with the curious American tradition of making few concessions towards the less keyboard-literate musician. One of these days, someone will come up with a sequencer that enables the user to forget the distinction between real-time and non-real-time, but until then, we're stuck with software that's either drearily reminiscent of a VisiCalc display (the step-time brigade) or little more than a re-working of the conventional analogue tape machine, though lacking even the autolocation features that the rock industry has come to expect.

No, in all honesty, I wouldn't use Passport Designs' description of MIDI/4 as a 'studio grade' sequencer. True, it's very serviceable and fair value for money (especially if purchased in the States), but there's still a long way to go. Mind you, I'm sure they're capable of it. So come on, Passport, what about digging that old head out of the sand and coming up with the goods that us computer musicians are longing to see? ■

UK prices and information from Syco Systems, 20 Conduit Place, London W2. ☎ 01-724 2451.

BACK ISSUES

1981

MARCH (SOLD OUT) ***Music*** BBC Radiophonic Workshop ***Hardware*** Yamaha SK20 ***Computer Musician (CM)*** Using Microprocessors ***Technology*** Advanced Music Synthesis (VCOs, FM), Spectrum Synth, Hi-Fi Sub-Bass Woofer

APRIL ***Music*** Warren Cann (Ultravox) ***CM*** Using Micros Pt2, Programming Micros ***Technology*** Advanced Music Synthesis (PWM), Spectrum Synth Pt2, Syntom I

MAY ***Music*** Tim Souster ***CM*** Apple Music System, Using Micros Pt3 ***Technology*** Spectrum Synth Pt3, Noise Reduction Unit

JUNE ***Music*** David Vorhaus ***Hardware*** Fairlight CMI, Yamaha PS20 ***CM*** Using Micros Pt4 ***Technology*** Mosfet Amp

JULY (SOLD OUT) ***Music*** Duncan Mackay ***Hardware*** PPG Wave 2 ***CM*** Using Micros Pt5

AUGUST ***Music*** Irmin Schmidt ***Hardware*** Resynator Synth, Casio VL1 ***Technology*** Harmonics, PA Signal Processor Pt1

SEPTEMBER (SOLD OUT) ***Music*** Kraftwerk ***Hardware*** Linn LM1 ***CM*** Using Micros Pt6 ***Technology*** Noise Gate, PA Signal Processor Pt2

OCTOBER ***CM*** Using Micros Pt7 ***Technology*** Harmony Generator, Effects Link FX1, dbx Explained

NOVEMBER ***Music*** Landscape ***Hardware*** Casio MT30, Roland GR300 and CPE800 ***CM*** Using Micros Pt8 ***Technology*** Speech Synthesis, EMT (Phasing), Auto Swell Pedal

DECEMBER (SOLD OUT) ***Music*** Rick Wakeman, OMD ***Hardware*** Yamaha CS70M, Vox Custom Bass & Custom 25, Roland CR5000 & CR8000, Elka-Orla X50, Vox AC30, aphaSyntauri, Fostex 250, ElectroVoice Mics ***Technology*** Synclock

1982

JANUARY ***Music*** Tangerine Dream ***Hardware*** Casio 701, Teisco SX400, Aria TS400, MCS Percussion Computer, Soundchaser, Beyer Mics ***Technology*** EMT (Flanging), Spectrum Synth Update Pt1, Volume Pedal

FEBRUARY ***Music*** Ike Isaacs ***Hardware*** Korg Trident, AKG Mics, Roland TR606, Fostex A8, Tokai ST50 and PB80 ***CM*** PolySequencing on ZX81 ***Technology*** Yamaha GS1&2 (FM) Explained, Digital Delay Line Pt1, Spectrum Synth Update Pt2

MARCH (SOLD OUT) ***Music*** Klaus Schulze, Robert Schröder, Kraftwerk 'Computer World' Music ***Hardware*** Firstman SQ01, SCI Pro One, Tascam 124AV, Shure Mics, Hamer Prototype ***Technology*** Power 200 Speakers, Digital Delay Line Pt2

APRIL ***Music*** Martin Rushent (Human League) ***Hardware*** Korg MonoPoly, Fostex 350, Roland TB303 ***Technology*** MF1 Sync Unit, MultiReverb

MAY ***Music*** Holger Czukay, Depeche Mode ***Hardware*** Moog Source & Rogue, Calrec Soundfield Mic ***Technology*** Soft Distortion, Quadramix

JUNE ***Music*** Jean-Michel Jarre, Classix Nouveaux ***Hardware*** Emulator, Carlsbro Minifex ***Technology*** Panolo, Multisplit

JULY ***Music*** Ronny with Warren Cann & Hans Zimmer, J-M Jarre 'Magnetic Fields' Music ***Hardware*** Roland Juno 6, Peavey Heritage, Steinberger Bass ***Technology*** Universal Trigger Interface

AUGUST ***Music*** Kitaro, Jon Lord ***Hardware*** Synergy, Korg Polysix, Tascam M244 Portastudio, Shergold Modulator 12-string, Yamaha Pro-FX ***Technology*** 8201 Line Mixer, Guitar Buddy practice amp

SEPTEMBER (SOLD OUT) ***Music*** Richard Pinhas ***Hardware*** Yamaha CS01, Jen SX1000, Casio 1000P, Fender Squier, Carlsbro Stingray, Pearl Effectors ***Technology*** Comp-Lim, Twinpak

OCTOBER (SOLD OUT) ***Music*** Kate Bush, Ken Freeman ***Hardware*** Fender Vintage Series, Rhodes Chroma, Kay Memory Rhythm ***Technology*** EMT (Performance Controls), ElectroMix 842 Pt1

