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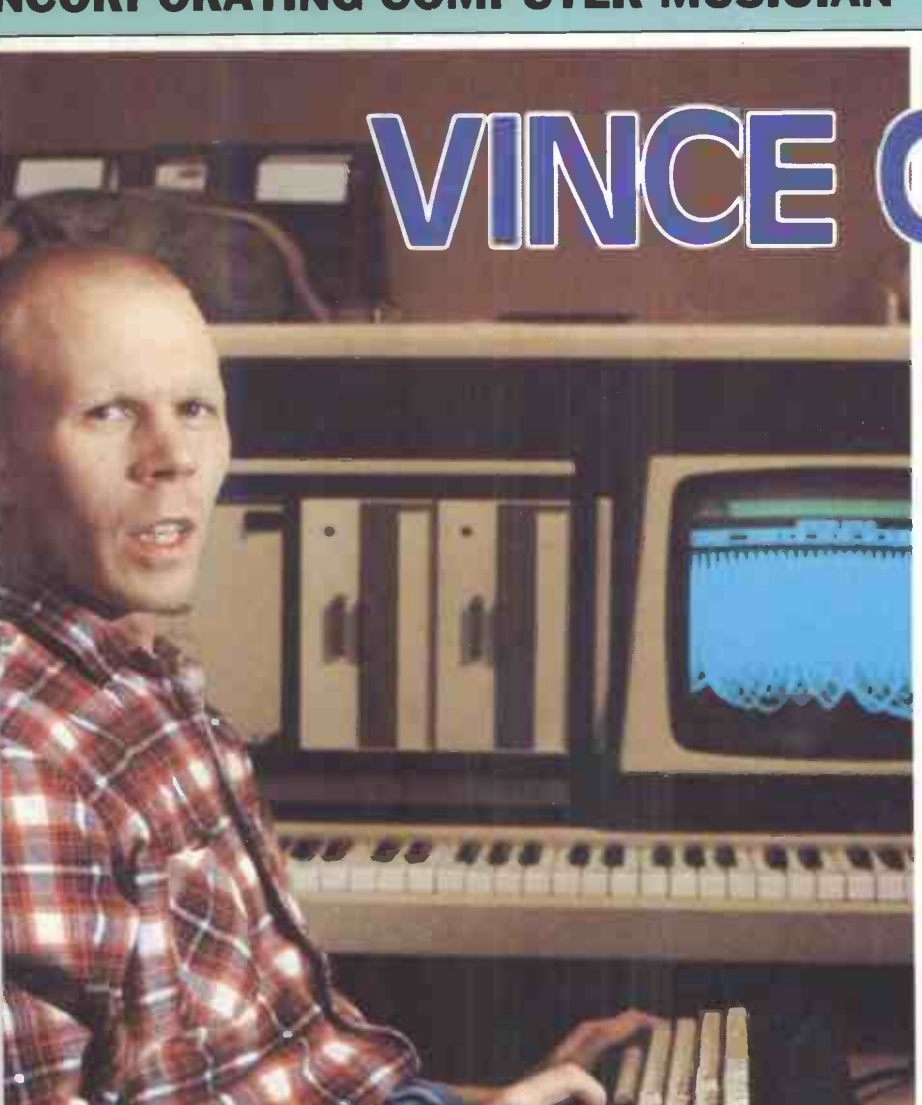
Music Maker
MARCH 1984 95p
INCORPORATING COMPUTER MUSICIAN



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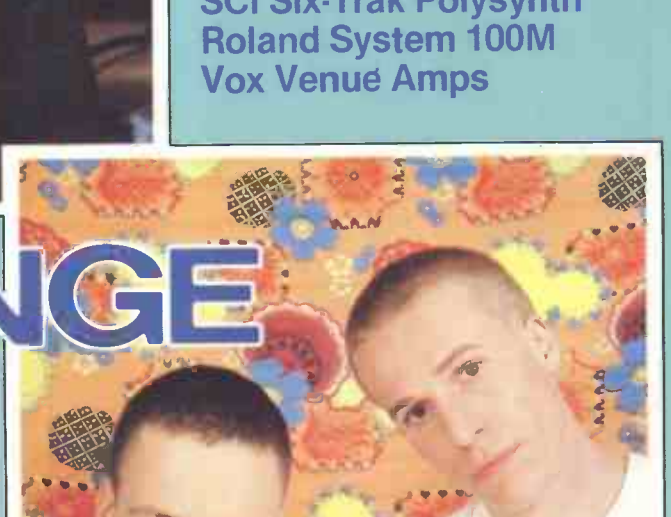

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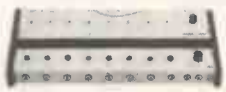

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Electronics & MUSIC Maker

March 1984 Volume 3 Number 13

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Looking Back

Birthdays are traditionally a time for celebration, but rather than start blowing our own trumpet, it seemed more appropriate to us to look at some of the successes that have taken place in the world of electronic music since E&MM first saw the light of day, three years ago this month.

Few people can have failed to notice the success achieved over the last year or two by musicians using electronics as a means to fulfil their artistic goals, whether their musical output has been the understated beauty of Jean Michael-Jarre, the unashamed splendour of Vangelis, or the uptempo pop of Heaven 17 and Depeche Mode.

Hand-in-hand with the success of artists using predominantly electronic musical instruments has come the upturn in fortunes of those companies involved in designing, manufacturing, distributing and marketing those instruments. Few people three years ago could have predicted the degree to which sales of electronic music hardware would rocket as a direct result of the music becoming accepted by the public, yet nowadays we tend to view such a dramatic change as something that was bound to have happened sooner or later.

As technology has leapt ahead, so the design of musical instruments and related equipment has leapt ahead also, with the result that digital and computer-related hardware has become increasingly accessible to the average musician, even if his means are never going to be anything but slender.

However, major manufacturing companies can never be all things to all men, and for those whose needs are not served by ready-built products, the past three years has seen increasing numbers of people taking hold of a soldering iron and getting a glimpse of technology at first-hand, and saving themselves a tidy sum in the process.

Nowhere is this now more true than in the world of personal microcomputers, where both hardware and software makers have been too preoccupied with the mass-market boom to focus on the needs of individual musicians, leaving the way clear for myriad groups of smaller companies and enthusiasts to make the most of the real advances in computer music – on both sides of the Atlantic.

Against this background, the success of E&MM over the past three years almost dwindles into insignificance, yet we still like to feel we've made an important contribution to the world of high-technology music-making, and we feel confident we can continue to do so.

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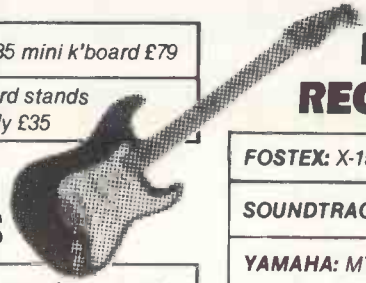

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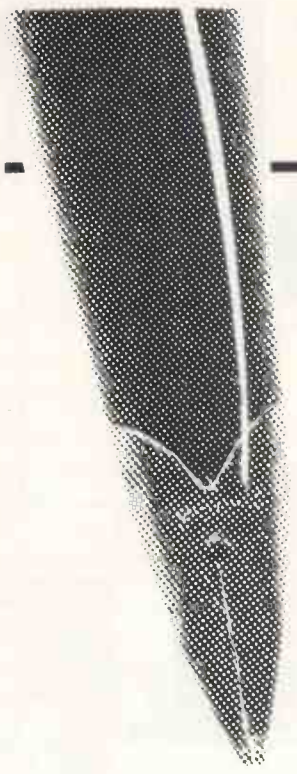

Grecian Greetings

Dear E&MM,

So far as I know, I am one of the two or three keyboard players in Greece interested in computer music and seeking ways of expanding the possibilities of their keyboards and sequencers, computers, etc. Here in Greece, we don't have many opportunities to get informed of the development of technical advances, so the very interested articles about these sorts of things in the November issue of *E&MM* made me decide to write to you for advice.

I own two Roland polysynths, the JX-3P and the Jupiter 6, but the local Roland dealer knows almost nothing about technical equipment. I am mainly interested in doing things live on stage, so I'm a little afraid to get involved with computers. On the other hand, I think what I need is a real-time polyphonic sequencer with a large capacity (such as the Prophet 600 has, or the Oberhelm sequencer). So far as I know, Roland hasn't got such a sequencer for their keyboards, except the Microcomposers which I think will be difficult to handle on live situations. Do you perhaps know whether 'the control of the memory data via an external keyboard', which is described in an MC-4 prospectus, means that it can also function as a real-time sequencer? Can you tell me the price of the MC-4 in the UK?

Further, I read in the *E&MM* article about computers that the Apple IIe, BBC Micro and Commodore 64 have a MIDI connection, so I thought that as both my keyboards have a MIDI interface, connection with the above is possible. Can you please tell me if my conclusions are right and which micro I should perhaps get? Can you please describe to me what a computer such as these is able to do?

Thanking you in advance.

Minas Alexiaolis
Athens,
Greece

It's certainly true that the MC-4 can be programmed in a real-time fashion, but the keyboards you're using would need an additional DCB interface to convert the digital signals to the CVs and gates that the MC-4 recognises. Where the MC-4 really scores (pardon the pun) is in the step-time department, and, as far as we know, most musicians who've parted with the £1,500 or so that it costs in the UK are virtually exclusively using this side of its programming.

I think you'd be better off looking at the new digital sequencers that Roland are just bringing out. First, there's the JSQ-60, a £250 sequencer package that interfaces directly with the DCB input/output of the JX3-P, Jupiter-6, or Juno 60. This gives room for 2,500 notes in either real-time or step-time, with up to three polyphonic overdubs, and these can then be dumped onto cassette along with patch-change info. Alternatively, there's the MSQ-700, priced at £850, that has both MIDI and DCB interfaces. This can store up to 6,500 notes on eight individual tracks, again from either type of programming, but it also stores dynamic changes, pitch-bending, portamento, and patch changes, and has some very comprehensive editing facilities.

So far, there's no micro available in the UK that actually has a MIDI interface already built into it. There is, however, a new Yamaha micro (the CX5), supposedly about to be released over here, that includes both the MSX and MIDI standards. The idea behind this is that the micro will be able to communicate quite happily with both other MSX micros and any MIDI-equipped synth or sound generator add-on (such as Yamaha's FM synthesis hardware). On the other hand, many companies are now producing poly-sequencing packages aimed at linking the micros that you mention with MIDI keyboards, and these will obviously include the necessary interfacing hardware. Sequential Circuits are bringing out a polysequencing package for the Commodore 64 and any MIDI keyboard, and, by all accounts, this'll be extremely competitive with anything else on the market.

The point about using a micro in this way, rather than, say, buying the JSQ-60 (about £50 more than the current UK price of the 64) is that you'll then benefit from all the facilities of the micro, ie. a proper screen display rather than a difficult-to-read LCD, a decent QWERTY keyboard rather than a keypad, the option of disk-drives rather than cassette, and so on.

What you need to think about is where you're likely to go in the future. Even though you may be afraid of computers at the moment, there's no doubt that a polysequencer based around a pre-existing micro should provide much greater flexibility than the hard-wired approach exemplified by the JSQ-60. So, bearing in mind that perseverance may pay dividends in the future, go for what your brain tells you is best! Who knows? You may actually get bitten by the computing bug...

Letter from Logo

Dear E&MM,

I've been meaning to express my appreciation for some time – yours is one of the few magazines I always buy before consulting the index!

Please don't get people too excited about the possibilities of the vanilla micro; they are commonly built for $50 and most will never be great at music without add-ons. Another $50 in parts and they are six times as powerful, so show people who to do that (or what commercial products do it well). The 64 and the Macintosh are exceptions to the above, of course.

You were too harsh on MSX; it beats the Apple which hasn't even a timer, let alone impossible graphics. And some of those (4 MHz) machines, RIP! We used to think LOGO was a slow language...

On the questionnaire, I said I'd let you know what was brewing. For the time being, I've been occupied rebuilding a '59 Gibson fretless bass and adding some electronics to it, including your 'Shaper' and 'Syneld'. That's because computers take so long to get finished! My group, Sonde, will be in Berlin for the 'Inventionen' festival in February; if you are there, please say hello!

LCSI is contributing parts for a board to be built around TI's 320 Digital Signal Processor. Our engineer used to work in Russia's main electronic music studio, and showed Shostakovitch around the place. He wants to duplicate something they had there, the 'ANS' (after Scriabin), which has 300 sinewave voices and graphical input. I think it will take three 320s. I am contributing design time for it because it will be a prototype for my *'Vox Sidera'*, an intelligent, Just-intonation, 2-voice instrument more like a cello than a piano.

The 320 has tremendous potential. In fact, I could no longer bring myself to spend $1,000 on a delay device, because a 320 board will cost around $400, including 16-bit DAC, interfacing, some memory, and a (switching) reconstruction filter. That leaves $500+ for memory, 16 bits wide. When the mass-producers get into using it, things will be very interesting.

I'll let you know how these projects go. LOGO may go into music editors and MIDI software, and you'll hear of that too.

Yours in phase,

Chris Howard
Logo Computer Systems Inc.,
Quebec,
Canada

Thanks for the comments, Chris. I'm very interested to see that you're doing something with the Texas Instruments TMS 320 chip. I'd glanced at the spec sheet, but the £100 one-off price tag rather dampened my initial enthusiasm! Perhaps now's the time to return to it...

For those intrigued by what Chris says about the TMS 320, let's just say that it's the first commercially available VLSI device that's designed for high-speed signal processing. The chip can be made to perform Fast Fourier Transforms, digital filtering, linear predictive coding, and other operations reputed to be applicable to music. It does all this by achieving a speed of 5 million instructions per second, and can do a 16-by-16-bit multiplication in just 200 nsec!

Incidentally, Chris, you might be interested in looking up the TMS 320 software development system that Computalker Associates (1730 21st St., Santa Monica, CA 90404) have brought out for the Apple II running CP/M.

Jumping Jupiter

Dear E&MM,

I have recently bought a secondhand Roland Jupiter 4. The manual is a little vague and leaves me at a loss on certain points. Can you explain what the 'external clock in' socket is for and also is it possible to use my BBC computer as a sequencer to control the JP4?

A. Ashton
Luton

When it comes to synthesiser manuals all manufacturers never quite seem to get it right. Roland are however one of the better ones! The 'external clock in' socket allows you to control the rate of the arpeggiator by an external pulse. This allows you to sync the arpeggiator to other instruments like sequencers and drum machines. Interfacing the BBC computer to play sequences is unfortunately not possible. Although the computer is capable of being used as a sequencer the JP4 has no control and gate voltage inputs; this means it's impossible to control pitches. The BBC can however be used to generate pulses to drive the external clock input and therefore the arpeggiator rate.

Percussion Pickup

Dear E&MM,

I am thinking of building a modular electronic percussion system using your Synbal and Syntom modules. Do you supply the front panels and can you recommend a rack system for this project? Can you also advise a suitable pick-up for mounting onto a drum?

Neil Russell
Birkenhead

Unfortunately E&MM are not producing front panels for the projects you mentioned. You can however cut out your own panels as illustrated in E&MM February 1983 and mount these in a 3U high 19" rack case, available from many electronic component companies. The best pick-ups to use for drums are the C-ducer range of contact mics. A feature on these mics appeared in Home Studio Recording; see the September, November and December issues. If you are unable to obtain these, consult the Back Issues Department at our Cambridge address.

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NEW YAMAHA PRODUCTS

Yamaha CX5 Music Computer.

During 1984 **Yamaha** will release a number of computer controlled synthesis and signal processing units. At the centre of this new MSX system is the *CX5 Music Computer.* This is the first computer produced by Yamaha and incorporates Microsoft BASIC. The MSX system is not purely a Yamaha standard, it has been adopted by over 20 manufacturers and has been developed jointly by 'Microsoft' of the USA and 'ASKY' of Japan.

The main advantage of the MSX system is that it uses plug-in ROM modules that allow you to change software programmes quite simply. This enables the system to develop and expand rather than becoming outdated.

Yamaha have produced several specialised music-orientated software packages for the CX5. One program will, for example, simplify the creation of sounds on their DX-7 and DX-9 synthesisers. Further add-on units such as a MIDI interface, FM sound module and 3½ octave Keyboard will also be available. *Released around October.*

The *QX1 8-Channel Digital Sequencer* allows you to record up to 8 different polyphonic melody lines via an external keyboard or computer in real-time or step time. All 8 tracks can be edited note by note and a MIDI interface will allow you to link the QX1 to drum machines or other MIDI instruments. Memory contents can be stored on diskette with a capacity of one megabyte, approximately 80,000 sound events. The QX1 can also be used to control the new *T-8PR Modular FM Sound Generator.* Yamaha have developed this as a reasonably priced modular system which accommodates up to 8 FM modules in a 19" rack housing. This gives you the creative potential of 8 DX-7 type sound generators without the prohibitive cost. *Available August.*

A new remote keyboard controller, the *KX5* features a 37 note touch-sensitive keyboard. You can access up to 32 sounds at any one time and control one of the two other keyboards linked through the MIDI bus. Other controls include an octave changer, pitch ribbon strip (as on the CS80) and a modulation wheel. This instrument will undoubtedly appeal to all stage-active keyboard players looking for a replacement for their Moog Liberation. *Available July.*

The success of Yamaha's CS-01 mini synthesiser has led them to develop and restyle the instrument into the *CS-01 Mk II* which now has an improved filter section. *Available March/April.*

With the introduction of several new professional signal processing devices, Yamaha have started to broaden their market. The *REV-1 Digital Reverb* is designed to simulate all known reverberation characteristics and spatial acoustic factors. An extensive range of variable parameters allows the realisation of up to 40 early reflection with a pre-delay of up to 255ms and a maximum reverb decay time of 99 seconds. The unit is 19" rack-mounted with a separate remote control. Judging from the unofficial £5000 price the REV-1 is definitely orientated towards large recording studios and film/video soundtrack production. *Available July.*

To complement the REV-1, a state-of-the-art digital delay unit, the *YDD 2600,* will provide 4 channels of delay at 655ms per channel. Each channel has a stereo output and may be linked in series with other channels to provide longer delay times. Features include 12

NEW YAMAHA PRODUCTS

Yamaha QX1 Music Performance Programmer.

Yamaha KX5 Remote Keyboard.

Yamaha CS01 II mini-synth.

memories and a facility to load preset programmes. For the working musician the well-priced *£D1500 Digital Delay* offers 16 memories, a maximum delay time of 1023ms and external selection of memories from a DX-7 via the MIDI. *Both available around July/August.*

Finally the RX11 and RX15 Digital Rhythm Machines represent Yamaha's first venture into this area. The extensive pattern memory and PCM encoded natural percussion sounds make both these machines very appealing. Features include MIDI for synchronising to sequencers etc, RAM cassette storage of rhythms, 16 instrument sounds (12 on the RX15) and 50 memories. For a more in-depth preview see this month's Electronic Drum Supplement. *RX15 available June, RX11 around August.* **E&MM**

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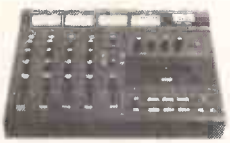

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SCI Six-Trak Polysynth

With competition at the lower end of the polyphonic synthesiser market hotting-up, Sequential Circuits have entered the fray with the Six-Trak , a fully-programmable six-voice polysynth with a built-in multitrack sequencer. Dan Goldstein **puts it through its paces and examines it in the context of SCI's** *Traks Music System.*

It would seem that most keyboard manufacturers have now all but given up on the monophonic synth and are devoting their efforts instead to developing more versatile and more cost-effective polyphonic devices. Sequential Cirtcuits' new Six-Trak polysynth is further evidence of this trend, and in fact goes one better than many of its competitors in that it also forms the basis of a complete performing, sequencing, and rhythm programming system, the like of which has only previously been seen among products of considerably greater expense.