NOVEMBER ***Music*** Patrick Moraz, Robert Moog, Bill Nelson ***Hardware*** Yamaha PC100, Technics SXK200, Casio MT70, Hohner P100, JVC KB500, Gibson Firebird 2, Alligator AT150, AHB 1221 Mixer ***Technology*** ElectroMix 842 Pt2, Sweep Equaliser

DECEMBER ***Music*** Cliff Richard ***Hardware*** Elka Synthex, Crumar Stratus, Tokai Basses, Shure PE Mics, The Kit ***Technology*** Transpozer Pt1, Canjak

1983

JANUARY ***Music*** Richard Barbieri (Japan) ***Hardware*** Westone Bass, BGW 750C Amp, Korg EPS1, Clef BandBox, Zildjian Cymbals ***Technology*** Synblo, Transpozer Pt2

FEBRUARY ***Music*** Isao Tomita, Human League ***Hardware*** Novatron, LinnDrum, Simmons SDS6, Klone Kit, Movement Drum Computer 2, Korg KPR77, MemoryMoog, Synclavier II, Powertran Polysynth, Vigier Guitars, Pearl Mics ***Technology*** Synbal, Caltune

MARCH ***Music*** Klaus Schulze, Michael Karoli, Francis Monkman, Bernard Xolotl, Chris Franke ***Hardware*** RSF Kobol Expander, Korg Poly 61, Aria Mics, BGW 7000 Amp, Ibanez Pedals, Tokai Flying V ***Technology*** Shaper, 842 Mixer Meter Bridge

APRIL ***Music*** Naked Eyes, Gabor Presser ***Hardware*** Casio 7000, SCI Prophet 600, Chroma/Apple Interface, Eko Bass pedals, Vox Guitars ***Technology*** Syntom II

MAY ***Music*** Keith Emerson ***Hardware*** Roland MC202, Fostex X15, Carlsbro Cobra 90 Kbd Combo, M&A K1/B Kit, Echo Unit Supplement (13 reviews, inc. Roland SDE2000, Fostex 3050, Korg SDD3000) ***Technology*** Introducing the MIDI, MicroMIDI, Active Speaker

JUNE ***Music*** Steve Hillage, Arthur Brown ***Hardware*** Synclavier II, Synton Syrinx, Emu Drumulator, Vestafire Dual Flanger, Aria AD05 Delay, Suzuki Mics, Clarion and Cutec four-tracks ***Technology*** OMDAC

JULY ***Music*** Marillion, Hans Zimmer ***Hardware*** Trident VFM Mixer, Kawai SX210, Aria U60 Deluxe BBS, Deanvard VA30K Amp, MXR Omni FX, Milab Mics ***Technology*** Yamaha DX synthesisers, Ditigal Signal Processing Pt1, Tap Tempo

AUGUST ***Music*** Bill Nelson, Hubert Bognermayr, Barclay James Harvest ***Hardware*** Roland JX3P/PG200, OSCar, 360 Systems Digital Kbd, MPC Music Percussion Computer, Yamaha SG200, Fender 100W Stage Lead, Frontline FX ***Technology*** Digital Signal Processing Pt2

SEPTEMBER (SOLD OUT) ***Music*** Peter Vettese ***Hardware*** Prophet T8, Oberheim DX, SCI Pro-FX 500, Rickenbacker 360 12-string & TR75 GT Combo ***Computer Musician (CM)*** Music Composition Languages Pt1, Sounding Out the Micro Pt1 ***Technology*** Which Synth Guide, Synclap

OCTOBER ***Music*** John Miles, Andrew Powell ***Hardware*** Yamaha DX1, OctavePlateau Voyetra 8, Siel Opera 6, MXR 185 Drum Computer, Ross Pedals, Fender Elite Precision Bass 1, Steinberger six-string ***CM*** Sounding Out the Micro Pt2, Speech Synthesis, ***Technology*** Digital Signal Processing Pt3, Mains Distribution Board

NOVEMBER ***Music*** Tony Banks, John Foxx ***Hardware*** Seiko Digital Keyboards, Eko EM10, UC1 Sequencer for SCI Pro One, Doctor Click, Klone Kit 2, Ibanez HD1000, Korg KMX8 Mixer, Ibanez RS315SC Guitar ***CM*** Music Composition Languages Pt2, Software Envelope Generator (ZX Spectrum), MUZIX 81 (ZX81) ***Technology*** Digital Signal Processing Pt4

DECEMBER (SOLD OUT) ***Music*** Gary Numan, Psychic TV, Philip Glass ***Hardware*** Prophet T8, Yamaha PC1000, Carlsbro AD1 Echo, Personal Keyboard Guide ***CM*** Decillionix (sound sampling for Apple) ***Technology*** Valve Driver

1984

JANUARY ***Music*** Simple Minds, Saga, Hawkwind, Dave Hewson ***Hardware*** Oberheim OB8, Vigier Bass, Siel Cruise, Ibanez DM2000, The Kit + Accessories ***Technology*** Using Sequencers, Electronic Metronome

FEBRUARY ***Music*** Daniel Miller, China Crisis, Don Airey ***Hardware*** Korg Poly 800, Siel PX, Yamaha PS55, Eko EM12, Boss DE200, Roland Chorus Cube 60, Washburn Bantam Bass, Carlsbro Marlin, Dr Böhm Digital Drums ***CM*** Mainframe ***Technology*** Drumatix Mods, Voltage-Controlled Clock

MARCH ***Music*** Vince Clarke & Eric Radcliffe, Blancmange ***Hardware*** SCI SixTrak, Roland SDE3000, Roland System 100M, Electronic Percussion Guide (nine reviews inc. SCI Drumtraks, Boss DR110, AHB Inpulse One, Hammond DPM48) ***CM*** Music Composition Languages Pt3 ***Technology*** S-trigger Converter, Lead Tester