Background

The Six-Traks is a six-voice polyphonic synthesiser with one oscillator-per-voice, and, unlike the Korg Poly 800 reviewed in last month's *E&MM*, the specification also includes one 4-pole filter for each voice, so that multiple triggering is possible.

In what amounts to something of a break with tradition, the Six-Trak utilises the parameter/value method of programming popularised by Korg with the 61 and coninued by the 800. For the uninitiated, this means that in place of long rows of rotary pots with one function each, the control panel is occupied instead by a control section consisting of three selector switches and a numeric keypad for selecting which parameter is to be altered.

On the Six-Trak, parameter values are selected not by a pair of increment/decrement pushbuttons, as is commonly found on synths of this type, but by a single rotary pot in the middle of the control section. This pot has no detents because some parameters are variable over a much wider range than others (the attack time has a value range of 00-15 – maximum time 11 seconds – whereas the pulse wave duty cycle has a value range of 00-63 – maximum 99%) with the result that, with the more precisely variable parameters, the merest turn of the pot sends the values shooting up or down ten units or more. Annoying.

Unlike the Korg instruments, the Six-Trak does not contain a schematic display of all the various parameters and the degrees by which they may be varied, making either a thorough knowledge of the instrument and/or the encyclopedia user's manual a prerequisite for rapid sound alteration, particularly live.

In toto, 35 different parameters make up a sound on the Six-Trak, and even if selecting their respective values isn't quite as troublefree as one would like, what matters is that put together they offer a sound-generation and modulation store of considerable versatility. Parameter 35 is 'Unison'. Value 01 selects this mode, in which the keyboard becomes monophonic, all six voices being assigned to the lowest note played.

Multitrack Sequencing

This really is the Six-Trak's nerve centre, the built-in six-channel sequencer. This has an 800-note capacity (in two memory banks, A and B) and is perhaps most remarkable for the manner in which it allows any of its channels to be recorded individually or together in groups. The closest analogy I could think of was a multi-track tape-recorder, and this is indeed exactly what SCI's designers have aimed for: a sequencer that behaves as if it were a dedicated digital multi-track recorder. To record your initial sequence (backing-track?) all you do is check that the pitch wheel (see later) and Speed knob are centred, select you program (factory preset or user-edited), select Track Record and either Bank A or B, and the sequencer will begin recording the moment your fingers touch the keys for the first time. Stopping the recording is accomplished either by switching Record off (in which case the sequence you just played is played back and looped) or by switching Seq off (in which case your sequence will not be repeated). It's possible to synchronise the first note of your sequence with the start of the sequencer's recording by using the supplied footswitch, while any track can be erased simply by holding down the Track Record button while the desired track switch is selected.

The best is yet to come, however, because on the Six-Trak, any one, two, three, as so on up to six voices can be recorded individually, so that you can build up a polyphonic sequence layer-by-layer. Once you record one voice

singly, you're not confined to recording all the others the same way, since it's perfectly possible to record, say, a unison bass-line (track one), followed by a triad backing (tracks two, three, and four) and two lead synth lines (tracks five and six), so long as the overall number of tracks you're using does not exceed six, of course.

Overdubbing In this way is accomplished as follows: existing backing tracks are played back by pressing Seq, while selecting Track Record puts the sequencer into record mode for whichever track(s) you then select. While both Record and Track(s) LEDs are flashing, no notes are recorded, but as soon as this initial loop is over, the first note you play on the keyboard sends the sequencer into record mode on the track(s) selected.

Stack And Arpeggiator

The sequencer section also houses the controls for the Six-Trak's arpeggiator and Stack function. The former has two modes: Up/Down and Assign. In Up/Down the arpeggiator will play up and down all the notes being held down on the keyboard at the time, using only voice six from the oscillator bank. Assign, on the other hand, sequences keys in the order they're played, so that you can play a lead-line slowly and then replay it at a faster tempo using the sequencer section's Speed control.

It is in Stack mode however that some of the Six-Trak's brightest colours are shown to the full. A stack consistes of up to six different timbres (programs) assigned to one note on the keyboard. There are two stacks (A and B) on the sequencer control section, so that two separate stacks of sounds can be stored onboard at any time. Each sound in the stack is stored by selecting the desired program on the keypad, switching Track Record on, and pressing the appropriate Track switch. Adjusting the Track Volume control up or down while holding down the relevant Track selector enables certain sounds in the stack to be brought up (or down) in level from the remainder (the same can be done with individual tracks on the sequencer itself), while setting this level to 0 for a particular voice/track deletes that sound from the stack altogether.

With the Legato switch off, the keyboard operates in unison (ie. monophonic) mode as per usual, with multiple triggering and low-note priority, but when Legato is on, single-triggering comes into operation.

Sequencer To Drumtraks

Since the Six-Trak and SCI's new digital drum-machine (see review elsewhere this issue) are intended to work together as part of a purpose-designed system, it's perhaps not surprising that the two sync together remarkably quickly and easily. A simple DIN-to-DIN cable (any old one will do) is connected so that it runs from the Drumtraks' MIDI OUT to the Six-Trak's MIDI IN. Once you've a basic track in time with the Drumtrak's rhythm pattern, turning the Six-trak's Speed control to zero automatically syncs the two devices together, so that all further overdubbing is done in sync with the drum-machine.

It is in fact possible, should you have both the inclination and sufficient capital, to connect two Six-Traks in series with one Drumtraks, while even more bizarrely, connecting Six-Trak MIDI OUT to Drumtraks MIDI IN enables the lowest Six-Trak keys to play on the Drumtraks voices.

Sound Quality

Flying in the face of Far Eastern fashion, Sequential's desingers have equipped the Six-Trak with good old-fashioned VCOs as opposed to the digital sound generators now so much in favour in the Land of the Rising Sun. Each oscillator has sawtooth, triangle and pulse waveforms available, so the variety of available sounds is quite a rich one. However, there's no doubting that the Six-Trak's output – and particularly the 100 factory presets – carries a heavy bias towards big, fat analogue lead sounds of which the Americans are still so fond. There's definitely more than a hint of Prophet 5 to the sound of the Six-Trak, more so than the Pro One, I would have said. While the Six-Trak isn't really capable of producing sounds of such 'acoustic' clarity as the best digitals, the other side to the coin is that the output is blisfully free of digital noise, while tuning stability is highly commendable for an analogue design.

Conclusions

Due to the fact that the two machines have been released in the UK almost within days of each other, I suppose it's inevitable that comparisons will be made between Sequential's new baby and the Korg Poly 800, but in reality each has something different to offer. There are several small problem areas with the Six-Trak: the awkward positioning of its mod wheels; its dearth of interfacing sockets (only MIDI in and out provided); the limitations imposed by its four-octave keyboard (a failing it shares with the Korg); and the sponginess of some of its controls, but there are a number of other areas where it scores highly. The sequencer is supremely versatile as well as being unbelievably straightforward to use, its full complement of filters facilities multiple triggering (once you've got it you never want to be without it), and it syncs up to what is undeniably a superb digital drum-machine in just about the easiest way possible.

If your taste in keyboard sounds leans more towards the old wave than the new – and you like the idea of buying a synth that's part of a convenient and expanding system – you shouldn't have to look much further than the SCI Six-Trak.

Dan Goldstein **E&MM**

The Six-Trak has an RRP of £795, and further information can be had from Sequential Circuits, Postbus 16, 3640 AA Mijdrecht, The Netherlands.

The Microlink ML-1 Interface

For Casio CT-1000P

One major problem besetting owners of the Casiotone CT-1000P is that although it contains a comprehensive programmable arpeggio section, synchronisation between the arpeggio pattern and a drum-machine is extremely difficult, if not impossible. Now Micro Musical, who have been distributing the Casio range of keyboards since 1979, have come up with a solution to the problem in the form of the Microlink ML-1 Interface. It took a determined effort on the part of MM's engineers to produce the interface, because the Casio uses a customised 40-pin IC to provide the majority of the instrument's functions. Add to this the fact that the signals from the IC are multiplexed, and you can perhaps begin to appreciate the scale of the task.

The problem has been overcome however by the use of a microprocessor-based interface with a 2K Erasable Programmable Read Only Memory (EPROM). The ML-1 comes on a purpose-designed PCB which is installed inside the keyboard. There are various ways of doing this. You can either install it yourself; get Micro Musical to do it for you; or purchase an already-modified Casio, designated CT1000P PML. The system we had for test came with Microlink already fitted, making installation unnecessary. All the relevant plugs and cables were supplied, and all that was left for us to do was plug them in.

Documentation

The documentation we received with the 1000P consisted of three A4-size instruction manuals. The shortest of the three deals with the modifications that have to be made to the Boss DR-55 drum-machine, while the other two contain details of the interface itself and its use. I must say that I was impressed with the manuals' presentation, and they were clearly and concisely written. Fitting instructions are listed step-by-step, and a list of all necessary tools is also provided. Should any problems occur even after the instructions have been consulted, you can always give Micro Musical a ring, as they are both friendly and helpful.

The ML-1 allows you to use a drum-machine (at the moment only Boss' DR-55 and the Clef Master Rhythm are compatible, but future developments should see other machines incorporated into the scheme) in six different modes of operation in conjunction with the 1000P's arpeggiator. If you don't have access to an external amplifier, this is not a problem since the output of the rhythm-machine can be fed into the Casio's internal amp and speaker. Doing this is simply a matter of plugging a single (supplied) lead into the foot volume jack socket located at the rear of the 1000P.

Mode One is the simplest mode available. It allows for the drum-machine to be operated normally through the 1000P amp and speaker but with no synchronisation between the two.

In *Mode Two*, the drums and arpeggio accompaniment start simultaneously, while in *Mode Three*, the drum-machine pattern begins in advance of the Casio's accompaniment. *Mode Four* is the direct opposite of this, so that the accompaniment begins first, leaving the percussion to be brought in at any time.

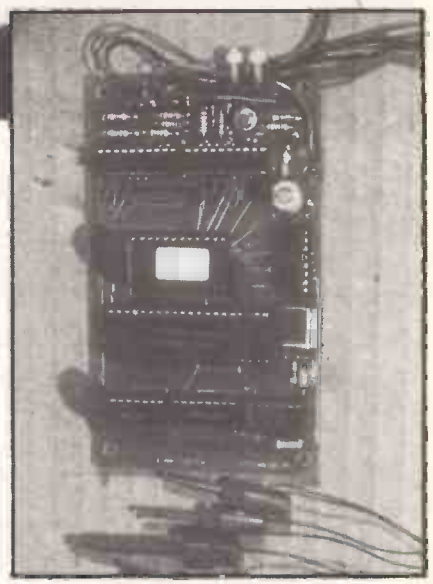
Mode Five is particularly useful for continuously synchronised accompaniment. For instance, if you play an arpeggiated chord on the off-beat, the drum-machine will also play on the off-beat, which certainly gives your music a more human feel, as well as supplying some additional variety to your playing.

The final option – *Mode Six* – allows the previously one-to-one relationship between drum-machine and keyboard to be altered. In this mode, the user has a choice of eight different rhythm variations, each of which allows the accompaniment to be played at a different rate to the percussion, though the two remain synchronised, of course. This mode is probably capable of producing the most interesting effects available from the ML-1 system.

In Use

Connecting the system together proved quite straightforward, and *Mode One* was entered simply by pressing the Start button on the DR-55. To use *Mode Two*, a 16-step pattern has to be programmed into the DR-55, and once this has been done, the 'up-down' and 'memory' buttons on the 1000P arpeggiator are selected in turn. As soon as any note on the lower two octaves of the Casio's keyboard is activated, the rhythm-machine begins playback in synchronisation. Exit from this mode is accomplished simply by re-selecting the 'memory' button. During performance, the tempo of the rhythm can be altered via the tempo control on the Casio's control panel. A nice touch.

All the remaining modes were tried in turn, and again, using them was a simple and trouble-free exercise; I soon got the hang of changing from one mode to another. *Mode Six*, which I found the most fascinating and rewarding system of operation, is accessed by holding down the DR-55's Start button and momentarily pressing the 1000P 'memory' button. The Start button is then released, upon which the Dr Rhythm's LED indicator begins flashing in accordance



with the programmed setting, ie. if Setting Eight has been selected, the LED will flash eight times.

It goes without saying that to get the best out of the Microlink, a thorough knowledge of both the Casio keyboard (see review *E&MM* September '82) and whichever percussion machine you intend to use is not only desirable but essential. Apparently, an appropriately modified ML-1 can be used not only as an interface to electronic drum-machines but also to bass-line machines or even micro-computers. Seeing that Micro Musical are continually developing new applications for their interfacing equipment, it might be a good idea to contact them if you feel your particular device might sync to the 1000P using a variation on the ML-1 theme. I've yet to try any of these variants (limitations of time, etc...) but hope to bring you news of them in a future issue.

Conclusions

To my mind, Micro Musical have come up with something of a winner in the form of the ML-1 Interface. It offers a comprehensive variety of playing and programming options and is extremely easy to use, the only limitations being those inherent in the design and construction of the keyboard and drum-machine used. Similarly, the documentation supplied cannot be faulted, with the possible exception of the main operation diagram which could perhaps have been a little clearer. I can wholeheartedly recommend the ML-1 system, so if you've got a 1000P and a suitable rhythm-machine, what are you waiting for?

Trevor Jones **E&MM**

The Microlink ML-1 interface has an RRP of £75, VAT inclusive, and can be obtained from Micro Musical Ltd., 37 Wood Lane, Shilton, Coventry CV7 9LA. Tel: 0203 616760.

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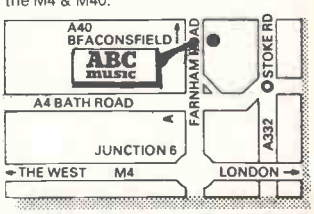

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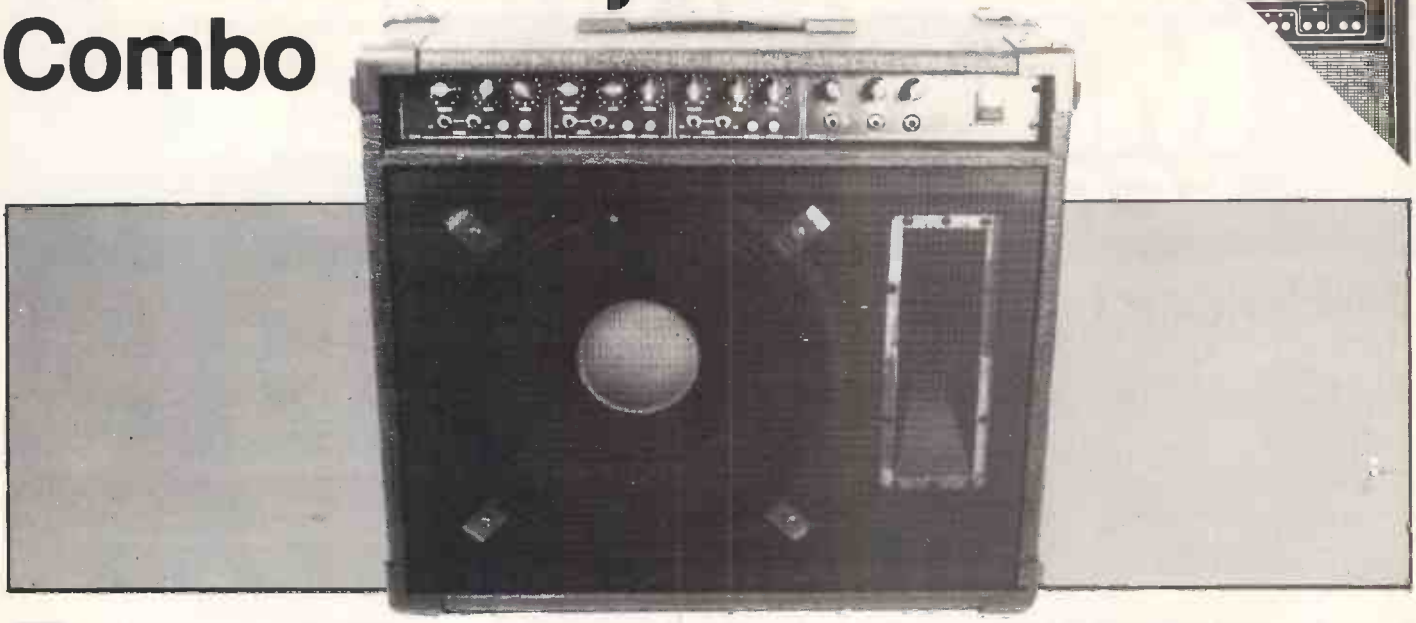
Vox Venue Keyboard Combo



This is one of the new Vox range of solid-state amps, which includes a guitar combo, a bass combo and a PA mixer/amp with speakers. It is obviously intended to compete with the Carlsbro Cobra 90, which it resembles in nearly every respect, right down to the knobs on the front-panel!

Facilities

The Vox Venue is a three input mixer amp. Though primarily intended for keyboards, you could also use it for electronic drums, occasional microphone, bass or guitar use, or even for group practice. Each channel has two input sockets with high and low sensitivities and a reasonably high input impedance (the same on both sockets) of 47K. The knobs are volume, treble and bass tone controls, with two push switches for reverb and an effects loop. The inputs are sensitive enough for most stage microphones, but overload fairly readily: care should be taken with very high output synthesisers and guitars to avoid distortion.

All three channels are identical. On the right of the panel are controls for master volume, overall reverb level, and presence boost at about 8kHz, which is useful for adding a bit of extra brilliance when the hall starts filling up and all those bodies soak up your treble. The reverb is switchable via an optional footswitch should you so require.

The effects loop is designed with levels suitable for floor type pedals, and worked well with my Carlsbro (oops!) echo and graphic equaliser, and also with the Amdek delay machine (see elsewhere this issue). Noise and distortion from the echo units were much improved by this connection, and they can of course be applied to all the inputs simultaneously without having to buy three of the same pedal! Some higher quality units can also be linked up, and the *E&MM* Digital Delay was used very successfully.

One design feature of the effects loop is that the direct path through the amplifier is not interrupted by plugging in the effects as it is on some other makes. This means the loop works best with effects like echo, phasing or chorus which mix with the direct sound. Units such as equalisers and fuzz will have their effectiveness diluted by the direct signal, and you can't use a volume pedal to control the whole amp, which is a pity.

The amplifier is rated at 100W into its internal 15" speaker and treble horn, more with an extension speaker fitted (8ohms minimum). There are two speaker sockets provided, but if you use two extension cabinets they must be 16ohms minimum to avoid overloading the amp. Also provided are sockets for a slave amp, DI (that's direct injection, not detective inspector; you can come out of the cupboard), and a headphone socket which cuts off all the speakers.

Construction

The Vox is solidly built from ⅝" board covered with the ubiquitous black vinyl, and protected with moulded corners which allow several amplifiers to be installed when stacked on top of one another. The speaker chamber is completely sealed, and the speakers are front-mounted and accessed via a removable front grille; whatever did we do before Velcro? One person can carry the combo for short distances with the top handle, and there are side handles for a two-man lift if required. There are supposed to be castor fittings too, but these were mysteriously absent on the review sample.