APRIL ***Music*** Fad Gadget, Vic Emerson (Sad Café) ***Hardware*** Simmons SDS7 & SDS8, Jupiter 6, Roland TR909 & MSQ700, Yamaha PS Kbds, Crumar Composer, Ibanez UE400 & UE405, Klone Dual Percussion Synth, Vox White Shadow Bass ***CM*** Gentle Art of Transcription Pt1, Ins & Outs of Digital Design ***Technology*** Understanding the DX7 Pt1, Syndrom Pt1, Bass Pedal Synth

MAY ***Music*** Wang Chung ***Hardware*** PPG Wave 2.3 & Waveterm, Roland Juno 106, Roland JSQ60, Casio 310, M&A Electronic Drums, Dynacord PDD14 ***CM*** PDSG Pt2,***Technology*** Understanding the DX7 Pt1, String Damper ***MIDI Supplement Pt1*** Specification, Theory & Practice, Product Guide, MIDI By Numbers (Steve Levine)

JUNE ***Music*** OMD ***Hardware*** Roland GR700/G707, SynthAxe, Siel Expander, SCI Model 64 Sequencer, MFB512 Digital Drum m/c, Jen Musipack 1.0, Boss DD2 Delay Pedal ***CM*** Gentle Art of Transcription Pt2, PDSG Pt2 ***Technology*** Understanding the DX7 Pt3, Syndrom Pt2, Multiwave LFO ***MIDI Supplement Pt2*** Inside MIDI, MIDI & The Micro, BeeBMIDI Interface Pt1

JULY ***Music*** Human League, Steve Jolliffe, Jade Warrior ***Hardware*** Yamaha DX9, Korg Super Section, Yamaha MK100, Microsound 64 Kbd, TED Digisound, Ibanez DM1100 DDL ***CM*** JMS MIDI Software, PDSG Pt3 ***Technology*** Spectrum MIDI (SCI SixTrak and DX7 Patch Dump), Understanding the DX7 Pt4, RackPack, BeeBMIDI Pt2

AUGUST ***Music*** Rusty Egan (Visage), Cocteau Twins, Hans-Jaochim Roedelius ***Hardware*** Synclavier Update, Technics SXK250, Yamaha PF10 & PF15, Siel Piano Quattro & PX jr, Roland HP300, HP400, PB300 & PR800, Garfield Electronics MiniDoc, Electro Harmonix Instant Replay & Super Replay ***CM*** EMR BBC B MIDI Software Fairlight Explained Pt1, ***Technology*** Understanding the DX7 Pt5, BeeBMIDI Pt3, Syndrom Pt3, Miniblo, SynthMix Pt1

Back issues are available at £1.30 each (inc. p&p) for 1983/84, while 1981/82 issues are available at a special price of 80p each (inc. p&p). All prices refer to the UK and surface mail to Europe and Overseas. Photocopies of articles from SOLD OUT issues can be obtained at 50p per article. Orders please to: E&MM Mail Order Department, Alexander House, 1 Milton Road, Cambridge, CB4 1UY.

This back issues page supercedes all previous listings, and the contents of each issue are presented in summarised form. See E&MM Feb 83 and Feb 84 for full Indices of 1981/82 and 1983 issues respectively.

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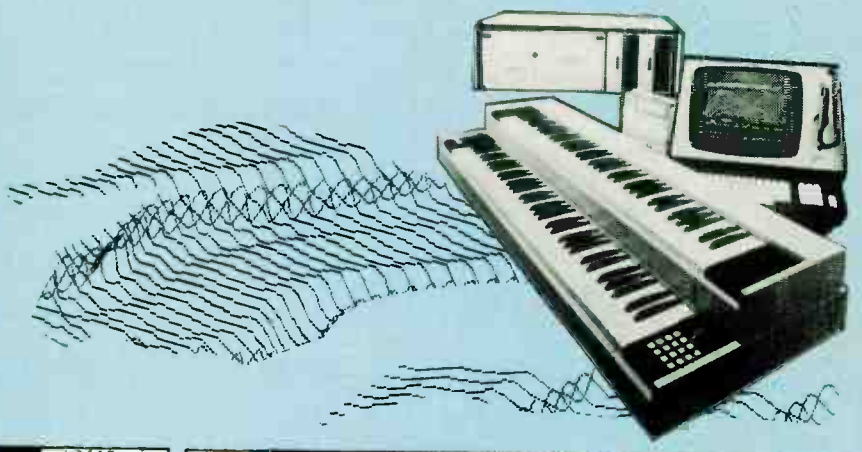
THE FAIRLIGHT EXPLAINED

The second part of our insight into one of the world's most popular computer instruments looks at display pages and what they tell CMI owners. *Jim Grant*



Last month we described the general software concept of the Fairlight and how much of its power lies in its ability to present its functions to the user as a group of related files called Pages. We saw that the CMI powered up with the Index Page (Page 1) and that sound and music files were managed by Page 2.