The four PCBs are mounted on a plated steel chassis, which also carries the reverb springs; these are spring mounted without any damping and clang somewhat alarmingly when you pick up the amp. Internal construction is good and neat, and the power-amplifier board plugs in for easy replacement. The output transistors are mounted on the back under a simple cover; they are accessible to sweaty fingers and dangling beads which could either give you a belt or vapourise the output stage respectively.

On a happier note, the mains lead is detachable via an IEC connector, with a built-in fuse holder containing a handy spare fuse. There's also a fuse to protect the speaker in the event of the amplifier going to The Great Transistor Factory In The Sky.

Performance

The combo was used with two Casio keyboards, a Logan string synthesiser and a Roland guitar synthesiser. If you can afford only one amplifier, a keyboard amp is in many ways a better compromise than a guitar amp for the wide frequency range of the Roland. There is a permanent midrange boost at 3kHz, and in fact it's impossible to get a completely flat response from the Vox; this may have been done to equalise the speaker, but remember the DI and slave outputs will be affected also. Because of this boost, the lack of a midrange tone control isn't so serious; electric piano and brass-type sounds were belted out with a great deal of punch, as was the guitar synth, but strings and those delicate tinkly Casio sounds were somewhat lacking in warmth. The cabinet isn't much bigger than the speaker, and the resulting colouration doesn't help either.

Conclusions

This Vox Venue combo will come across loud and clear in most situations, even if it lacks a little finesse. It's sturdily built in Britain, and quite reasonably priced to boot. Take the preceding comments in the light of this, try to ignore Vox's lack of originality and hear it for yourself – as always, let your ears decide!

Peter Maydew **E&MM**

The Vox Venue Keyboard Combo has an RRP of £299, and further information can be had from Vox at 32, Gordon House Road, London NW5 1NE. Telephone 01-267 5151.

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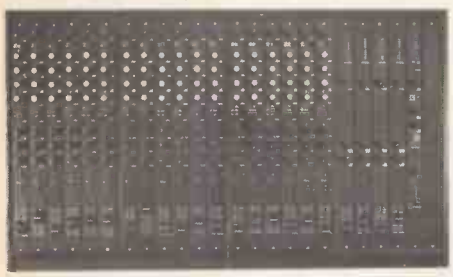

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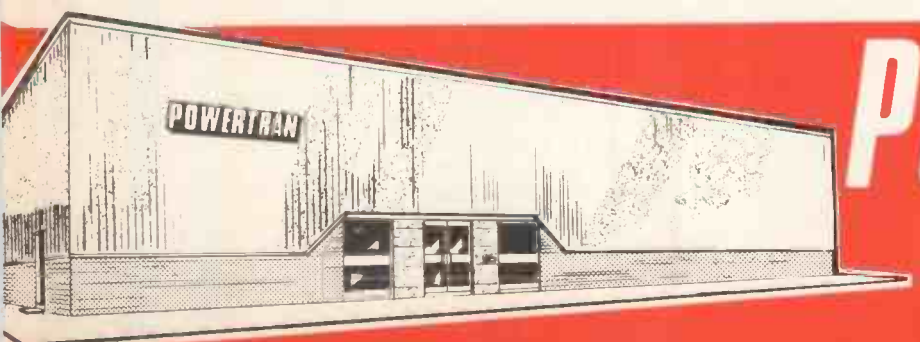

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Frankfurt Musik Messe 1984

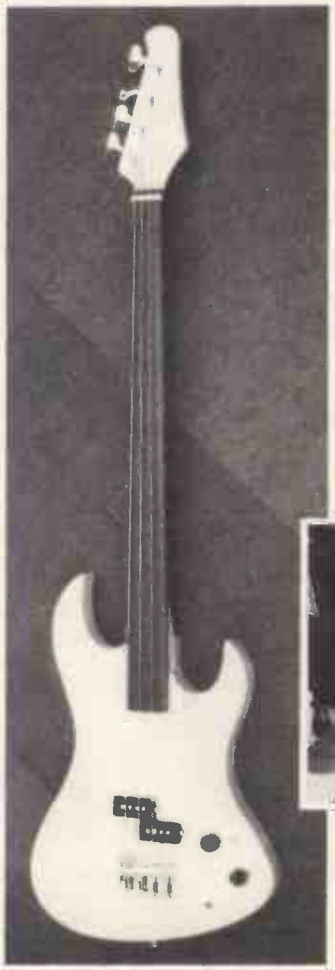
Frankfurt Musik Messe has had a difficult run in the late 70s and early 80s, with the 'dramatic new advances' that are touted every year, turning out, in most cases, to be mere mares' nests. This year, however, the equipment displayed showed some real innovation, and the new models and advances proved to be the most exciting for some time.

Staged around three of the massive Frankfurt Showground halls, the centre of attraction was mainly focussed on Halle 8 (guitars, electric and acoustic instruments and drums), and Hall 9.1, the 'upstairs hall' which contained the sound equipment, speakers, recording equipment and some of the most impressive new hardware ever assembled at a trade fair.

Over the next few pages are a visual guide to a selection of the brand new advances that were displayed at what is sure to be regarded as one of the most exciting trade fairs ever.

The revolutionary **Bond Guitar** features a neck devoid of frets! Instead, the strings are held against a carbon fibre neck, onto which are impregnated 'steps' in a sawtooth configuration. Much attention was fostered on the new guitars, soon to be put into full production in the UK at a new factory in Inverness.

Rose Morris unveiled the new range of *Vox* guitars at the show. Pictured is the *Vox White Shadow Fretless*, a maple-bodied fretless bass guitar, which will sell for well under £200 in the UK. Their new range of Venre amplifiers (reviewed on page 16) also attracted a great deal of attention, as did the 'traditional' Vox amps.



Hard to photograph due to the crowds around them were the new **Dynacord** *Digital Drums*. There are two types of controllers available for them, the *Percuter*, an eight-track digital drum computer which contains the natural sounds in chips that can be changed as required – a range is available. The others are 'ready to play' *Digital Hit*

incorporated sound module, for which one will be required for each drum. there is also a *Boomer Programmer*, which can be used to sound sample. RRPs are not yet available, but the drums are to be distributed in the UK in Spring.

The **Maxim** *Synth Drums* come with a special controller with five-drum capacity, and the capability to produce a stereo signal from the kit. There are also four preset sounds on each drum. While there is no distributor yet making the Maxim kits available, the manufacturers expect to announce an appointment soon. **UK** have started the manufacture of power amplifiers, mixer/amps, guitar and bass combos, mixers, and this low-priced 100W monitor, with internal amp and tweeter, and high-power driver. The RRP of this is to be well under £100.

Pictured here are just two of the myriad of products that were shown in the **MTR** stand. The *Vesta Fire AL 10*, ten-band spectrum analyser and graphic EQ will retail for just £324, while the *RV2* stereo spring reverb (with 8 springs, low-cut, and limiter) will cost £276.29. Other goodies that attracted attention on the MTR stand included the *ACES* range of pro sound equipment and multi-track, and the budget *McGregor* equipment range including the 200W Keyboard Amp, with 3 channels, costing £248.

Siel were showing – and demonstrating – their new *MIDI Computer Interface*, pictured here with Commodore 64 and 1541 disc drive. It's compatible with computers based on CPU Z80, 6502, and 6510 (Sinclair ZX Spectrum, ZX81, Vic 20, CBM 64 and Apple II etc . . .) There are 3 MIDI outs, a MIDI in, and 44-way connector for the Sinclair and Commodore models. Prices have yet to be fixed.

Siel *MIDI Expander*. This is a modular unit of a six voice polyphonic programmable MIDI expander, equipped with the

capacity to split the keyboard into 2 sections at any point, playing 2 different timbres simultaneously. MIDI cassette interface, and 'Polymode' position capability enable codified data from two or more Expanders to be identified from the master keyboard on the Siel Opera 6 polysynth.

The **Korg** stand contained a large number of new products, amongst them the new *Super Section PSS-50*. This allows are programming of backing patterns, including drums, bass, etc. and the chord progressions through which they are to run. Forty-eight built-in patterns are programmable as song patteras, written in one bar at a time (or half for chords). Up to eight songs can be stored, the drum sounds are digital, and the whole output has stereo capability. Korg also showed a new tuner, the *AT 12*, with calibration capacity, the new *PME 40X* effects system, plus huge quantities of *Poly 850* keyboards.

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Pic 18
The **ddrums** electronic *Digital Drum Pads* were being shown by E-mu Systems. Two user sounds can be programmed into each of the drums, which feature sound-sampling. They are expected to retail for around the £200 mark in the UK.

The **McLeyvier** digital computer system, based on FM synthesis techniques, attracted a lot of attention at the show. Designed by Laurie Spiegel, the company are currently negotiating for a UK distributor.

Pic 13
The new **Solton** *Project 100* programmable keyboard appeared on the Craft Stand at the fair. The unit offers 6-voice poly operation, a polyphonic sequencer (and mono sequencer), chorus, a tape interface, transposition, plus joystick operation for pitch bend. Stereo outputs and MIDI input complete the picture on this new item. Again, a UK agent is being investigated.

Akai unveiled their new *Micro Studio System* at the fair.

The centre of the system is the MG1212 12 channel multitrack mixer/recorder, based on the world's first ½" cassette tape.

Pic 15
The *Music Processor MS16* converts notes and other musical information on music scores into standard keyboard or key input data. It can use MIDI to control multiples of synths simultaneously. Fine nuances and dynamics can easily be accommodated, and the program up to 10,000 notes can be memorised.

The *8-voice polyphonic AX80* synth is used as the sound source for the system. It features 32 preset tones, a 64-tone memory bank, a fluorescent display that shows every sound parameter, and a pre program facility, allowing the 'Next Key' system to be changed through one single switch. The keyboard is touch-sensitive. In addition to the above three items, there is also a *Rhythm Oscillator Bank MR10* which has 16 percussion sounds (operated through the MS16), and a MIDI/Analog coverter *MS404* which takes the signals from the MS16 and converts them into CV and Gate signals, enabling it to be used with analogue synths. MR10 and MS404 are rack-mounted.

Pic 17
Not only instruments were shown at the fair, accessories were also very well represented. **General Music Strings** displayed some products from P+N Stands, including the *377 Double Keyboard Stand,* which will retail for £29.95.

FRANKFURT STOP PRESS

Space dictates that we can't print pictures of all the relevant new equipment presented at the Fair (at a quick estimate, it would fill about 304 pages of *E&MM*), but below are a few things that caught our eyes (and ears...).

PPG Wave 2.3
The natural successor to and development of the 2.2. Either as a unit alone or as part of the PPG music system, 2.3 is a 'sound polyphonic' instrument which means that its 8 different voices can each have a completely different sound (up to 8 different wavetables). These can be played either with the keyboard itself or via the sequencer.
With a basic program of 30 wavetables, each of them a combination of 64 waveforms, all the waveforms can be partly or completely controlled by the envelopes. PPG have also added two natural sounds, piano and saxophone, which are called up in the same way as the other custom patches. Unlike the 2.2, the 2.3 is entirely compatible with the Waveterm Computer.
We hope to run a complete test on the Wave 2.3 in the near future, as they are to be introduced into the UK this month. Watch this space...

E-mu Systems Emulator II
Not just an update on the old Emulator I, the new model has up to 17 seconds of sampling time and a full magabyte of disk storage. Independent, delayed LFOs are available on each channel (eight in all), and these can be coupled to VCAs and envelopes to give extensive program modifications. There is also direct MIDI interfacing available for multi-purpose trigger/control/sampling and pass-on data interfacing.

Roland JSQ-60 Digital Keyboard Recorder.
Following on from the Digital Piano Recorder, the JSQ-60 has the capacity to real-time load or step load from the Juno 60 and the Jupiter 8 (with DCB capability). The JSQ-60 has a 2000-note capacity.

Audio Control Pro Power Amp
A new rack mounting PA amplifier or monitor amp, there are two models available, the 500, giving 200W per channel at 8 ohms (270W per channel at 4 ohms and 540W mono bridge mode) has a frequency response of ± 0.5dB 20Hz – 20Hz and a S/N ratio of better than 100dB. The 260 model gives 100W per channel at 8 ohms, 150W at 4 ohms and 300W in mono. They are being distributed in the UK by Executive Audio, but no prices were available at press time. (They were all still in Frankfurt...)

3rd Generation.
A new UK company displayed a new range of sound equipment at Frankfurt. Hailing from Southen, 3rd Generation displayed mixers in a myriad of configulartions, both for recording and for live work, high powered amplifiers up to 1kW, crossovers, equalisers, and a range of mini mixers for keyboards, featureing 6/2 capability, it is also available with an internal 100W per channel amplifier.

The Oberheim Xpander... was attracting vast crowds in their booth in Halle 9.0. The spec-sheet for the new keyboard was enough to make many music dealers froth at the mouth: 90 VCAs, 30 LFOs, 30 Envelope Generators, 6 FM Processors, MIDI in and out... the list is as long as it is impressive. Price for the Xpander is expected to be around £2500, and UK deliveries should begin around May.

Roland Juno 106
This is essentially an update of the Juno 60 programmable polysynth, which it replaces. Its 128 memories (in two banks of 64) and polyphonic portamento are just two of the reasons why the 106 represents an advance over its predecessor, and the appearance of the synth has also been tidied up to give it a more contemporary aspect. Expect to pay about £800 when the keyboard reaches these shores in the not-too-distant-future.

Roland MKB-1000 MIDI Keyboard Controller
Developed exclusively for MIDI equipment, the MKB-1000 is an 88-note fully polyphonic controller with velocity-sensitive wooden keys, the idea being to make it feel as much like a traditional piano keyboard as possible. Two 19" rack-mounting modular MIDI sound sources, the MKS-10 Piano Module and the MKS-30 polysynth module, were also unveiled at the show...

Roland GR 700 Guitar Synthesiser
Roland G707 Guitar Controller
The new Roland Guitar Synthesiser deserves a mention here if only for the attention that it attracted throughout the Musik Messe. With demonstrators on hand during the fair, the G707 controller and the GR700 were put through their paces several times a day. Creating the sound of a giant organ, a pipe organ, a flute ensemble, and even voice and choral effects. And that is just a brief selection of some of the latest innovations and products. Over the next few months we will endeavour to cover as many of the new products as we can, as and when they are released to the UK market. One of the major problems in writing about an international fair such as this is that many of the products will never see the UK shops, and sometimes never seen again in this continent! Still, here's to next year!

Tim Oakes **E&MM**

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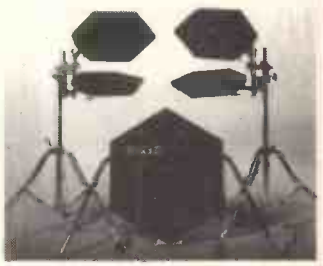

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Sequential Circuits Drumtraks

To kick off this month's mammoth electronic drum supplement, Ultravox percussionist Warren Cann **takes a look at the Drumtraks, SCI's new £950 digital drum machine, and discovers some features that set it well apart from the crowd.**

My initial reaction to Sequential Circuits' new digital drum-machine (their first) was quite a neutral one but, as I spent time with it, that first impression was replaced by real interest. The Drumtraks' dimensions are approximately 21½" x 9½" x 4", and yes, it's yet another drum-machine that can't be separated from its coffee-table end-pieces and rack-mounted. Given that manufacturers are continuing to make things a 'tidy' size, you'd think they'd have considered this possibility, but alas . . .

Before I plugged the Drumtraks in, or even leafed through the owner's manual; a brief first glance at the control layout told me I would be doing a lot of button-pushing to switch from mode to mode, and so it proved. All of the machine's major functions are accessed by pressing one of two 'select' buttons, so, for example, to go from Record to Erase or from Insert to Delete, etc. you keep pressing one of the two switches until the desired red LED is illuminated. On reflection, I have to admit that this method is at least a legible one, and so long as you remember where to look it's pretty easy to know where you are at any given time. Granted, having to keep chasing LEDs up and down their columns does tend to disturb one's train of thought when programming, but to be fair, SCI have laid things out in as unconfusing a fashion as possible for such a complex multi-mode arrangement.

Controls

Most of these are fairly straightforward. You've got Master Volume, Click/Metronome Volume, and Tempo controls, plus individual voice selectors, a run/stop switch and the above-mentioned LED panels to indicate which pattern or song you're using, what tempo you're running at, and so on.

There are 13 percussion voices: bass drum, snare, snare rim, toms 1 and 2, crash and ride cymbal, open and closed hi-hat, handclaps, tambourine, cowbell, and cabasa. Each voice has a 'tap' button so that all the sounds can be played 'live' or in the record mode.

There's a 10-key numeric keypad in the centre of the control panel, with increment/decrement switches either side of the zero key. These perform a variety of functions, the simplest of which is manually stepping patterns along in consecutive order with just one stab of the finger, every time you want to go from, say, pattern 88 to pattern 89.

The mono output can also drive stereo headphones directly, giving a mono signal from each side of the cans. There are also six audio channel outputs plus a metronome output, and these are shared by the percussion voices as follows: **Channel 1** – bass drum; **Channel 2** – snare and snare rim; **Channel 3** – toms 1 and 2; **Channel 4** – crash and ride cymbal; **Channel 5** – open and closed hi-hat; and **Channel 6** – claps, tambourine, cowbell and cabasa. This makes most of the voices reasonably accessible. It's not an ideal arrangement, obviously, but it's still as good as you'll get without paying upwards of £2000. It's possible to dump patterns and programs onto tape and sync to tape and/or sequencer.

Programmable Functions

So far, then, pretty much what you'd expect from a digital drum-machine retailing at just under £1000, but the best is yet to come. What sets the Drumtraks so firmly apart from its competitors is the fact that you can program tempos and tempo chenges, levels of individual voices (in both live and record modes), and each instrument's pitch. Now I've got your attention!

No fader arrangement for levels is necessary because all the individual levels are programmable in steps from 00 to 15, this being displayed on one of the LED panels. Tempo is preset at 100 BPM at power-on but can be varied between 40 and 250 BPM. 'Pattern' tempo is not programmable but 'song' tempo is, and tempo changes relative to the start of the song can also be stored in memory.

Tuning is programmed in a similar fashion: the LED panel displays a pitch number from 00 to 15 and that value remains constant throuhout all patterns and songs for that instrument unless you specifically change it.

The overall memory capacity is 3289 notes, while volume and tuning changes take up additional space in the memory, so to make sure you don't run out while programming, remaining memory space is represented as a percentage display on one of the LED panels. Each drum pattern can be up to 100 measures long and can be programmed in any time signature (for those who have their own weird and wonderful methods of programming, I suppose). Patterns can be chained together into songs of up to 100 steps each, while the Drumtraks' memory is retained when the mains is turned off via a back-up battery with 'a ten-year life'.

Interfacing

The machine has two forms of interface system built in to it. First, a selectable 24, 48, or 96 pulse-per-quarter clock input and a 24-pulse output are provided for use with older sequencers, rhythm units and sync-to-tape. Second, there's a MIDI interface that lets you use the Drumtraks in conjunction with any other similarly-equipped computer-controlled synth or sequencer. I had the Drumtraks operating happily with

Sequential Circuits' new Six-Trak polyphonic sequencer/synthesiser (reviewed elsewhere this issue) and also the same company's Prophet T8. This allowed me to use the latter's velocity-sensitive keyboard to control the drum-machine's percussive voices, so that the harder the keyboard was struck, the louder the drums appeared. Programming levels for each individual instrument can be a bit larorious via the drum-machine alone, and real-time recording of the instrument dynamics via the keyboard not only makes things faster but also enabled me to attempt things I wouldn't normally have the patience and/or skill to try and do 'dry'.