One of the problems associated with most sound-generating equipment is the way in which the sense sight is excluded from the process of sound formation. Most instruments operate on

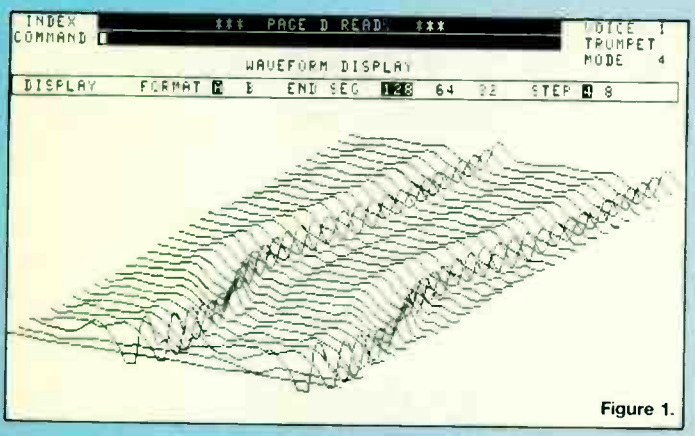


Figure 1.

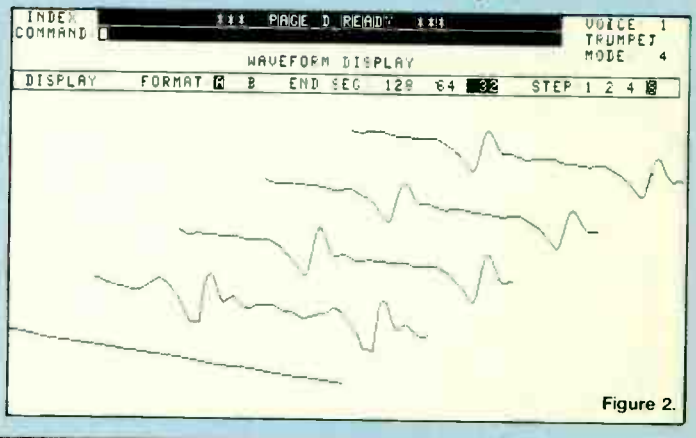


Figure 2.

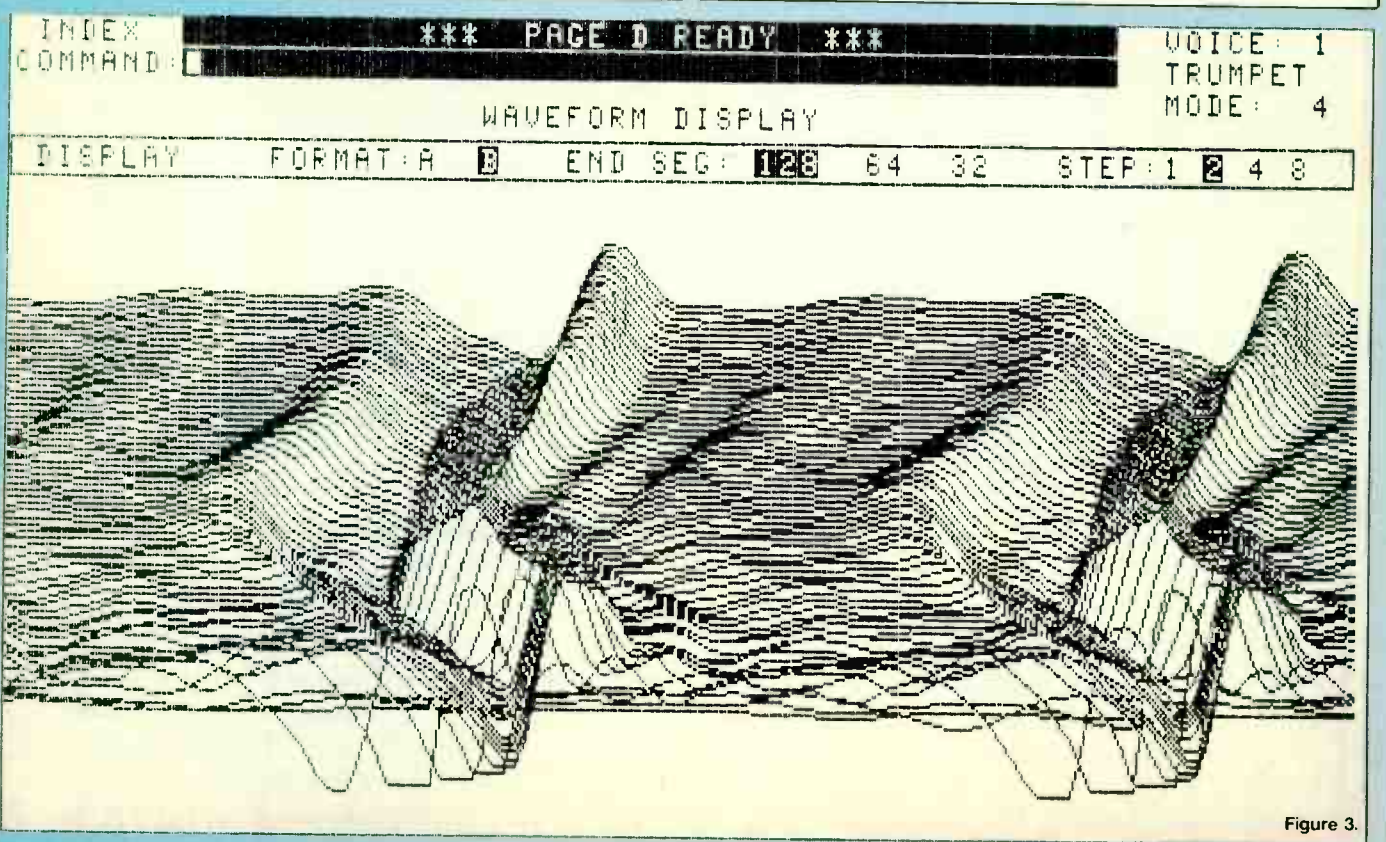


Figure 3.

the basis of the user twiddling the controls and stabbing the keyboard. Fair enough: of all our senses, the ears are by far the most acute. Yet if we consider all the electronic music equipment currently available, the most user-friendly instruments have graphic displays, perhaps in the form of panel legends and LEDs or liquid crystal display. Despite the fact that sight is a very poor qualitative sense, it can be of enormous psychological help in our field. Basically it boils down to: 'If I can see it, I can understand it.'