Sound Quality

I took the Drumtraks into Mayfair Studios, Primrose Hill, to test the quality of the digital chip recordings through big control room monitors. After all, all the programming versatility in the world doesn't count for much if the basic sounds themselves are pretty ropey. I've got no complaints, though. Everything on the Drumtraks sounded very, very good: I know sounds are always a matter of taste of course, but I thought almost all the sounds were fine. The bass drum, in particular, impressed me because it had plenty of both bottom and top: you can't very well increase the bass with external EQ if there's no bass there to begin with. The snare is also solid and very workable, and in fact I achieved a usable sound for just about every percussion voice with the help of the Drumtraks' tuning facility and some fiddling on the desk EQ. The only small area of complaint is the tom-toms. Having only two tom-tom tap-keys isn't a disadvantage in itself becuase the tuning can be adjusted on-board to give effectively 32 different tom sounds, but almost all of these lacked attack, which tended to make them appear a little weak by comparison with the other voices. On the other hand, almost everything else sounded exactly like what a cabasa, clap, tambourine, or whatever should sound like, while the cymbals sounded even better than those on the LinnDrum, the Drumtraks' extra ROM capacity for this sound allowing a little more decay.

Chip Replacement

This leads us on to a rather interesting discovery. After lifting the lid off the unit (this is thoughtfully restrained in the 'up' position by a swing-arm arrangement which prevents it from swinging all the way back and crashing against the jack-sockets on the rear panel, unlike another rhythm-machine I can think of) and conferring with Ultravox's resident boffin, I discovered that the single-chip voices from the LinnDrum will slide straight in to the Drumtraks – a bit like lowering a 427 cu. in. V8 into a family car. I had a lot of fun.

Conclusions

The bane of the reviewer's schedule is that, almost invariably, he's asked to look at something while there are still very few examples around, with the manufactuer and/or distributor trying to get them (or even, in this case, 'it') to as many different people as possible over a short space of time. With the Drumtraks, I didn't get as long a test of it as I would have liked, so perhaps there are some quirks and booby-traps about it that I didn't have time to discover, but I certainly liked the machine while it was around.

Due to their higher production volumes and a policy of holding back on product release to see what the other manufacturers had up their sleeves, Sequential Circuits have been able to offer a superb item at a very good price indeed. I think the Drumtraks has a substantial future with musicians and recommend it. I bought one. **E&MM**

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Hammond DPM-48 Digital Percussion Machine

With every few months seeing a new digital drum computer coming on the market, it's to be expected that a combination of healthy competition and tried-and-tested technology will eventually result in more or less the same product coming out at a cheaper price. That's just plain honest-to-goodness economics for you – 'we'll supply it if enough of you demand it', in other words.

The first sign that such moves were afoot came in the middle of 1983, when several under-£1,000 sampling drum machines emerged from the woodwork. Well, now there's a new contender in the digital drum stakes, the Hammond DPM-48, and this time the recommended retail price is expected to be just £600 – including VAT.

Beneath The Surface

Hammond is hardly the sort of company that springs to mind in the context of the latest gadget for the rock musician, but there's no denying their ability at producing electronic organs with a human touch, and, like their fellow-manufacturers, Lowrey and Technics, they seem to have got their digital voicing techniques successfully together in their latest and more up-market instruments.

The DPM-48 reflects this policy with a not inconsiderable degree of success – and it also looks good. Unlike the Drumulator, for example, which has a certain spartan quality in its pressed steel construction, the DPM-48 looks much more up-market with its nicely solid aluminium front panels and well laid-out, colour-coded buttons. Both these and the individual level faders at the back work positively, with none of that sloppy feel so often found on equipment manufactured on a tight budget. The unit is also more compact than some, measuring just 13.75"(L) x 10.4"(D) x 3"(max H).

Internal Construction

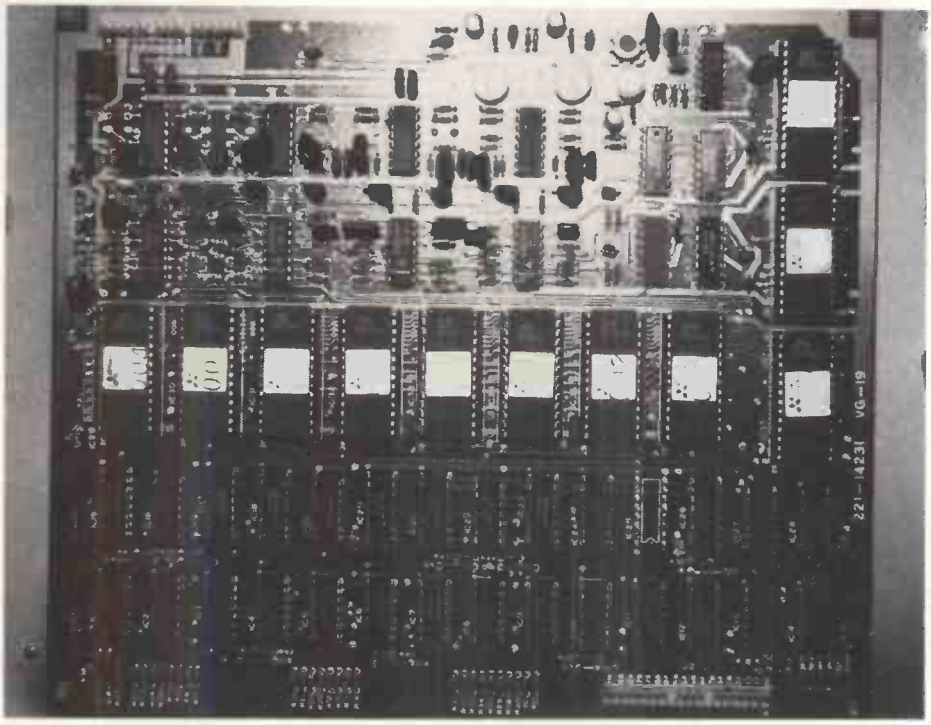
Opening the unit up for servicing and replacing fuses or EPROMs (should the need arise) is simple, though there are a number of flying leads and ribbon cables to contend with. The processing side of digital drumming goes on on the PCB attached to the front panel, where the ubiquitous Z-80 type of processor is to be found doing its thing along with the pushbutton keys, LED display, and so on. On the track side of the same PCB there's a single 2732 EPROM, which a modicum of detective work suggests contains the necessary firmware for running the machine. The other ten 2764s and one 2732 EPROMs (a grand total of 84K) are found on the other main PCB, along with much macho TTL, one MC1408 DAC (8-bit, non-companding type), four AN6554s, and four LM13600s.

Because of the Japanese flavour of some of the chips, it's a bit difficult to be 100% certain of what's going on, but I'd hazard a guess that the AN6554s are dual sample & holds used in a multiplexing fashion like the Drumulator and MXR unit. Unfortunately, the manual is as silent as a grave when it comes to telling you about what goes on inside the DPM-48's head. Because of this, it's also impossible to tell how much memory is allocated to each sound. But 84K is a fair whack above most of the competition (64K for the Drumulator, 52K for the MXR, and 64K for Oberheim DX, as against 124K in the LinnDrum), and this shows up in the generally high quality of the sampled drum sounds.

If there's a single distinguishing feature between the DPM-48 and its more expensive brethren, it's the recess at the front where the RAM cartridge normally gets slotted. The DPM-48 is the only digital drum machine on the market to make use of this much-

maligned storage medium, and I feel it's a strong point in its favour, although it's something of a mixed blessing. The problems with cassette storage are legion to anyone with a micro, and precisely the same problems of drop-outs, run-down batteries, and misalignment of tape heads applies to the loading and saving of drum-machine data. RAM cartidges provide a virtually instantaneous means of changing over from one set of songs to another, albeit at the cost of buying a set of cartridges. The DPM-48 RAM cartridges use two 5118 CMOS RAM (1K x 8-bit each), giving just 2K for song storage, and therein lies the only real problem with this unit, namely that you're limited to accessing only 3 songs at any given time. Whether or not that's a problem in practice is up to how you go about organising your creativity. In the studio, it's no problem at all, but on stage, you'd be well-advised to take time labelling the cartridges, not to mention keeping them out of beer mugs...

A word of warning: If you choose to change RAM cartidges in a quick-fire salvo fashion without switching the unit off first, you stand a good chance of condemning something or other to the great Silicon Chippy in The Sky. So, take heed of Hammond's warning: *'Turn off the DPM-48 before setting or taking out the RAM cartridge. Do not insert the RAM cartridge with unnecessary force. It could cause a great deal of trouble.'*



The DPM-48 opened up.

Sounding Out

Like the Drumulator and the MXR 185 Drum Computer, the DPM-48 has sounds digitally 'recorded' in EPROMs. The provisional (I hope) manual supplied with the review unit informs me that 'twenty-two voices were all digitally recorded, so DPM-48 recreates even the most sensitive overtones' (whatever that means). If that's really true, it's extremely unusual, because most digital drum-machines make do with a smaller number of drum samples than the actual drum sounds available from the unit, by using the tricks of altering the sampling rate to get different pitches and a post-DAC VCA to vary the dynamics for accenting purposes. Since there is a lot (84K) of EPROM sample space in the unit, it is conceivable that this is what they've done in part, but I'm sceptical of Hammond's claim that they've sampled as many as twenty-two separate voices, as that'd give less than 4K for each, and there's no wasy that a decent (and the DPM-48's is) crash cymbal can be squashed into that meagre pint-pot. Hammond also say that they recorded the total drum-kit sound for every individual drum sample, the idea being to pick up whatever sympathetic vibrations are engendered by a mighty thump from the bass drum. But does pre-programmed crosstalk 'make DPM-48 produce the liveliest sound', I wonder? Well, here's what actually emerged from the DPM-48 in practice...

Toms 1/2: Tuned in thirds, a good duration of about 0.4", and plenty of membrane bounce, but suffers from a halo of (quantisation?) noise, though this wouldn't be obvious when buried in a mix. I'd say that both sets of toms would benefit from being re-recorded at a faster sampling rate at the expense of length of sample (which is probably too long for its own good). As Ian Gilby said in his review of the MXR unit (*E&MM*, October '83), the tom sound that's in vogue at present is the African tom, its main features being a gut-gripping impact tone and a fast decay, and perhaps Hammond would do well to go for this rather than what they've got at the moment.

Toms 3/4: Lower pitched and a slightly longer duration of about 0.5", with a good solid tone. Again, on the noisy side. Because the deeper tones of this set of toms aren't proportionately longer than toms 1/2, and since the sound is that of a larger set of drums rather than small ones put through the digital mangle, it's obvious that toms 3/4 come from memory that's separate to their higher-pitched counterparts. On top of that, this second set of toms goes through a separate D/A channel, so you've got the facility to play two toms (from the two groups) simultaneously, unlike the LinnDrum and Oberheim DX, which have just one tom sample doing the time-sharing bit.

Bass 1/2/3: A nice meaty kick to this, though EQ would help to make it a mite 'clickier'. No noise to speak of. Bass 2 just adds a few more dB to the output to accent it, but Bass 3 is a curiosity; I think it's meant to be a third dynamic level, but it actually sounds as if someone's laid some snares across the drum skin. Bearing in mind what the manual says about separate drum samples, this is undoubtedly a different sample to the other two bass-drums. The problem with Bass 3 is that it seems to have lost its percussive identity. In fact, it almost sounds as if the sample is being clipped in some weird and wonderful way in getting to the outside world (or perhaps on recording?). Mind you, it's still usable; I'm just not sure when and where.

Hi-Hat Closed/Accent/Open: For once, the accented version of the closed hi-hat isn't just the latter at a louder dynamic level. This time, the sound actually changes quality (the benefits of the multi-sampling approach). Ten bonus-points to Hammond... What's more, the open hi-hat sample is also excellent.

Snare 1/2/3: A good, personable snare, this, and guaranteed to work its way through to the top of the mix. Like the bass-drum, this is as clean as a whistle as far as noise is concerned, which makes me wonder why Hammond let the toms get away with being so dirty. Snare 2 is just a few steps louder than Snare 1, but Snare 3 is another different sample, this time an effective 'near the edge' sort of sound.

Ride 1/2 & crash cymbal: This is the really tricky territory where less than angelic machines fear to tread. To be or not be be a crash cymbal, that is the question... Well, last things first, this is a *good* crash; it's not perfect, but it does provide a darn good secondful of sound that decays with grace rather than being caught *in flagrante delicto*. Judging by the layout of EPROMs on the voicing PCB, I'd say that Hammond are using three 2764s for this one sound. 24K is a lot to splurge on a single sample, but its worth is well and truly proved in this case. Ride 1 and 2 (the latter just a notch up in dynamic level from the former) don't fare quite so well as far as abrupt cut-offs are concerned, but in the context that a ride cymbal is normally used, I don't foresee any problems. The important point is that they perform well while sample data is there for D/A conversion.

Cabasa 1/2 & Clap: The organ pedigree is showing here. Cabasas are those gourd-like things filled with dried peas and shaken to death by organs pretending to be of Latin-American descent. Actually, they're quite effective if used sparingly and well back in the mix. The DPM-48's cabasas lend themselves well to this requirement because they've been recorded with a cautious eye on the meter. The clap, on the other hand, deserves an entire paragraph of criticism (don't worry, I won't). This definitely wins my nomination for the worst clap of the century. If it sounds like anything on the face of this blighted planet, it's the bark of a dog being force-fed with worming pills – a sick dog, in other words. I'm sure the main problem with this sample is that it's being played back at too slow a sampling rate, but, of course, without any sort of tuning option on the DPM-48, it's impossible to test that theory.

Agogo 1/2 & Rim-shot: An agogo is a set of two cowbells, tuned apart by a third. Fortunately, that concurs with Hammond's idea of

an agogo, a point which saves a lot of potential egg on the face. These cowbells are actually rather nice. Still, cowbells are cowbells – alpine symphonies and all that sort of thing. On the other hand, the rim-shot is just what the doc ordered for that crisp, clean feel when you're tired of the ride.

As drum-machines go, the range of sounds on the DPM-48 is very generous, but why, oh why, is there no tuning control, either overall (as on the MXR) or for individual voices (as on the Oberheim DX – admittedly not possible with the multiplexing approach)? And as for the 'clap', the sooner the DPM-48 gets a shot of a megaunits of penicillin the better!

If I've a general point to make about the DPM-48's drum samples, it's that they're fairly traditional voicings of the sort you'd expect to find in a drum computer coming from the electronic organ stables. To cater for the quirky demands of the discerning rock musician, Hammond might consider offering alternative EPROM sets that go a bit further into the sort of new-wave percussive territory explored by Peter Gabriel and others.

Controls

One of the sensible things about the DPM-48 is that each of the twenty-two sounds has a separate (blue) button, so the unit can be played in real time with just the fingers if that's what takes your fancy. In comparison, the MXR has twelve voice buttons, the DX eighteen buttons, and the Drumulator only six buttons, with a seventh to switch between conventional drums and the more exotic side of percussion. And with eight separate output channels, going via individual faders to separate outputs or a stereo or mono mix, straight digital input to those twenty-two buttons can make for a very impressive bit of bombast.

Like just about every other digital drum-machine around, the DPM-48 allows this sort of real-time input to be recorded for posterity, and provides a metronome click-track for that purpose. Incidentally, though the metronome level is fixed when it comes through on the mono or stereo mix, a separate output is also provided. A drum pattern is built up event by event, sound by sound, and once that's done, it can then be subjected to what Hammond call their 'automatic correcting system' a process whereby the timings of your manually-entered events are quantised to a greater or lesser extent depending on the minimum duration you choose to program into the machine.

As with other digital drum-machines, tracks are constructed by assembling Patterns into Songs. The yellow keys immediately under the LED display and down the right-hand side provide all the necessary programming functions. The DPM-48 allows 48 patterns to be stored, with up to 32 events in each. Precisely what those events are depends on (obviously) what drum sounds are used, but you also have to take into account how far you want to go with sub-dividing the crotchet. The options here are 1/2, 1/3, 1/4, 1/6, 1/8, 1/12, 1/16, 1/24 and 1/32, or, in other words, going from a plain and simple quaver to the sophistication of a demi-semiquaver. All this is accomplished by using the COUNT (sub-division of a crotchet) and LAST STEP (number of steps in a pattern) keys in conjunction with the grey numeric keys, and it's the combination of these that determines in what shape or form a real-time programmed pattern sees the light of day.

The alternative approach to entering drum events is step input, where the ' ' and ' ' keys are used to move through the steps of a pattern, and the appropriate combination of drum keys are pressed accordingly for each step. The ERASE key provides the wherewithal for scrubbing either Patterns, Songs, or individual voices by pressing the key in conjunction with other keys. Considering the fascination of the keyboard fraternity with non-real-time methods of input, it's curious that the only other sampling drum-machine to provide this lazy drummer's option is the Oberheim DX. Mind you, the 'quantisation' option on this and other drum-machines makes entering drum scores so straightforward as regards timing goofs and so on that it's quite understandable why most makers have stuck to their real-time guns.

Once a number of Patterns have been put together, these can then be turned into honest-to-goodness Songs by telling the machine which Pattern you want played for each of up to 256 sections. An INSERT key is also provided so that one Pattern can be changed in favour of another within a Song. The one big (well, fairly big) drawback is that the unit only has room for just three songs because of the limited memory in the eponymous RAM cartridge.

What's left of the front panel controls include the RUN/STOP key, REPEAT (which switches Pattern playing to the next highest numeric value – excellent for setting up segno/dal segno repeats, fill-ins, improvisations *et al.*), the coarse and fine tempo controls, and the mixed volume.

Externalisations

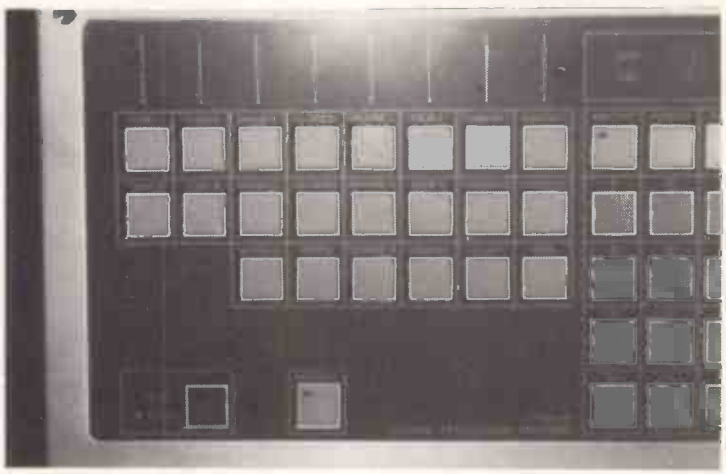
A mark of a good machine these days is the number of sockets on the back panel, and the DPM-48 gets good marks on that front (if you'll pardon the reversed pun). Aside from the separate 1/4" jack outputs for the metronome, two sets of toms, bass-drum, hi-hat, snare, cymbal, perc 1, perc 2, headphones, mono and stereo mix, there's also a 5-pin synchro in/out working on the 24 pulses-per-crotchet standard of Roland and Korg, and sockets for footswitching of the REPEAT and RUN/STOP functions.

In addition, there's a 12-pin 'D' connector marked 'Triggers', which presumably allows a micro to take control of the voices or the driving of the unit from drum pads. Mind you, the manual seems to turn a blind eye to this side of the DPM-48's interfacing potential.

One further point worth mentioning is the 'write protect' switch on the RAM pack. If you value your sanity, it's absolutely vital to remember what you're doing with this!

Pattern-programming control section.

Percussion voice selector controls.



Conclusions

Overall, this is a superb digital drum-machine at a remarkably cheap price. Everything works as it should, it's easy to program, and the majority of the sounds are very good. In fact, it'd fit very happily into my own studio. What it could do with is a larger capacity RAM cartridge (using 6116s, for instance) and the option of different sets of EPROMs to suit different users. If the DPM-48 doesn't break Hammond into the rock market, there's no justice in the world...

David Ellis **E&MM**

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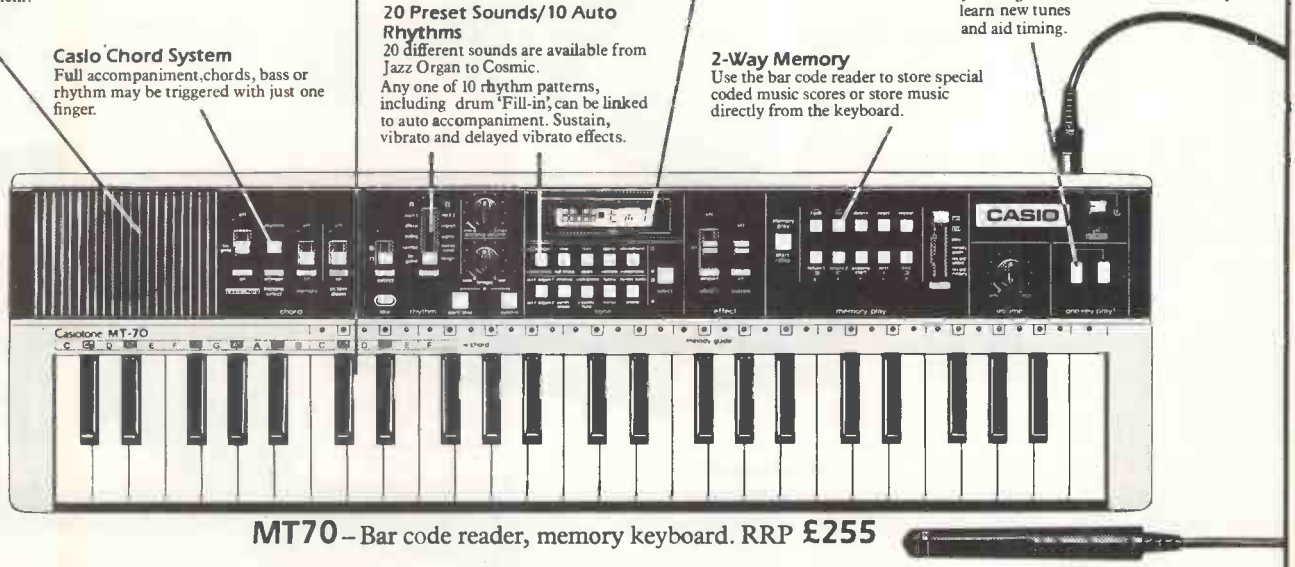

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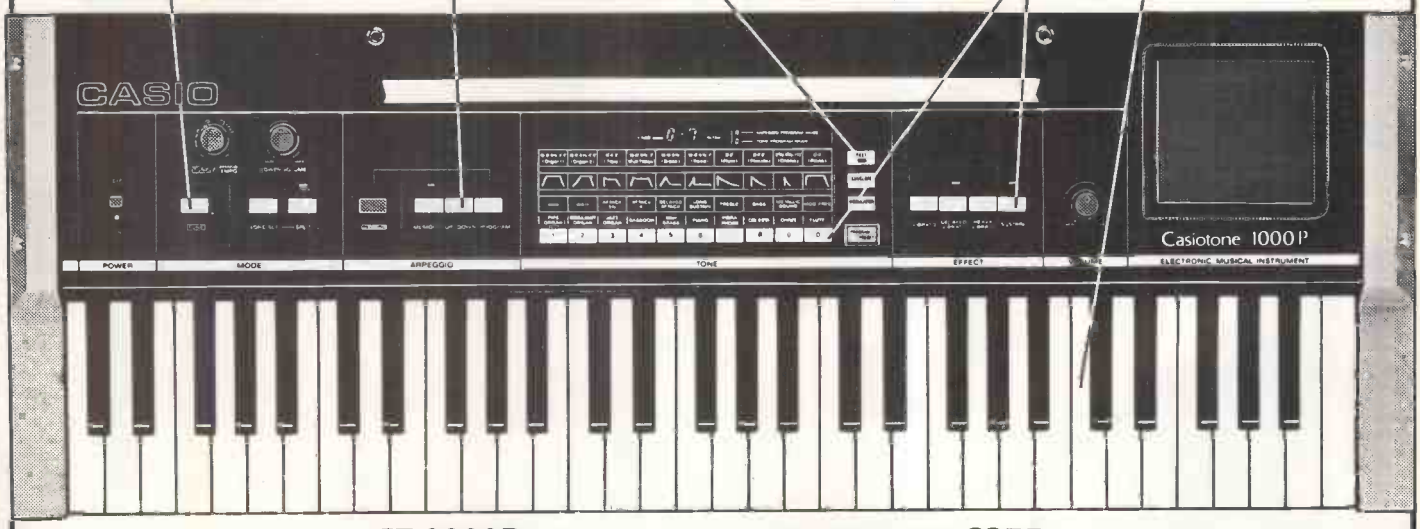

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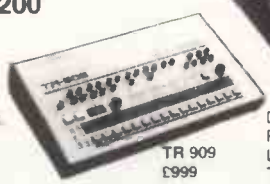

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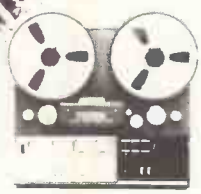

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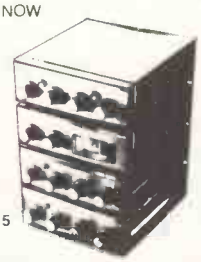

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Cactus Desert Drums

Previewed at last August's British Music Fair, the Cactus Desert Drums are now in full production, though the delay in getting this electronic kit on to the market has unfortunately meant that several competitors now have rival devices on the stocks, or at least on the threshold of them.

The kit is the brainchild of former *E&MM* technical writer Pete Kershaw, who has spent not inconsiderable amounts of time and capital developing a digital sampling system that would give his drum-pads a subjective 'edge' on sound quality over its rivals. Judging from the impressive – and impromptu – demonstrations members of the public were giving on the Cactus stand at the recent Frankfurt Musik Messe, I'd say he's by and large succeeded.

Design

The basic Cactus kit comprises the bass drum pad and four identical circular pads for snare, hi-hat, and two toms. These have a diameter of 30cm and are injection-moulded from ABS plastic, which makes them both light and extremely resistant to inadvertent damage. The bass drum is (not surprisingly) rather bigger at just over 50cm diameter, and is constructed from a slightly less rigid composite material. It's supported by two spiked spurs with push-on rubber feet, but though this sounds like sufficient 'scaffolding' in theory, in practice the bass drum can slip quite alarmingly away from the user if the kit is played with a little enthusiasm and the floor surface is less than leech-like. As with most other electronic drum-kits, the bass drum's steel bracket is compatible with most makes of standard kick-pedal.

Unusually, cymbals and hi-hats are on pads identical to those for the smaller drums, which means that it's now possible for a drummer to play a kit where each percussion voice has a direct output. The hi-hat in particular is an impressive piece of work, since a standard-type pedal 'opens' and 'closes' the sound in exactly the same manner as a traditional one, which means that any drummer can sit behind the Cactus kit and be almost totally at home with all the drums and the actions needed to trigger them.

Synthesiser Chassis

All the pads are linked to the synthesiser module via XLR connectors, and each chassis can accomodate up to ten voice modules. Should you desire more than that figure, you'll have to buy a further chassis. All the sounds have variable sensitivity, decay (complete with peak-reading LED), and, of course, pitch, in addition to input gain and a pan control for the chassis' stereo outputs.

The hi-hat and snare modules have mixable white noise to add to the digitally-sampled sound, while filter frequency and resonance are also adjustable on the snare; resonance, frequency and sweep on the hi-hat. The only non-digitally-sampled sound available as an option is the synth module which relies on good old analogue tone generation and offers variable click in addition to those facilities already listed for the hi-hat. Unfortunately, the basic tone of the synth module is of the 'pew-pew' variety, so I doubt very much whether it will find a place in the kits of many fashionable percussionists.

Further Modules

What might prove rather more popular however is the range of additional drum samples that are being made available as I write this. These include a whole host of Latin percussion voices, handclaps, claves, obasas and tambourines, plus what Pete Kershaw describes as 'the world's most expensive cowbell' and a gong sample with a maximum delay time of up to 10 seconds. No mean feat.

Each module has an individual output, while a 15-way 'D' socket facilitates connection of the entire chassis to an external computer or sequencer. It is hoped that interfaces for this purpose will be made available for a variety of different outboard units in the not-too-distant future.

An eleventh module at the extreme left of the chassis front panel houses the master output circuitry, and controls here are limited to a main stereo output level pot, a headphone socket with individual level control and pot for the level of the built-in metronome, as yet still a prototype option. It's this that will provide the sync track for the external control devices mentioned above.

The chassis is neatly designed and finished, and the intending purchaser has a choice of solid mahogany end-cheeks or 19" rack-mounting brackets either side of the control modules, which is certainly a point in the Cactus' favour if you envisage it being used in a studio environment.

All the samples use 64K RAM and the average sampling-rate is somewhere in the region of 45kHz. This is pretty good going for a unit in this price category, and goes a long way to explaining the overall high standard of sound generated by the Cactus' modules.

Sound Quality

In general, the sound samples on the Cactus are of a very high quality indeed. The bass drum and hi-hat cymbals are worthy of special mention, I feel, particularly in the latter case since this is where some rival manufacturers have failed time and again to produce a sound that is both metallic and warm enough to be realistic. The bass drum seems to be at its most effective with a fairly short decay time, a realistically low pitch.

The only mildly disappointing sound on the basic kit (aside from the synth modules, of course) is the snare, though it's only really below-par in the context of the rest of the set-up; on many competing kits it would be perfectly satisfactory. What it does lack however is a bit of 'beef' at the lower end, something which no amount of pitch/white-noise adjustment can cure.

Conclusion

While there's little doubting the fact that the market in which the Desert Drums compete has suddenly become a very competitive one, there's also no doubting the versatility of the Cactus system and the thoroughness with which that system has been put into production. The majority of the sounds are excellent, and the prospect of additional samples becoming available on a frequent and regular basis over the coming months from a local manufacturer is certainly an exciting one.

Quite simply, if you're in the market for an electronic drum-kit between £500 and £1000, you can't afford not to give the Cactus a trial.

Dan Goldstein **E&MM**

The basic Cactus Desert Drums kit costs £699.00 including VAT, and you can get further information from the distributors, Atlantex Music, 1 Wallace Way, Hitchin, Herts. SG4 0SE. Tel: 0462 31511.

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Yamaha RX Digital Rhythm Machines

Electronic Drum Supplement

Although MIDI compatible systems are certainly going to play a large part in tomorrow's music, it would still have been nice for the RX models to have retained conventional trigger/gate connections, as without them it's impossible to sync your drum machine to non-MIDI devices, without incurring the expense of an add-on interface box. However, the MIDI bus does make both units compatible with other manufacturers' products – which is always a good sign.

Rumours have been rife for some time that Yamaha had finally taken up the gauntlet thrown down by other manufacturers and begun work on a programmable digital drum machine of their own. The outcome of this development manifests itself in the form of not one, but *two* digital drum machines, competitively priced and designed to appeal to a wide-ranging audience.

Appearance

The two machines, the RX11 and RX15, both come in a slimline black case approximately 14" x 8" x 2", that is a refreshing departure from the wooden end cheeks of competing models. A 16 character alpha-numeric LCD readout (similar to the DX keyboard's display) provides rhythm information on both units, and a further LED readout is available on the RX11 for bar data etc.

The overall layout of controls appears excellent with soft touch selector buttons for the individual drum voices and a nice line in colour coding.

The two machines are unlikely to be available until June (RX15) and August (RX11) of this year, but here is a rundown on their features and capabilities just to wet your appetite!

Features

Both drum machines utilise 8-bit pulse code modulation (PCM) sampling techniques to capture the sounds of natural percussion instruments which are stored in the 256K memory. Tape dump of all program data is possible via mini-jacks on both models, but the more sophisticated (and thus expensive) RX11 permits the complete exchange/storage of self-programmed rhythms via the RAM cartridge as on the DX7 synth.

Memory capacity of both machines is similar — 100 patterns, 10 songs, 255 steps per song. The essential differences between the two drum units are in the onboard facilities: the RX11 features 16 different sounds as opposed to the 13 of the RX15, but with no great surprises in the chosen instruments — 2 x bass drum, 2 x snare, rimshot, 2 x hi-hat, 4 x toms, 2 x cymbals, clap, cowbell and shaker.

Programming of rhythms can be in step or real-time from the unit itself or an external keyboard (eg. DX7), with complete control over rhythm and song construction. Six variations in note resolution are on offer; whilst tempo changes can be programmed using a vertical fader and LCD readout and stored for instant recall.

Both models have a stereo operation with separate Left and Right output jacks on the rear panel, whilst individual instrument volume levels and accent can also be set and remembered.

In addition, the RX11 features a programmable Pan facility for each individual voice, which is a fairly novel inclusion on a drum machine and should help reduce drum tracks on recordings, as well as separate output jacks for ten of the drum sounds.

Footswitch start/stop and headphone monitoring are included on both devices, but the major feature has to be the inclusion of MIDI In and Out DIN connections. These replace the usual trigger connections of the older drum machines and permit programming, remote control (via your DX or MIDI keyboard) and synchronisation with all MIDI-equipped sequencers etc.

Conclusions

Linked to a DX7 synthesiser, dynamic volume control of all drum sounds is also made possible, using the pressure/velocity sensitivity functions of the keyboard.

An appraisal of the drum sounds found on the machines would be foolhardy, having only heard the devices in action a couple of times at exhibitions, so you'll have to await the full reviews later in the year. What I can say though, is that the fast attack of the instruments creates a bright edge to the sounds, especially on the four tom toms, which are separately sampled with very authentic results.

On brief acquaintance my only quarm must be the lack of any instrument tuning facility — a vital omission and maybe a hazardous one too. Generally speaking, Yamaha have produced two good variatons on a theme, with some original flavouring thrown in for good measure, but I suggest that they consider advancing the respective release dates of the two products, or else they may find that other units have beaten them to the punch.

Ian Gilby **E&MM**

Prices of the RX15 and RX11 are expected to fall around the £650 and £800 mark, but these are yet to be finalised. For further details contact: Yamaha Musical Instruments, Mount Avenue, Bletchley, Milton Keynes, Bucks MK1 1JE. Tel. (0908) 71771.

Boss DR-110 Dr. Rhythm Graphic

Treading hard on the heels of the successful TR606 Drumatix comes the DR-110. The circuitry has been streamlined into a neat silver plastic case about the size of a small box of chocolates (the sort that you ski down mountains with) and sports an up-to-date liquid crystal display which indicates the program status in a very comprehensive manner. The push-buttons are made of pale blue rubber and are reminiscent of the Sinclair Spectrum home computer keys.

Although based on essentially the same technology as the TR606, there are several important differences. Gone are the bland-sounding tom-toms and gone is some of the programming flexibility. On the bonus side, a very realistic handclap sound has been added and the programming facilities are much more user-friendly than on the TR606. Another important feature is the ability to play all the voices in real-time by means of the push buttons. These can be played on their own or over the top of a pattern which is already running.

The memory contains space for 32 rhythm patterns, 16 pre-set and 16 user-programmable. The pre-sets are all modern and useful.

Two arrangements or 'songs' can be programmed of up to 128 measures each, and memory is preserved when the unit is turned off by means of the four type-AA batteries which provide power. A mains unit is available but a good set of batteries must be left in or the memory will be lost when the power is turned off.

Controls

The front panel has only four rotary controls, Tempo, Balance, Accent and Volume. Rather than provide a volume control for each voice, Boss have opted for a single control which adjusts the balance between drum and cymbal voices whilst leaving the hand-clap sound unaffected.

In order to impart some feel to the rhythm, an accent can be added which gives an extra degree of punch to whichever voice or voices fall on the accent beat. The degree of accentuation is set using the rotary accent control.

The tempo control operates over a sensible range without being too sensitive and the volume control affects both line-out and headphone levels.

There are two rows of push buttons, the top one handling control and programming functions and the lower one the volcings and accent.

Most of the keys are dual function, the second function being printed above the key and accessed by means of the shift key. It would be pointless to go into too much detail concerning the actual programming as the user's manual is very comprehensive, but I'll point out the important features.

Rhythm patterns are arranged in four banks of eight and are labelled A, B, C and D, these being selected by means of the appropriate push-button. The bank currently selected is indicated on the LCD display, banks C and D containing the pre-set rhythms. Patterns one to eight are played by pressing the correspondingly numbered key and then the Start button. Using the shift key and the 'step' or 'tap' buttons, the pattern can be programmed in step-time or in real-time by tapping the voice buttons.

Patterns may contain 16 or 12 beats for bass-drum, snare-drum and open and closed hi-hats, with handclaps cymbal and accent sharing a line. Programming a 'song' is simple with the current measure being displayed in its own window on the LCD display. Editing mistakes is not difficult and is much less frustrating than performing the same feat on the TR606. A trigger pulse is provided for use with sequencers or synthesiser gate inputs and occurs wherever an accent is programmed.

The pulse is 6 volts positive going and has a width of 10ms. This is compatible with all Roland synths and many other types, but makes such as Korg and some Moogs will require a special trigger pulse adaptor. (See elsewhere this issue for details of how to build such a kit yourself).

Sounds

The bass- and snare-drums are reasonably convincing but benefit greatly from a bit of EQ to beef them up. The hi-hats are also good providing that they are kept low in the mix. It is always a great temptation with drum machines to set the hi-hats far too loud.

The cymbal has a definite metallic sound, produced, I suspect, by several intermodulating oscillators. Although it *does* sound like a cymbal, it is definitely a cymbal that I would not like to own!

On the other hand, the claps are great, though to my mind, not quite loud enough compared to the rest of the mix. All in all, then, a useful little box combining the best features of its predecessor with some innovative new ideas at a much lower cost.

Paul White **E&MM**

MPC Drum Synthesiser Modules

And Live Pads

As a natural progression from the Kit Music Percussion Computer, Clive Button, designer of MPC's products, has now developed a new drum synthesiser, the DSM, and a set of budget stage pads, which together create a modular system similar to that already marketed by Simmons, among others.

The stage pads themselves are 10" in diameter, 1½" deep, and are covered in a tough, resilient polyvinyl pad. Initial tests on the pads, which were first unveiled at this year's NAMM show in the States, tended towards this type of finish against a rubberised cover to the pads. The rear of each pad contains the MPC logo, and a mini cannon connector.

MPC have aimed towards a five pad drum kit as the basis of the system, but it is quite easy to start with just one pad and the power supply/DSM – as we shall see.

The stands for the system have been specially designed to reduce triggering of adjacent drums through stand vibration, with large individual legs for each stand and a system of reversed hooks that allow the pads to be set in any desired position.

For the purposes of this review, we will look at the integrated five-drum kit that was demonstrated. All the pads are the same, and each can be used for any purpose, be it snare, toms or bass-tom. It is the synth modules themselves that dictate the overall sound of each pad.

Using just two stands, the five-drum kit is formed with the snare pad mounted onto the side of one stand, below a pair of tom pads, while the second stand contains the bass-tom pad. The bass-drum pad is free-standing, and MPC do not supply the bass-drum beater. It's compatible with all popular makes, however.