Page D

There's no doubt that the Fairlight's visual presentation is founded on this premise. Each display Page is graphic without being ostentatious, and Page D, the voice waveform display, is a prime example of this. Typing PD followed by a RETURN on the alphanumeric keyboard will result in a display of the type shown in Figure 1. To appreciate the significance of the display, we must delve a little deeper into the workings of the CMI.

Remember that voice information is held in 16K of RAM on each channel card. To simplify matters, the CMI divides the memory (and thus the waveform) into 128 sections called segments. Each segment consists of 128 bytes, so the waveform comprises 128 segments multiplied by 128 bytes to give 16384 bytes, ie. 16K. This saves the musician handling unwieldy computer numbers when dealing with the waveform RAM.

The display shown in Figure 1 is a psuedo-3D representation of the voice called TRUMPET. Each line from left to right is a segment, and the foremost segment represents the beginning of the sound. When a keyboard note is pressed, the CMI reads out the RAM information segment by segment from the front to the rear of the display.

There are two display formats, A and B, and a number of options within each type. Figure 1 is in format A, and segments 1 to 128 are shown in steps of 4. Figure 2 is again format A, with the end segment number 32 and steps of 8: therefore only five segments are shown. Format B gives an oscilloscope-type display, but with each segment slightly above the preceding one. Again, there are a number of display options. Figure 3 shows TRUMPET segments 1 to 128 in steps of 2, and Figure 4 segments 1 to 64 in steps of 8.

Although Page D is purely for display purposes and does not support any sound creation commands, it's still an invaluable aid. At its most basic level, it answers the questions 'where has the sound gone?' and 'is the waveform zero?'.

Page 3

Page 3 is another utility-type display Page. It deals with voice tunings, Channel allocation and keyboard maps.

Figure 5 shows a typical display with eight separate voices loaded into the CMI. Registers A to H are groups of one or more of the eight Channels and 'NPHONY' is the number of notes that can be played with the sound held in a Register. A quick look at Figure 5 reveals that there are eight active Registers, each holding the voice indicated. In this case, all eight Channel cards hold a unique sound, and therefore the maximum number of notes that can be played on the keyboard with any single sound is one. This is indicated by the corresponding 'NPHONY'. If a single eight-note polyphonic voice is required, only Register A will be active and Channels 1 to 8 will be allocated to A. The active Registers are mirrored on Page 2 so that they can be loaded with sounds from disk. The Fairlight will flag an error

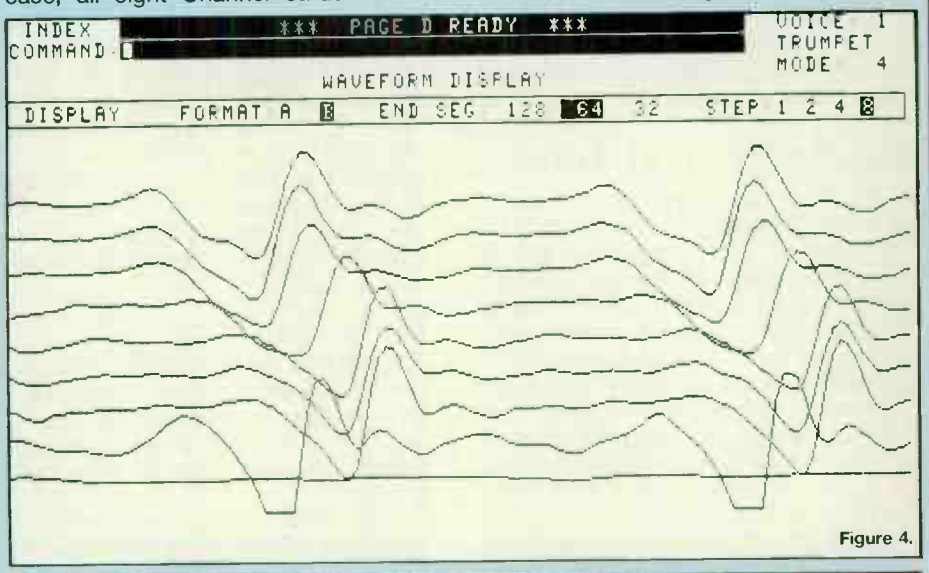


Figure 4.

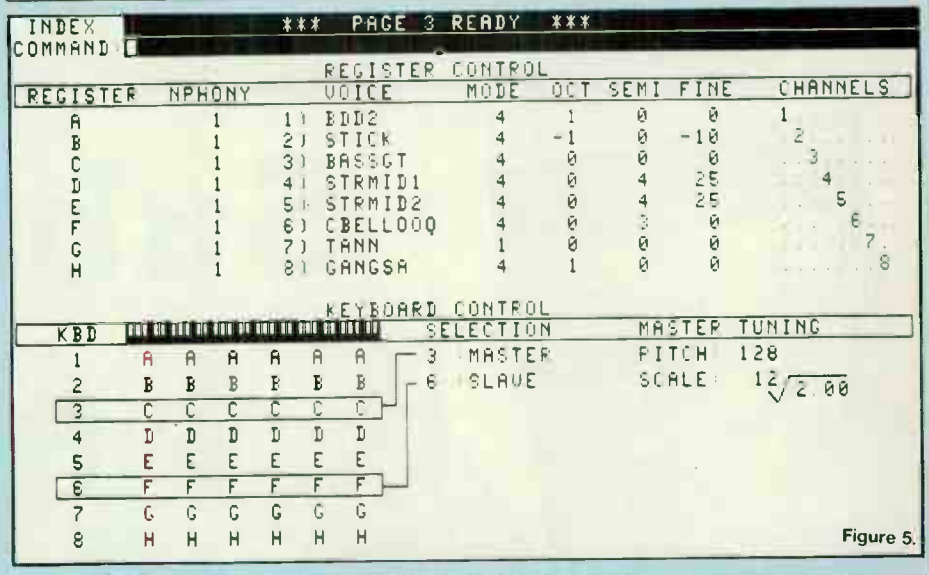


Figure 5.

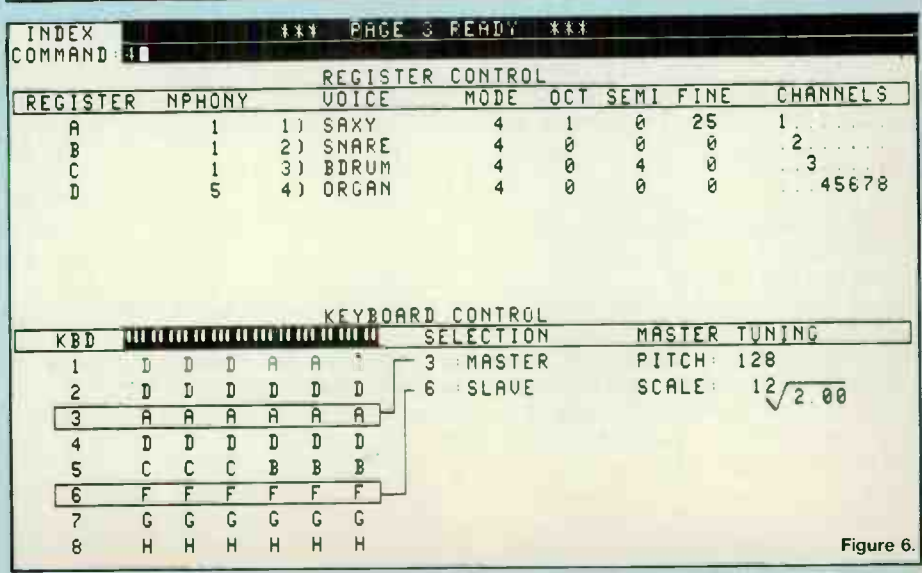


Figure 6.

message if you try to open another Register or increase the NPHONY beyond eight. A simple rule applies: the sum of the active Registers times their NPHONY must be less than or equal to eight.

Figure 6 shows another example of the Register allocations. Here, another set of voices has been loaded, so the NPHONY and Registers are configured differently. Although the Register and NPHONY settings may seem a little confusing and limited, the exact configuration is determined entirely by the musician, and changes can be effected very quickly for evaluation.

Keyboards and Tuning

Any voice can be tuned in increments of plus or minus one hundredth of a semitone up to ±6 octaves with crystal accuracy. Scale allows the Western tempered tuning of 12th root of 2.00 to be changed to any other macro/micro tuning, eg. for quarter tones, you simply change Scale to 24th root of 2.00. Pitch is a master tuning control which can vary tuning of all the loaded voices by a quarter of a tone in 256 discrete steps, to bring the CMI in tune with other instruments if necessary.

The Keyboard Maps each consist of a keyboard number (1 to 6) followed by six letters indicating the Register assigned to each octave. As the CMI is a musician's instrument, it supports two six-octave keyboards called the Master and the Slave. Using the maps, it's possible to create eight different keyboard configurations by choosing which sounds will play on each octave within a keyboard. The Master and Slave can be linked (as shown in Figures 5 and 6) to any map by changing the Selection numbers.

The information presented in Page 3 is known as an Instrument file. The file can be saved on the user disk and is given the suffix NAME.IN. When this file is loaded it will pull the specified voices into the CMI, allocate the Registers automatically, adjust the tuning and spread the sounds across the keyboards. Instrument files are a usefully quick way of bringing the CMI up to a playable state with 'preset' voices and tuning.

Hardware

At the time the Fairlight was designed, the microprocessor was considered to be a medium- to slow-speed device. To increase the power of any computing system, designers have two basic choices.

One of these (the Synclavier approach) is to base the instrument around a discrete logic minicomputer, thus utilising the raw speed of logic chips. This is quite an elegant solution since 'music by numbers' requires lots of number crunching, but the other choice, and one which is becoming increasingly popular, is computing concurrency. In a basic CMI system, there are four microprocessors of the 6800 family. Two of these are in peripherals, ie. one each in the music keyboard and the alphanumeric keyboard, and this means there can be several independent processes being executed concurrently.

The microprocessor in the alphanumeric scans the keys and passes the data to the music keyboard when requested. At the same time, the music keyboards are scanned for pressed notes, key velocities are calculated, and the control sliders and switches read.

At the right-hand end of the Master keyboard is a calculator-style keypad and alphanumeric display used for rapid loading of voices in a live situation. Music keyboard information has the highest priority of all data in the CMI, which responds instantly to the packets of data sent flying down the cables at 9600 Baud.

Well that about finishes off our description of the utility-type display Pages. In case you're wondering what the Mode setting on Page 3 is for, don't worry: all will be explained.