The stands have simple butterfly lugs that hold the pads against the reverse hooks, and while the system looks a little slight in construction, a period of hard playing on the pads showed that they are quite capable of taking some extreme blows both on rim and pad.

Power Supply/Controller Module

This is an essential part of the system, since it powers the rest of the DSMs (Drum Synth Modules). The power supply is accompanied by a single DSM module, an ergonomic design that not only saves valuable space, but also allows the drummer to start off with just one pad and one Power Supply/DSM unit.

The front of this module has the power supply section on the left, with an illuminated rocker switch for on/off, and a blank set of the controls on the system in graphic form. This allows the user to set up the system to the required sounds and then to place his own favourite patches onto the graphic display with, say, a chinagraph pencil. This makes setting up and remembering patches a lot easier.

On the right is a single DSM (the other units have two DSMs). Controls are: Input Sensitivity (which controls the level of

'triggering'), Decay (dictating the length of decay on the sound), and then an integrated system that starts with Bend control (to change the attack and 'roundness' of the sound), and Pitch, followed by a Mix control. On the right of the mix control is the Click, which allows for variation of the 'noise' level of the pad.

What this means in reality is that the click factor of the sound, which is the percussive or 'stick' element regardless of pitch, can be integrated with as much Bend and Pitch as is required to give the sound you want. Really, this forms the minimum number of controls for the level of creativity that is required – and it gives the maximum control and variation of the sound for the minimum of control units. On the far right of the module is a Level control, which governs the overall output of the module.

Drum Synthesiser Module

Each of the DSMs contain two controllers. So while the power supply has capacity for only one pad, each of the DSMs can control two stage pads.

Basically, they are the same as outlined above in the controls that they offer, the only difference between the two rack mounting units being the outputs on the rear. These are an Output Jack, which can either be used to feed straight into one channel of a mixer or into the master module where a single output is available for all the pads; an Accent Adj. control, which allows for the pad being controlled by that DSM to be accented against the other drums via an external controller; and the Trigger In jack governs the external triggers (any signal can be placed through this, from, for example, the MPC). The Pad In jack takes the trigger from the stage pad itself, while a power supply on a 5-pin DIN plug feeds from the master module to power one dual DSM.

Operation

Once all the pads have been positioned correctly, they are then fed into one of the modules. Typically, the single DSM on the master would be used for the snare, while the hi tom and lo tom are fed into one DSM Module, and the bass-tom and bass-drum would be fed into another DSM.

We're using the terms hi tom etc. to distinguish between the positioning of the pads, *not* the sounds themselves. As we shall see, you can have a cowbell sound from the 'snare' position drum, or a synthesised bass-drum from the 'hi tom' positioned pad.

When each pad has been linked up the corresponding DSM can be marked with a chinagraph pencil, or in a static system, Letraset could be used to differentiate between the pads. Setting up the sounds can then begin.

In practice, developing sounds using the DSM controls is simple and efficient. It is easy to get the 'traditional' sounds of real drums, and these can then be built-on using the Bend, Pitch and Click controls to create an almost endless variety of sounds. As I've already mentioned, a cowbell sound is one simple patch (taking the Pitch right up, Click on around half and the Bend on minimum), and onto that you could add a little more Click and Bend and end up with a 'cracked' cowbell!

The 'Bend' sounds give an alternative to the usual rounded attack characteristics of the pad's sounds, and they can also be used to 'synthesise' the sounds; the usual range of synth drum noises can be created quite easily. All in all, a cleverly designed and simple system. . .

Potential

Since any of the proprietary drum pickups can be used to trigger the DSMs (such as the Tubby Drum or the C-Ducer), a standard miked-up signal can bed fed from acoustic drums to a mixer which has the facility to be switched on or off via a footswitch. The pickups are fed into the DSMs and their output can then be switched on or off via the 'Mute' footswitch. Therefore a standard drum-kit can create the usual acoustic drum sounds, or this sound can be switched off and the synth sounds used via the DSMs, or (and this is where things start to get exciting /confusing) any combination of the two sounds can be mixed together.

Of course, most drummers will plump for using either the stage pads alone or using them in conjunction with a standard kit. But the beauty of the system is that it is modular – and it is also very cheap.

Another possibility is that of using the Music Percussion Computer in conjunction with either the stage pads (which will trigger the MPC) or with the DSMs. It should in theory be possible to connect the stage pads to the DSMs via the MPC. Hopefully, we will be able to take an in-depth look at the consequences of such a system in a future *E&MM*.

Conclusion

The 'feel' of the stage pads themselves came as a surprise. They have a level of 'bounceback' that gives them one of the most important characteristics of playing real skins. Their robustness is unquestionable – given an extra heavy hand, you are more likely to put your eye out than do the pad in!

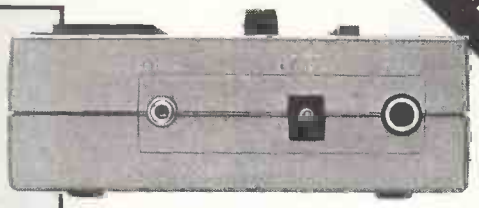
The controllers themselves show a very creditable amount of research into compactness, ease of operation, and versatility. Both the stage pads and the DSMs should certainly find a ready market among innovative drummers of all styles.

Tim Oakes **E&MM**

The complete five-pad system, ie. four pads, with stands and bass-drum, plus two DSMs, one Master Module and all leads etc. costs £799.00. The pads alone come to £299.00 (inc. leads and stands.)

DSM with Master Power Supply is £129.00, while the DSM modules are £189.00. Details from MPC Electronics, The Gables, Station Road, Willingham, Cambs. CB4 5HG. Tel: Willingham (0954) 60264.

YAMAHA MR10 Drum Machine



The MR10 Drum Machine forms part of the Yamaha 'Producer' series of budget electronic equipment that includes mixers, multi-track recorders, speakers, amplifiers etc. While it is intended for use with this series, the MR10 can quite easily be used on its own.

The unit measures just 224 x 530 x 130mm and weighs in at 600g (1lb 5oz). There are twelve preset rhythms available on dual-choice buttons. These are Disco, 16 Beat, Jazz Rock, Samba, Slow Rock, Mambo, Swing, Rhumba, Waltz, Bossa Nova, March, and Tango. 4-bar or 8-bar variations can also be selected for each rhythm. The rest of the controls are Tune, which allows the tone of the output to be varied, Tempo, which varies the rate of the present rhythms, Bass Drum Volume, Cymbal Volume and a dual on/off and master volume control.

Below these is the active part of the unit – the finger pads. These are pressure-sensitive circular pads that can only be hit with the fingers – not sticks. These offer Start/Stop (which enters the presets and which also has an LED to give a visual indication of the beat), and a pad each for Bass Drum, Snare, High Tom, Low Tom and Cymbal.

On the side of the unit are a connector for the optional bass-drum pedal, a mains power input (9-12V DC), and the main output jack. There is no internal speaker or amplifier system, so that the MR10 has to be used in conjunction with either a hi-fi or amps.

In operation, the preset rhythms are brought in and the pads are then played over their sound. This allows a full and quite expressive sound to be created, and if your rhythmic senses are not quite up to scratch, it enables you to play along with a static beat and build up accuracy that way.

The presets are the usual ones to be found on most home organs, but all offer some interesting and usable rhythms that are not limited to the bass/hi tom/low tom/snare/cymbal of the finger controls. They also have congas, marimbas etc, among others.

Drum Sounds

The snare sound is bright and clear, though the pitch control can take this down for a 'rockier' sound. Hi Tom and Low Tom are less successful, and since their volume (and that of the snare) cannot be altered, they have to be matched to the other sounds by the judicious use of the master volume and the level controls for the bass-drum and cymbal. The bass-drum sound, and to a certain extent the sounds from the toms, are powerful and strong, and mercifully lack the 'click' noises prevalent in some of the MR10's competition.

The 'feel' of the pads is good, with a definite 'click' when the internal trigger is switched. It takes a very light pressure to activate the switches, so fairly fast rolls and fills can be accomplished. Having the cymbal on the far right takes time to get used to, but as the unit is so small, both hands can be used across the pads and they soon 'fall into place'.

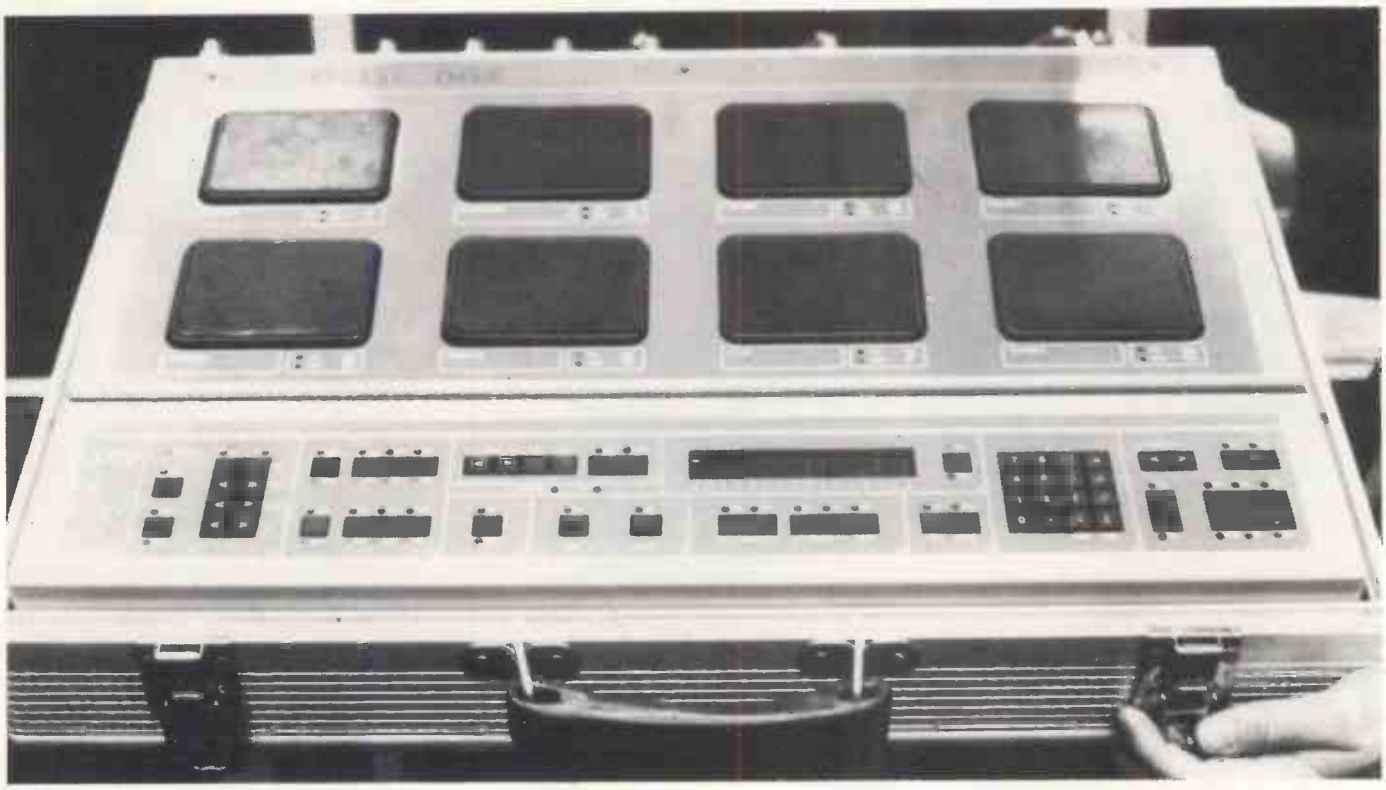
The MR10 was supplied with a footswitch that activates the bass-drum sound. This is optional, but is really quite necessary if you're used to a standard kit or want to start to build up speed on the finger pads. An interesting effect is that because the presets use the bass-drum sound, the bass pedal can be used to trigger a second bass-drum, while a third bass-drum can be conjured using the finger pads. Jungle!

It took little more than a couple of hours before the unit had been explored to the full, and the ultimate potential of the sounds reached. Some extremely good sounds can be got from this tiny machine, sounds that sound good through speakers and through effects, and are reasonably clean in recording. The MR10 is a cheap and versatile drum-machine with capabilities far beyond its appearances, so if you haven't much money to spend, you can't really go too far wrong.

E&MM

The MR10 Drum Machine costs around £89.00 and is available from Yamaha stockists all over the UK.
Further information is available from Yamaha UK, Mount Farm, Bletchley, Milton Keynes. Tel. 0908 71771.

AHB Inpulse One Drum Computer



While they're not exactly the first company that would spring to mind during a discussion on the production of digital drum-machines, Allen & Heath Brenell are nevertheless widely respected as designers and manufacturers of fine recording equipment, so it came as no surprise to me when I discovered that the Inpulse One – their first foray into the world of electronic percussion – was as well conceived and as well executed as their mixers. What was more in doubt however was the company's ability to keep pace with manufacturers of considerably greater research and design experience in what is becoming an increasingly competitive market sector . . .

First Things First

The Inpulse One comes complete with eight factory preset sounds built-in, these being controlled from the eight pads that take up most of the instrument's front panel. These are touch-sensitive over an approximately 30dB range. A further eight sounds also come supplied with the unit, these being stored in digital data on a standard audio cassette. It is hoped that this philosophy will be extended over the coming months, so that it will be possible for Inpulse owners to buy cassettes of different percussion samples from AHB, these coming from a growing library of voices.

It is not envisaged that the manufacturers themselves will provide optional live pads for the Inpulse, but since each pad has an external trigger input (with adjustable sensitivity) mounted on the rear panel, it should be possible for the user to control the voices from any of the multitude of electronic drum-kits that are becoming available should this be desired. Also on the rear panel is a 40-pin expansion connector, which provides an interface for the Apple II microcomputer and also acts as a connector for future related modules. This interface is also used as an access port by AHB during manufacture. There's also a metronome click output which acts as a guide for real-time playing, while a pulse output – with pulse-rate and resolution programmable from the Inpulse's keypad – can be used to sync the machine to sequencers, other drum-machines, and so on. Finally, SMPTE code inputs and outputs (with a level control for the latter) are provided on quarter-inch jack sockets, which should make working with the Inpulse in conjunction with multitrack tape in a studio environment a lot easier.

Front Panel

Working from left to right, the main control panel can be split into several control sections, and each one of these has a distinguishing letter. Section A contains, among other things, the output stage, which houses a pan control for the overall stereo output, and three pairs of increment/decrement buttons to adjust pitch, decay and level respectively: these operate on whichever pad was last triggered. The decay can be anything from 40ms to about 13 seconds, which is no mean feat.

Section B is to do with recording, programming, and loading data into the machine. There are two ways in which to programme the Inpulse. 'Record' puts the unit into real-time recording in time with the metronome click-track, while 'program' selects step-time recording. When this latter mode is selected, a flashing cursor appears on the Inpulse's LED display, and this is moved from side to side along the LED bar until it reaches the desired point, whereupon a simple tap of the required pad will insert one beat at that point. A second tap deletes the beat. The display also acts as a visual indication during real-time recording.

Further pushbuttons in the same control section select whether a song is to be played once or cycled over and over again. A song consists of any number of bars or patterns up to 199, while each pattern can be between 1 and 32 beats in length.

Section C contains the tempo adjusters and related controls. It's possible to store a particular tempo in memory, while the LED display can be programmed to show Beats Per Minute if you require a visual reminder. Section E is simply the 'stop/go' button which is pretty self-explanatory really, while Section F next to it houses the controls to select the click-track and open or closed hi-hat metronome. Both these sounds can be inserted into the stereo mix if required.

Section D is the display, which has been alluded to above and really represents the Inpulse's nerve-centre. In

addition to the functions already described, the display can show the number of beats-per-bar and number of bars-per-song selected, as well as the time-signature (any can be used) and sundry other functions.

Feel And Scatter

Section G is the 'feel' panel. Irrespective of any dynamics that might be programmed into a particular pattern (it is possible to programme a rhythm with no dynamic feel at all, using the 'dyn' pushbutton on the extreme left of the unit) the user can programme accents of as much as 4dB higher or (unusually) lower than unaffected beats, while the 'shift' key enables you to move a beat forwards or backwards along the display by a programmable amount, so that occasionally a voice can be triggered slightly 'off-beat'. 'Scatter' is basically similar to another digital drum manufacturer's 'shuffle', and can be programmed in eighths or sixteenths; the effect can be repeated over one bar or over an entire song.

The remaining control sections contain the numeric keypad and further pushbuttons for control of programming functions. All in all, it must be said that the control layout on the AHB is an extremely logical one, particularly so when you consider the complexity of some of the facilities offered, and should be learned fairly quickly by most users.

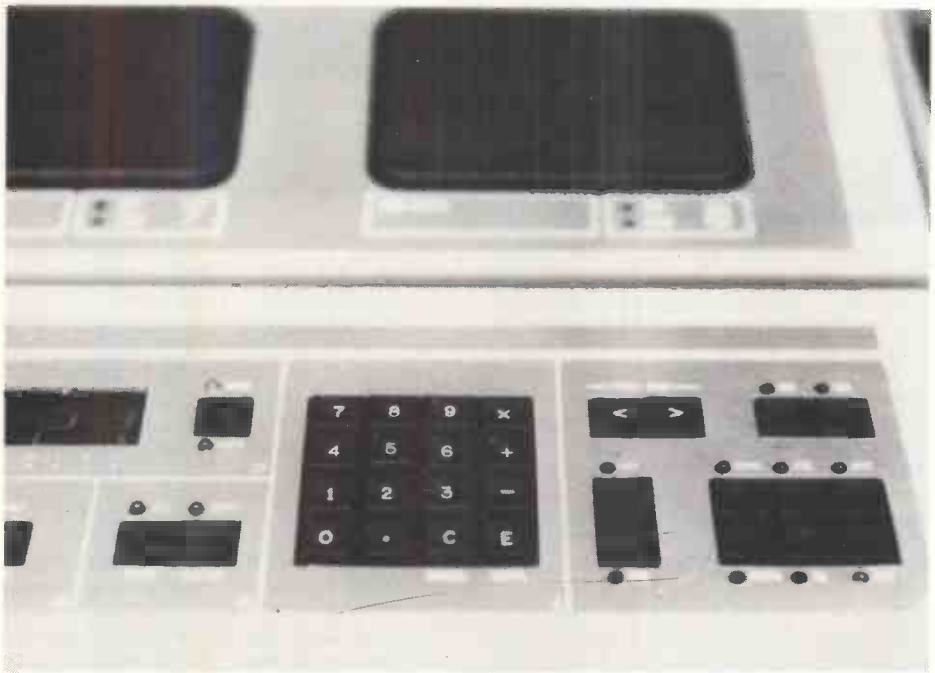
Construction

Inpulse One is built into a flightcase as standard, partly because its designers had received several complaints from musicians who found other less well-protected devices didn't stand up too well to the rigours of live use. Both the two main component boards are shock-mounted, so all in all the unit should take a fair battering before there's any risk of failure due to maltreatment. Internally, the Inpulse makes use of two Z80 (surprise, surprise) microprocessors, and it is hoped that plans to incorporate a standard MIDI interface into the design should reach fruition soon, when machines not already so-equipped will be able to accommodate it as a retro-fit.