Next month, the controls on Page 7 and sampling on Page 8. ■

Step-time Composition on the Model 64

A short program that enables SCI's MIDI sequencer to be programmed in step-time. *Billy Cowie*

First of all, a couple of amendments to the earlier *Editing on the Model 64* article, published in E&MM June. A few errors crept in to the piece since it left me (*Sorry* – Ed), the most serious of which was the omission of Figures 2 and 3: these are reproduced below for anyone who's interested, though it should still have been possible to make the program work without them. There were also some syntax errors that should perhaps be cleared up to save further embarrassment – these are as follows. 'Refer to the patches' should read 'refer to the pitches'; 'A "D" dynamic' should be 'A "O" dynamic'; 'beginning at "D"' should be 'beginning at "O"'; and lastly 'Input "B"' should in fact read 'Input "3"'.

Now to this month's program.

The normal mode of operation of SCI's Commodore 64 Sequencer is in real-time. This means you play your sequence on a MIDI keyboard instrument (such as the Yamaha DX7) and the sequencer reproduces it exactly as you played it. You can of course speed the sequence up, overlay it with another and also correct it time-wise to a drum machine rhythm. However, other sequencers work in a different way, where the notes and rhythms are entered numerically in what is known as step-time. This technique has certain advantages over real-time composition: the music can be created by someone with no keyboard ability, sequences of great complexity and subtlety – which would be almost impossible to play manually – can be recorded without trouble, certain types of music that require extreme precision (modern dance music is one example) can be easily written, and lastly, the technique is usually faster and easier to correct. Of course, some musical forms, notably classical music, are not suited to step-time composition, depending as they do on nuances of performance. The musician must choose whichever method is suitable for his or her style of composition.

MIDI systems are ideally suited to step-time composition, and because the Model 64 sequencer is based around an accessible microprocessor, programs can be created which are not only user-friendly but also tailor-made to the requirements of the user. Thus, instead of being faced with a series of numbers to remember (as in some systems), the player can design software that is intelligent: one program may be designed for simple monophonic sequences and be extremely simple to use, while another might be more complex, to include polyphonic sequences with pitch bend, voice changes, and so on.

The sample program printed here is complex enough to give the user some idea of the possibilities available, but obviously concise enough to fit into a magazine article. It enables the production of fully polyphonic sequences with a considerable dynamic range, incorporating note durations from semiquaver to semibreve and also rests.

In the Editing article referred to above, we saw how it was possible to retrieve the stored information for an existing sequence, doctor it, and then return it to tape or disk so that it may be used in its new form. This time we must start from scratch and create a completely new data file that matches the normal ones. When it's fed into the sequencer, the machine will be unable to tell the 'counterfeit' file from a real one.

The data in the files is in two parts: a central core of information regarding the pitches, duration and dynamics of the notes (arranged in groups of eight numbers per note) and a surrounding shell of numbers that contains general information on the sequence, its length, name and formats.

Central Core

After the input of a new filename (n$) and the length of the sequence, the program moves to a subroutine to get the hard information regarding the sequences (nos. 1000 to 1300). After a prompt to remind you of the codes, the sequences are fed in very easily. The note is put in first by its letter name (B, F, C etc.) followed by its duration (C for crotchet, S for semiquaver etc.). Notes outside the octave range above middle C are prefixed by either H (for octave higher) or L (for octave lower) or any number of these: LLC is the bottom note of the DX7 while HHC is the top. A prefix of > (louder) or < (softer) or any number of these raises the dynamic level of that note. A prefix of # raises the note by a semitone and the prefix of a D before the duration value adds half again to the duration. An input could be A C (crotchet A, normal dynamic) or >>>H#F DS (a dotted semiquaver F sharp an octave above middle C and three steps louder than normal!). A rest may be fed in by inputting R followed by its duration in the normal way.

The music is fed in in a linear fashion, ie. the top melody line, then perhaps the bass line, then the individual harmony lines. At the end of each complete line, an X input draws a string of **** on the screen and the next line can then be started. In order to make the whole process clearer, as the notes are fed in they are printed with their duration on the screen in letters. After all the notes are fed in, the £ input tells the computer the sequence is complete and it moves on to the next stage in the process.

The program itself uses GET statements to obtain the information and converts the letters into the corresponding numbers. The pitch conversion is straightforward, and the ▷

Software listing for step-time composition.

```
10 INPUT "NAME OF SEQ (7LETTERS) ";N$
15 INPUT"LENGTH OF SEQ IN CROTCHETS";LL
20 GOSUB 1000
30 Q=38+A*8
40 DIM B(Q)
43 L=60
45 B(1)=L:B(2)=16:B(3)=144
67 Z=1
70 FOR E=4 TO (A*8+3) STEP 8
80 B(E)=V(Z,2)
85 B(E+1)=V(Z,3)
87 B(E+2)=V(Z,4)
88 B(E+3)=V(Z,5)
89 B(E+4)=V(Z+1,2)
90 B(E+5)=V(Z+1,3)
92 B(E+6)=V(Z+1,4)
94 B(E+7)=V(Z+1,5)
96 Z=Z+2
100 NEXT
110 B(Q)=23
120 B(Q-1)=LL
130 B(Q-2)=0
140 B(Q-3)=16
150 B(Q-4)=L
160 B(Q-5)=23
170 B(Q-6)=0
173 K= (Q-13)
175 FOR S=7 TO 1 STEP -1
177 D$=MID$(N$,S,1)
179 H=ASC(D$)
200 B(K)=H
202 K=K+1
205 NEXT
210 B(Q-14)=192:B(Q-15)=16:B(Q-16)=L
240 FOR W=(Q-31)TO(Q-17)
250 B(W)=0
260 NEXT
280 B(Q-32)=LL:B(Q-33)=23:B(Q-34)=255
400 FOR S=1 TO Q
410 PRINT B(S);
420 NEXT
430 OPEN 15,8,15
440 OPEN 5,8,5,"0:SEQN."+N$+",P,W"
450 FOR Z=1TO Q
460 PRINT#5,CHR$(B(Z));
470 NEXT
480 CLOSE 15,8,15
490 STOP
1000 DIM A(1000,5)
1003 Z=0
1004 PRINT"#=SHARP,H=OCTAVE UP,L=OCTAVE DOWN,>=LOUDER,<=SOFTER,£=END,X=NEWLINE"
1005 E=23:F=0
1006 PRINT "A/B/C/D/E/F/G/=NOTE ABOVE MID C.,R=REST"
1007 PRINT "W=SEMIBREVE,M=MINIM,C=CROTCHET,Q=QUAVER,S=SEMIQUAVER,D=DOT"
1008 FOR V=1 TO 1000 STEP 2
1009 Y=0:D=75
1050 GET C$: IF C$ ="" THEN 1050
1080 IF C$="£" THEN GOTO 1320
1111 IF C$="A"THEN X=69:GOTO1128
1112 IF C$="B"THEN X=71:GOTO1128
1113 IF C$="C"THEN X=60:GOTO1128
1114 IF C$="D"THEN X=62:GOTO1128
```

dynamics take a neutral 75 and add or subtract ten for every > or < before the note. Timing conversions are slightly more complex, because the computer must convert a duration into a start and stop time, which it does by summing from zero at the beginning of each new line. A fifth placing number (which is actually the first in the array) is used in the sort process. An interesting point is that no key pressed needs to be shifted (eg. the # sign is stood in for by 3, its lower case companion) thus making the input of information much faster.

The computer must now do a few sums, which may take up to 30 seconds (for a complex polyphonic sequence) to complete. What it's doing is sorting out the starts and stops of each note into their logical positions. If, say, a long note is held right through the sequence, its start-up command might be the first information the computer needs, while its stop time might be the last. A simple sort (1320 to 2000) does the trick, and we return to the beginning of the program.

Nos. 30 to 410 create an array (B) and fill it with the correct numbers. Of particular interest are 80 to 94, the numbers which we already input; 175 to 205, the name of the sequence; and 240 to 260, 15 noughts which are actually the spaces where the overdubs would go. Having completed the array, the computer first prints it onto the screen and then inputs it into a storage device (in this case a disk).

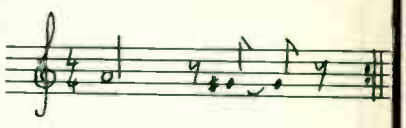
Once the new sequence is safely stored, the Sequential Circuits cartridge can be inserted (once again, switch off first) and the sequence loaded normally. The sequences may be overdubbed as with any normal real-time sequence.

Further refinements precluded by space here are an error command that enables the user to correct any mistakes while inputting the sequence, pitch controls, program changes, and so on. The easiest way to find out how to control these aspects is by running trial sequences on June's Edit program and examining the data. ■

```
1115 IF C$="E"THEN X=64:GOTO1128
1116 IF C$="F"THEN X=65:GOTO1128
1117 IF C$="G"THEN X=67:GOTO1128
1118 IF C$="R" THEN PRINT C$ ,:GOTO1136
1120 IF C$="3" THEN Y=Y+1:PRINT" ";
1121 IF C$="H" THEN Y=Y+12:PRINT C$;
1122 IF C$="L"THEN Y=Y-12:PRINT C$;
1123 IF C$="."THEN D=D+10:PRINT">";
1124 IF C$=","THEN D=D-10:PRINT"<";
1126 IF C$="X"THEN E=23:F=0:PRINT"********************"
1127 GOTO 1050
1128 PRINT C$,
1129 X=X+Y+Z
1130 A(V,1)=F*24-E+24
1131 A(V,2)=E
1132 A(V,3)=F
1133 A(V,4)=X
1135 A(V,5)=D
1136 K=1
1137 GET L$:IF L$="" THEN 1137
1140 IF L$="W" THEN F=F+4*K:PRINT"W":GOTO 1200
1142 IF L$="M" THEN F=F+2*K:PRINT"M":GOTO 1200
1144 IF L$="C" AND  K=3/2 THEN F=F+1:E=E-12 :PRINT"C":GOTO1200
1145 IF L$="C"AND K=1 THEN F=F+1:PRINT"C":GOTO1200
1146 IF L$="Q" THEN E=E-12*K:PRINT"Q":GOTO 1200
1148 IF L$="S" THEN E=E-6*K:PRINT"S":GOTO 1200
1149 IF L$="D" THEN K=3/2:PRINT "D";:GOTO 1137
1160 GOTO 1137
1200 IF E<0 THEN E = E+ 24:F=F+1
1230 IF C$= "R" THEN GOTO 1050
1250 A(V+1,1)=F*24-E+24
1260 A(V+1,2)=E
1270 A(V+1,3)=F
1280 A(V+1,4)=X
1290 A(V+1,5)=D
1310 NEXT V
1320 A=(V-1)/2
1390 W=1:DIM V(2*A,5)
1400 Q=1
1450 FOR Z=1TO 2*A
1500 IF A(Q,1)>A(Z,1) THEN Q=Z
1535 NEXT Z
1540 FOR T =1TO 5
1545 V(W,T)=A(Q,T)
1548 NEXT T
1550 W=W+1
1560 A(Q,1)=900
1570 IF W<2*A+1 THEN GOTO 1400
2000 RETURN

READY.
```

135 17 144 23 0 69 31 23 2 69
0 11 2 68 23 11 3 68 0 255 22
4 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0 0 135 17 192 78 85 82 84
83 69 84 0 23 135 17 0 4 23



Editing on the Model 64 Figures 2 and 3.

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