Sound Quality

Shortage of time and the fact that the Inpulse tested was in effect a pre-production sample precluded a thorough subjective assessment of its sonic capabilities, but on the basis of what I did manage to hear, I'd say the AHB could rank alongside the very best as regards sound quality. The bass and snare sounds in particular were virtually indistinguishable from the real thing (though whether or not the purpose of drum-machines should be to imitate real kits is another matter altogether, of course) and the pitch-tuning and decay adjustment proved invaluable in creating sounds that were individual without resorting to costly and inconvenient outboard effects units. No other samples other than those for the basic eight-drum kit of bass, snare, hi-hat, two cymbals and three toms were available for evaluation at press-time, but I for one fully expect any future sounds that might become part of the AHB library to live up to the standard set by the voices tested.

It is hoped that additional sounds (which can be assigned to any one of the eight percussion pads) will be available at a very modest cost, and the fact that they are stored on compact cassette should mean there are very, very few Inpulse owners for whom the prospect of using such voices is not a viable one. Even more excitingly, AHB's engineers are currently working on an additional module (to connect to the Inpulse via the 40-way port) which will enable the user to sample his own percussion sounds, or indeed any sound at all of short enough duration. They do stress however that this development is still a little way off, and that, initially at least, the makers' sound library will be the most practical way of adding voices to the Inpulse's repertoire.

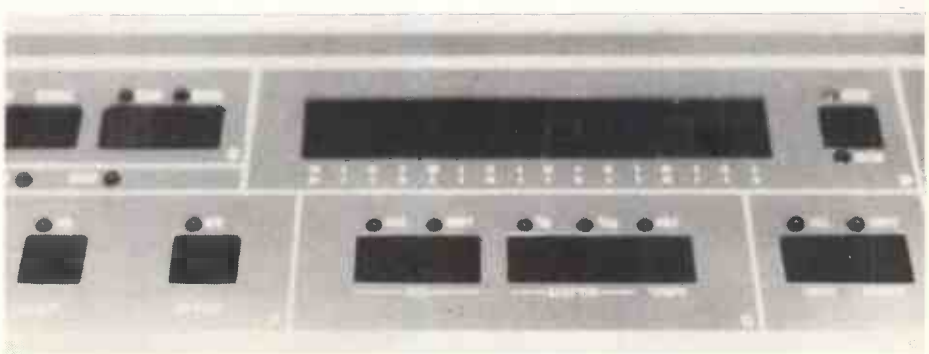


Conclusions

Although the world of electronic drums and machines has grown massively over the last two years or so, very few devices could honestly be said to have broken really new ground. Yet it is my belief that the Inpulse One will do precisely that. AHB quote a provisional RRP of just under £2000, which is expensive but not extortionate when you consider the amount of research that has gone (and is still going) into the model's design. The Inpulse would appear to be one of the few drum-machines currently in production whose development can truthfully be said to be open-ended, and in that respect it could almost be seen as the drum-machine equivalent of the Fairlight.

Even given the fact that the most exciting aspect of the design's overall concept is still some way from reaching completion, as it stands now the Inpulse is an excellent device of immense programming flexibility and design sophistication, all within a simple, robust shell. Few people will be able to ignore it with any safety.

Dan Goldstein **E&MM**



Roland TR-909
Digital Rhythm Composer

Electronic Drum Supplement

Nobody can deny the fact that Roland have done more than any other company, to date, in popularising the electronic drum machine; their TR-606 and 808 models are industry standards, against which all newcomers have been set. Thus, it comes as no real surprise to learn that Roland are expanding their range with the introduction of the TR-909 Digital Rhythm Composer, a 'hybrid' update of their 808 machine. Whether this means *auf wiedersehen, pet* to the glorious 808 or not is still to be seen.

What does come as a surprise, though, is the discovery that all *but* the cymbal sounds on the 909, are synthetically generated (not sampled sounds). However, the percussion sounds available from the machine are totally 'new', not simply copies of the 808's sounds, and are the result of computer simulation tests used to analyse the changing character of drum sounds, in order to recreate authentic 'voices'.

What follows is not strictly a review; rather an introduction to the features available on the TR-909. A full analysis of the unit will grace *E&MM*'s pages as soon as possible, but in the meantime read on. . .

Layout

Visually, the TR-909 resembles it's smaller brother the TR-808, with similar physical dimensions. All connections are retained on the rear panel whilst the newly-styled, grey finished case houses the extensive programming and playback controls. These are well laid out and easier to follow than those on the 808, I'm glad to say.

Briefly, the unit has a capacity of 1792 bars and 96 memories, selected in two banks. Programming is possible in both 'step' and 'real time' via the front panel drum voice selector buttons or the MIDI system, using the rear panel 5 pin DIN connectors.

The inclusion of the MIDI system is a sensible one, and Roland are claiming a world 'first' on this aspect, although rival drum machines are also fitted with the interface. MIDI enables the TR-909 to be played and programmed by any MIDI-equipped keyboard, as well as from Roland's superb new GR-700 guitar synthesiser. At a recent unveiling of Roland new products, I witnessed the unbelievable sight of a drum solo being played on the bottom octave of a Roland HP piano, linked to the TR-909 via the MIDI connection!

Using this facility the TR-909 can be played 'dynamically' ie. with fully variable volumes on each drum sound, dependent upon how hard the relevant piano key is struck (and provided you use a touch-sensitive keyboard!).

Without the MIDI connection, the unit is still capable of dynamic response but to a lesser degree. For, as well as an overall Total Accent control, the majority of sounds have two selector buttons that govern the 'Loud' and 'Quiet' volumes of the instrument, enabling accents to be programmed and remembered within the space of a bar or on every beat.

A 3 number digital readout is also provided for tempo, measure and song information. The retention of the LED sequencing for step time (as on the TR-808) is welcome, and in conjunction with the new-style, illuminated program buttons, makes for a visually appealing, informative front panel.

Both Tempo and Master Volume utilise click-stop rotary controls which make continual resetting easy, although tempos are programmable as well. A Tape Sync facility has been included to enable triggering of the 909 from an external click-track recorded on a multitrack tape, thus making the unit a more attractive proposition to home recordists, and film music composers alike.

Another welcome feature is the inclusion of 'shuffle' which has eight variations to duplicate the human drummer, and to help remove the clockwork feel identified with analogue-type drum machines (if desired).

To help further in this area the TR-909 can also simulate 'flams' (ie. two drum beats in very quick succession) which once again add a useful degree of authenticity to any rhythm pattern.

Programming

Roland have taken the best aspects of the higher-priced digital drum machines, in terms of their programming facilities that is, and included them on the TR-909. These include bar or pattern insertion and deletion capabilities when creating rhythm chains or sequences, and a bar 'copy' facility which both makes life easy when constructing rhythms as well as saving on valuable memory capacity.

Drum Voices

There are 16 individual instrument sounds available on the unit, although this number does include the dual level variations found on the Bass Drum, Snare and Toms.

The controls associated with the instruments themselves, are all located in the top section of the front panel, as on the 808, divided clearly into separate instruments; only this time more variation facilities have been included and more substantial knob caps used (the previous design on the TR-808 were too small for comfort).

Bass Drum offers control of tuning, volume level and attack and decay, giving a very usable range of sounds from a low 'thud' to a 'click'. As well as Tune and Level, the Snare has an overall Tone control and a separate control labelled 'Snappy' which governs the amount of 'snare wire' sound mixed into the main snare signal.

Low, Mid and Hi Toms are provided, each with a Tune, Level and Decay control, covering a similar pitch range as the 808's previous tom sounds. Rim Shot and Hand-clap simply have separate Level controls, whilst the open and closed Hi-Hat has a shared Level control, but individual Decay. This is an immediate improvement over the 808.

Finally, the Crash and Ride Cymbals, which employ digitised 'real cymbal' samples. These both have Level and Tune controls enabling various-sized cymbals to be duplicated. The use of sampled cymbal sounds is a logical move on Roland's part, as cymbals are undoubtedly the hardest instruments to synthesise on a drum kit via analogue means. However, their inclusion is certainly an improvement. The decision to go for synthetic toms may well prove a fortuitous one for Roland, as the majority of digital drums are often lacking in this department, simply because they use only one tom 'sample' and clock it at a faster or slower rate to obtain pitch changes for the various toms. This, inevitably, creates a compromise which manifests itself in less than authentic sounds, and limited programming ability ie. only one tom can be played at a time. This is *not* the case with the TR-909 tom sounds.

Conclusion

Judgement of the instrument's sound qualities must be reserved for an in-depth test, as an exhibition demonstration rarely provides the best indication. Final points to mention though, are the individual jack-socket outputs for every instrument, and the stereo output facility with pre-panned instruments, if individual mixing or treatment is not required.

The final question is 'what price?' Well, at £999 including VAT the Roland TR-909 is not exactly cheap and in the face of the burgeoning competition this may prove a vital factor. What it does have in its favour is the MIDI connection facility, and extreme ease of programming. Will this be enough to attract potential customers? Only time will tell.

Ian Gilby **E&MM**

Further details from: Roland (UK) Ltd., Great West Trading Estate, 983 Gt. West Road, Brentford, Middx TW8 9DN. Tel: 01-568 4578.

THE E&MM ELECTRONIC DRUM GUIDE

On the following two pages you'll find a list of all available (or soon-to-be-available) electronic drum-kits and rhythm-machines. In the latter case, we've confined ourselves to those devices that offer the user some degree of programmability, since the market for machines with only factory-preset rhythms has contracted considerably in recent months as a direct result of increased competition from the programmables, which offer far greater artistic freedom as well as greater programming versatility.

In the case of electronic kits, we've included any device that has strikable pads, so that as well as full-size kits such as the Simmons models, you'll also find downsized machines such as The Kit and Mattel Synsonics. Hybrid devices that offer pads as well as rhythm-pattern programming, like the Music Percussion Computer and the new AHB Inpulse, are also listed here.

Where firm retail prices have yet to be announced by manufacturers or distributors, this is indicated by 'TBA' in the listings. Prices for these instruments will appear in future issues of E&MM, as and when they begin to be implemented.

PROGRAMMABLE DRUM MACHINES

BOSS

DR-55 £75.00
DR-110 £135.00
Roland UK, 979 Great West Road, Brentford, Middlesex.

CLEF

Master Rhythm £129.00
Band Box £439.00
Clef Products (Electronics) Ltd., 44A Bramhall Lane South, Bramhill, Stockport, Cheshire, SK7 1AH.

DR BÖHM

Digital Drums (kit) £669.00
(built) £963.00
Swankit Instruments, Chantry Park, Henfield West, Sussex BN5 9JE.

DYNACORD

Digital Drum Computer TBA
Washburn Ltd., 20 Victoria Road, New Barnet, Herts.

E-MU SYSTEMS

Dramulator £985.00
Syco Systems, 20 Conduit Place, London W2.

HAMMOND

DPM-48 £699.00
Hammond UK, 42 Blundells Road, Bradville, Milton Keynes, MK13 7HG.

KAY

Memory Rhythm £75.00
British Music Strings, Bedwas House Industrial Estate, Bedwas, Newport, Gwent, NP1 8XG.

KORG

KPR-77 £399.00
Rose Morris, 32 Gordon House Road, Kentish Town, London NW5.

ELECTRONIC KITS AND HYBRIDS

AHB
Inpulse One £1995.00
Allen & Heath Brenell, 69 Ship Street, Brighton BN1 1AE.

CACTUS DRUMS
Desert Drums £799.00
Atlantex Music, see MXR.

DYNACORD
Live Pads TBA
Washburn Ltd., see Dynacord drum machines.

KLONE-KIT
Klone-Kit 2 £599.00
Honky Tonk Music, 300-302 London Road, Hadleigh, Essex SS7 2DD.

M&A
K-11B Kit £599.00
Seabright Supplies, 93 Main Road, Broomfield, Chelmsford, Essex.

MPC ELECTRONICS
The Kit £149.95
The Clap £69.95
The Synkit £59.95
The Tymp £59.95
Music Percussion Computer £875.00
Live Pads £389.00
MPC Electronics, The Gables, Station Road, Willingham, Cambs CB4 5HG.

MATTEL
Synsonics £99.00
Atlantex Music, see MXR.

SIMMONS
SDS 6 Sequencer £1250.00
SDS 7 Sequencer and Kit £1875.00
SDS 8 Kit £675.00
SDS 6.7 Package £2855.50
Clap Trap £101.85
Simmons Electronics Ltd., Abbey Mill, Abbey Mill Lane, St Albans, Herts AL3 4HG.

LINN
LinnDrum £2699.00
Syco Systems, see E-mu Systems.

MOVEMENT
MCS Percussion Computer £2290.00
Movement Audio Visual, 61 Taunton Road, Bridgwater, Somerset, TA6 3LP.

MXR
185 Drum Computer £1550.00
Atlantex Ltd., 1 Wallace Way, Hitchin, Herts.

OBERHEIM
DMX £1999.00
DX £999.00
No representation in the UK.

ROLAND
TR606 Drumatix £199.00
TR808 £745.00
TR909 £999.00
Roland UK, see Boss.

SEQUENTIAL CIRCUITS
Drumtraks £950.00
SCI Europe, Postbus 16, 3640 AA Mijdrecht, The Netherlands.

WERSI
Wersimatic CX1
(kit) £1175.00
(built) £1782.00
Aurasound, 14-15 Royal Oak Centre, Brighton Road, Purley, Surrey.

YAMAHA
RX15 TBA
RX11 TBA

the next step

The advent of a truly classic instrument is a rare occurrence. The sort of instrument that revolutionises the musician's art and leaves it's mark on the music of an era. The SDS 5, the world's first electronic drum kit, was such an instrument. It's successor would have to embody it's pioneering spirit while taking full advantage of relevant advances in technology. The SDS 7 is a system fully equipped to shoulder such a responsibility.

The rack can house a maximum of twelve modules. Each has two independent sound sources; the analog section which generates the classic "Simmons sound" and the digital section which is a recording of a real drum, stored in memory.

A variable level of either or both of these sounds can be routed through a versatile group of filter controls, providing an incredible range from real drums, through the classic "Simmons sound" to outrageous percussive effects.

The "programmer pad" enables one hundred different "drum kits" to be compiled giving a total of twelve hundred user programmable sounds and a choice of sixteen of these pre-programmed "drum kits" can be recalled by striking the appropriate section of the "selector pad".

The newly designed drum pads feature a specially developed, "softened" playing surface, reaching new heights in dynamic control.

We started a revolution. Ask your dealer for demonstration of the next step.

SIMMONS

Simmons Electronics Limited

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

Roland SDE-3000 Digital Delay

The microprocessor revolution of the last ten years seems to have had implications nobody foresaw in the mid-70's when the 4-bit and then the first 8-bit CPUs were produced. Initially these devices were scorned by 'serious' computer users who, in general, considered the microprocessor a quaint and rather amusing toy and failed to recognise it as the threat it was to become.

Even the designers themselves had modest aims. Their original intention was merely to introduce an intelligent logic chip which could be used in vending machines and the like! They never envisaged that anybody would have sufficient programming ingenuity to make the things run as computers in their own right and they certainly didn't imagine that anybody would write operating systems, high-level languages, advanced applications software such as word processors, and so on.

Yet all this happened, and in a remarkably short space of time. Nowadays the micro finds its way into hundreds of different consumer goods – some very sophisticated, some less so. Many ideas which would have been impossible or uneconomic to realise a few years ago are now being brought to fruition, and one of the more accessible results of this technology is that it has enabled digital audio to establish itself. The digital delay line is now considered almost a standard fitting in even the smallest of studios and is portable enough and cheap enough to be used by many musicians on stage. It offers more versatile delay-times and bandwidths to its analogue competitors and, of course, prices are continually falling and may be expected to do so for some time.

The microprocessor is taken for granted as a standard component of a modern signal processor and its recent humble beginnings are already being forgotten. The Roland SDE 3000 is a typical example of a microprocessor-controlled effects unit and retails for £799. It is a digital delay line offering long delays and wide bandwidths at a very high quality indeed, and conforms to the standard 19" rack mounting system, measuring 1U in height. The unit is finished in black with colour-coded lettering in white, yellow, green and blue which is helpful and not nearly as gaudy as it might sound. A twelve-digit LED display is employed to show the state of the system. The overall result is a unit which is beautifully smart and rather futuristic.

Layout

The majority of the controls are situated on the front-panel and all the connections (made by ¼" jack sockets) are at the rear. In an effort to offer better resolution in setting up, Roland have abolished the more usual rotary pots almost entirely and replaced them by a simple and yet effective switching system, a move which seems to be much favoured by manufacturers at the moment.

The switching works as follows. The delay time in milliseconds, feedback level, delayed signal level, modulation rate, and modulation depth are all shown simultaneously on the main display. Each setting may be incremented or decremented using a pair of momentary action buttons which will auto-repeat if held down. This allows the delay to be specified to an accuracy of 0.1ms for delays of less than 10ms and to the nearest 1ms on higher delays, and allows the other control settings to be made to an accuracey of 1 in 100. This is much better resolution than could be achieved using a pot but sacrifices speed of setting-up at times.

Working from left to right, the front-panel houses a bypass push-button with a corresponding LED, a VU meter (– 20dB to + 6dB which employs six LEDs, the Input pre-amp level control which may be set to give any gain from -22dB to + 6dB (using the only pot on the front panel), filter on/off (which is cryptically described in the manual as helping to provide a realistic echo effect. Delay x2, delay phase inversion, modulation on/off, feedback phase inversion, and the memory controls discussed below follow, and next come three LEDs showing the modulation rate, the delay rate (eg this flashes every 2 seconds if a 2000ms delay is set), and Delay on/off, the main display which is very bright and clear, the switch pairs used to alter the control settings, and finally the mains power switch.

The memory itself is very easy to operate. Eight separate channels are provided and so up to eight individual effects may be programmed in advance and called up at the touch of one or two buttons. The memory is divided up into two banks (A and B) of four channels. One push-button alternates between the two banks and four further buttons are used to select the desired channel. Each of the switches has an LED built-in which changes colour from green to red according to which bank is selected. Hence it's surprisingly easy to keep track of the system and these five switches allow any channel to be called up quickly. There is a very brief pause after a new channel has been selected while the unit changes its settings but this is unlikely to cause any problems unless the effect needs to be changed during a fast piece.

Each memory channel remembers the settings of delay time, feedback fraction, output level of the delayed signal, modulation rate and depth, and also stores the state of the filter, delay phase, modulation, and feedback phase. In fact the only parameter that is not held in memory is the gain of the pre-amp. To program an effect into memory the required settings are made manually and then the desired channel push button is held down for about two seconds, until its LED starts to flash. Once this has been done the previous channel contents are erased and the new settings are substituted. The memory retains its contents even when the power is removed so the unit does not need to be reprogrammed each time it is used.

The rear panel houses a potentiometer which allows the delay time to be increased by up to 50% at the expense of bandwidth. Then come modulation CV output to allow two units to be synchronised together to process a stereo signal, and CV input, to allow triggering by another SDE 3000, an external LFO or the optional footpedal.

Four further jacks permit very comprehensive remote switching to be performed in a number of ways. A footswitch may be connected to 'delay' to simply bypass the unit as required. Pressing the 'hold' footswitch causes the contents of the memory to recirculate indefinitely resulting in continuous sequencer-like patterns. The 'preset' jack steps successively between the eight memory channels. So if a number

of effects are programmed into memory in the order in which they will be used on stage, they can be called up very easily.

Feedback loop send and return jacks are also provided. Roland suggest two possible uses for these connections: first, a graphic equaliser may be placed in the feedback loop to add variety to the system, colouring echoes for instance. More imaginatively, two 3000s may be interconnected by patching the send of one to the receive of the other to give delays of up to 9 seconds!

Input, delayed output, and mixed output are available, and finally a level-matching switch (-20dBm or +4dBm) is provided which may be used in conjunction with the input gain pot to cater for a wide variety of input devices. An electric guitar, keyboard or mic may be directly connected using the -20dBm setting.

Construction

In addition to looking good the unit is also very well-built. The case is strong and sturdy and surprisingly heavy for its size. It is certainly rigid enough to be used free-standing on stage if kept well out of the way of feet and similar hazards, although a rack is obviously preferable.

The case is reasonably easy to open although a self-adhesive sponge pad supporting the top cover has a tendency to tear and wouldn't last very long if the unit were regularly disassembled. Roland make a plea in the manual (under the heading of 'Important Notes') that the unit should never be taken apart and to be honest there's no real reason (other than plain curiosity) why anyone should want to dismantle it.

Once the top and bottom panels have been removed the electronics can be seen in detail – the case is rather full. A large densely-packed single-sided PCB holds the main circuitry, with the power supply mounted separately on a smaller board. A third board mounted just behind the front panel to house the displays and the switches is just visible. The transformer is sensibly mounted inside a metal case to shield the audio sections from its strong magnetic field.

The main board houses a small piggy-back board holding the memory chips. The whole circuit contains over 50 integrated circuits, none of which are mounted in sockets. This seems a strange omission considering the price of the unit and could make life interesting if anything ever needed replacement. The circuit features a common mixture of analogue, TTL, and CMOS.

Two resistors are mounted on the back of the main board as an afterthought. This is obviously a last-minute design modification which does not merit the vast expense of redesigning the whole board. Overall the construction is of an extremely high standard, showing care in every stage of production which should result in a reliable instrument.

Results

The figures quoted in the manual state that the system offers a dynamic range of over 100dB at very low levels of distortion. The claimed bandwidth is 10Hz to 17kHz on the main delay range falling to 10Hz to 8kHz on the dalay x2 range. For stage use even the smaller bandwidth is perfectly acceptable. The signal-to-noise-ratio for the delayed signal is quoted as a startling 88dB. In use the system seems to live up to these figures. As always, signal levels are vitally important but if these are chosen carefully the unit runs very well indeed.

Eight sample control settings are provided. These include:

Echo

Various versions of echo may be obtained varying from sharp slapback effects through to delays of several seconds. The examples given in the manual illustrate the effect of varying the feedback (which determines the number of repeats produced) and the delay level (which controls the strength of the repeats). A little modulation may be added to give a fuller sound but the modulation depth must be kept low to avoid unpleasant effects. The feedback fraction may be set greater than unity and when this happens the echoes gradually become louder instead of dying away.

The unit must be praised since the echoes it gives are virtually indistinguishable in quality from the input fed into it. The results are always very clean and bright. If the feedback level is advanced to approach unity the echoes may be made to continue for very long periods and only after quite a number of repeats does the degradation in signal quality become unacceptable. This degradation occurs because the signal is digitised and then returned to its analogue form each time it goes around the feedback loop, and the minor distortion which results from each of these processes gradually accumulates. The filter may be employed to reduce the degradation considerably. Such a use of the unit would be uncommon since the 'hold' facility can be used instead to give infinite repeats without degradation.

One of my favourite effects with a DDL is to select a delay of something like 90ms with lots of feedback to simulate the ambience of a large room. The unit behaved admirably, giving an effect akin to reverberation on soft passages with sharp distinct echoes on staccato passages.

A sound-on-sound example is given in the manual which is merely a long echo (3 seconds in the manual) which repeats just once. Any input signal is replayed faithfully by the system after a delay.

Doubling and Chorus

The results for doubling are very similar to those for echo since the two effects have a lot in common. The sounds produced are natural and very accurate although perhaps not quite as thick and rich as I had expected. Two examples are given, both using delays of about 25ms. The first is wonderfully rich and believable and really brings an instrument to life. The second was less pleasing but still gave a thickening of the sound.

Flanging

This is one of the better flangers that I have heard recently. A wide range of phasing and flanging effects may be obtained. The character of the delay depends very strongly upon the length of the delay chosen and Roland have obviously considered this since they arrange that delays below 10ms are set to an accuracy of 0.1ms. This makes the SDE-3000 far more versatile as a flanger than the majority of its competitors. Heavy feedback can be added to increase the depth of the notches giving a very useful set of effects. The phase inversion switch further changes the tone of the sound.

Vibrato

A delay of about 25ms may be used in conjunction with the modulation section to give true frequency modulation. With the modulation depth set at zero the signal passes unchanged. If the depth is increased slightly the change is dramatic and the sound quality improves tremendously. Vibrato is a useful all-purpose effect since it can be used subtly to improve a sound without causing any strong or noticeable colouration. It is one of the easier effects to create technically and most DDLs are capable of producing good results: the Roland is no exception and performed to its usual high standard.

Conclusions

I must confess that I've come to like the Roland very much. It is well designed and well made and generates some excellent effects. The price may seem a little high at first sight but the unit really is worth every penny. When compared with other quality systems the Roland acually begins to appear cheap. For those with a more limited budget the SDE 2000 reviewed in *E&MM*, May 1983 is £600 and the SDE 1000 (see this month's *Home Studio Recording)* is £400. The units are very similar in performance, the essential difference being their maximum delay times.

The controls are well laid-out and very easy to use, but the one criticism I would make is that it takes a long time to alter the settings. For instance, to change the delay time from its minimum value to its maximum value takes just over 3 minutes. On stage this would be a ridiculously long time which, I suspect, is why so many memory channels are provided. In the unlikely event that more than 8 totally different effects are required the system might be troublesome. However, I am inclined to think that this would be fairly rare. The remote switching facilities are very flexible and would make the unit very easy to operate on stage.

The manual is written in pidgin English at times but is usually clear and concise and does contain more or less everything you might need to know. The system is actually very easy to use and set up and programming is extremely simple.

The 3000 is a good indication of the way things are going in the design of DDLs, with wide bandwidths and accurate noise-free digital encoding. It gives very good performance at a relatively low cost and has a lot to offer the guitarist, keyboard-player, or general-purpose musician and recording enthusiast.

Ed Stenson **E&MM**

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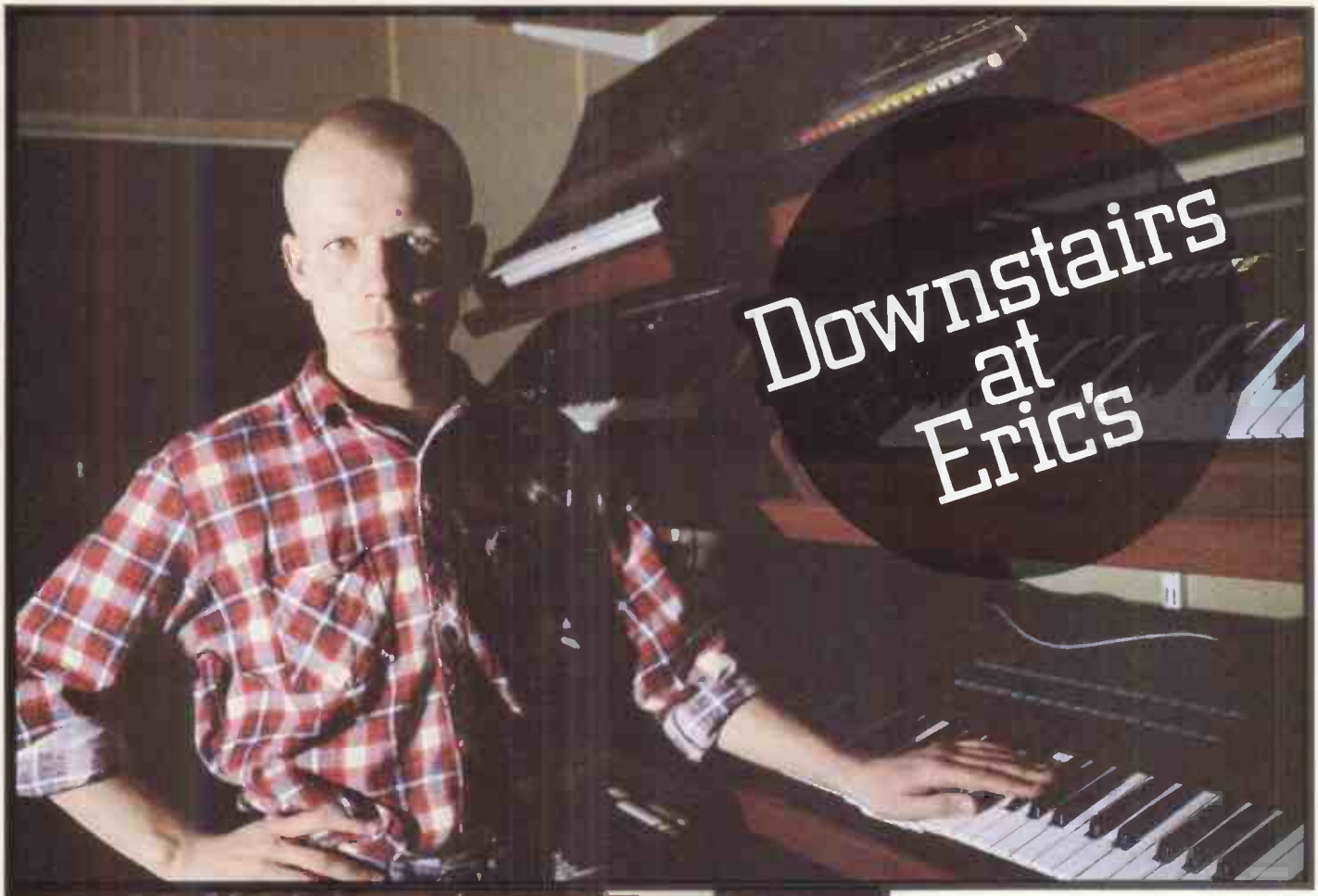
Downstairs at Eric's



In two tiny rooms in one corner of a disused church just off London's South Bank, Vince Clarke, founder-member of Depeche Mode and Yazoo, and Eric Radcliffe sound engineer and producer extraordinaire, have set up a recording studio devoted entirely to the arrangement and production of modern electronic music projects. At the present time, those projects consist of new albums by Robert Marlow, an old friend of Clarke's, and one by The Assembly, a band made up of Eric, Vince, and assorted guest vocalist. The tiny studio houses a treasure trove of high-technology musical and recording equipment, and Dan Goldstein **was fortunate enough to visit it recently to discuss it with its creators.**

Vince Clarke

For as long as I can remember, I've always had problems getting studio time. When we came to do the first Yazoo album, Blackwing Studio, which is just upstairs from here at Splendid, was fully booked-up. I think Depeche Mode were recording their new album there, and there were a couple of other bands in there as well. We had a choice of either recording at Blackwing at 4am every day or building a studio of our own, and in the end that's what we did. Having a place of my own where I can come in and work any time is really the only practical solution: Splendid really is completely different from Blackwing because it's not available for hire commercially. The only things that are recorded here are what Eric and I are working on.

How has your instrument line-up evolved over the years, and how did your current equipment list come about?

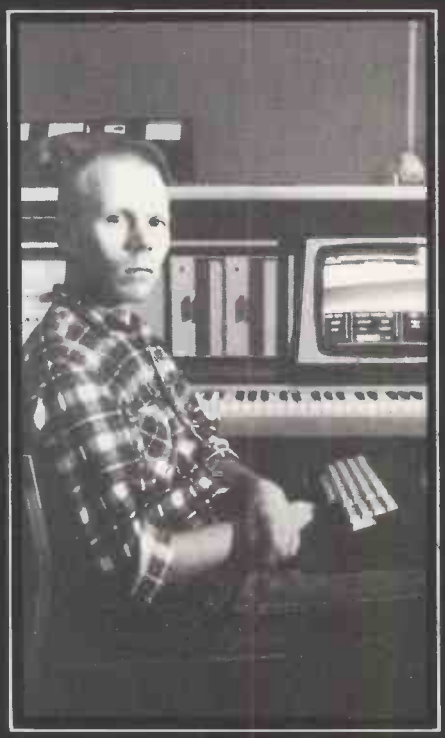
On the keyboard front, the first synth I ever had was a Kawai S110F monophonic. Before that though I'd always been primarily a guitarist, because originally I wanted to be a folk-singer. I used to play acoustic guitar in a gospel duet. Then I started writing songs with Andrew Fletcher (*of Depeche Mode*), and by that time I had an electric guitar and a very cheap PA, plus a dreadful Selmer Auto Rhythm Machine. I managed to persuade Fletcher to get an electric bass, and we used to play the odd gig – in each other's bedrooms!

The main problem was that I couldn't afford a decent guitar amp like a Marshall or something with a lot of fuzz on it. I could have used a fuzz pedal through the PA, but it wouldn't have sounded anything like a Marshall with a proper pre-amp built-in.

When Martin (*Gore*) joined the band, he was the first musician I'd met who had a synth, and it seemed obvious to me that he didn't need any special effects or amplification, because his instrument was really just like a big effects box with a keyboard on it; he didn't need anything else outside it. So Andrew and I decided to get a synth each. Martin had a Yamaha CS5, I got the Kawai, and Andrew borrowed a Korg 700, though just after that he bought a Moog Prodigy instead. And that was pretty much how Depeche Mode started.

We had a lot of cheap drum-machines. I remember an Electro-Harmonix machine that was really terrible, and quite honestly I don't know why we bought half our stuff. In the end though we bought a Dr Rhythm, which was the first programmable rhythm-machine we had, and it was after we bought that that we started playing some serious gigs.

When Depeche Mode signed to Mute Records, I was looking for a synth with memories, and at the time all I could find was the Roland Jupiter 4. In retrospect I think buying that was one of the biggest mistakes I ever made, because the JP-4 is polyphonic and I only really wanted another mono one. Roland did eventually bring out the Promars, which was like a monophonic version of the Jupiter, but even that wasn't around when I was in the market for a synth.



When I was in Depeche Mode, we used to have this thing about playing chords. We used to think that chords were a bit of an easy way out, and in many ways I still think they are. Most people use them simply as a means of padding out a song. Obviously it's more difficult to write a series of different melodies than it is to just write backing chords, but they're much more interesting to listen to, as well as being more fun to play as well. As a band we never really felt the need to play chords as backing, because we had so many melodies layered on top of another, so when I bought the JP-4, I was still playing it monophonically – I didn't use it as a polysynth at all.

The Microcomposer

I suppose the fact that I'm not technically a very good keyboard-player also has something to do with it. After I got the Jupiter 4 I bought an MC4 Microcomposer, and I used it mainly to play parts that I wasn't capable of playing myself. It means that, if you compose a melody, you can store it in the machine's memory and more or less forget about it, which really enables you to concentrate on getting the sound right for that part. The situation's much the same when you're recording as well, because you don't have to worry about playing the part absolutely right: it's there in one take and it leaves you free to concentrate on the recording process itself.

The MC4 came in very useful when I left Depeche Mode and formed Yazoo, because I used it in place of other musicians. The only problem was that the Jupiter 4 hasn't got Gate or CV In, so I had to get a Pro One to work in conjunction with the MC4. That was more or less all I had when I came to do the first Yazoo album: the JP-4, the Pro One, the MC4, and a TR808 to provide any percussion sounds the Pro One couldn't generate!

So it's only recently that you've got involved with more expensive technology?

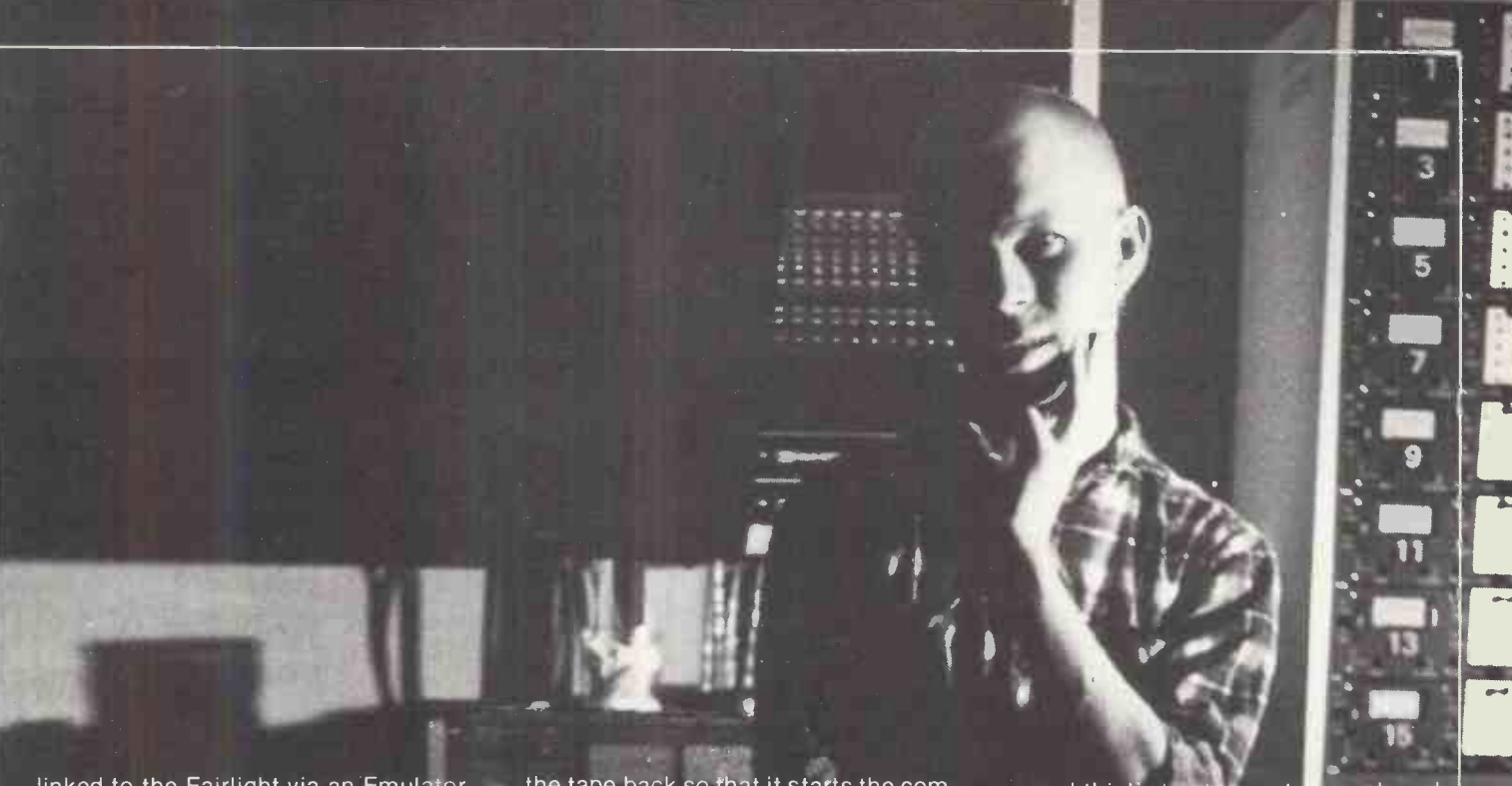
Yes. I bought the Fairlight CMI before I did the Yazoo tour, and the main reason for getting it was so that I could do the tour without using other musicians, in addition to which I also had this vague notion that it would be cheaper to do things that way. The first idea I had was to use two MC4s and eight RSF Kobol racks, but then I realised that would be a bit of a waste, because when you think about it, there's not a lot you can do with eight Kobols outside the tour. When you get in the studio it's useful to have one around, but there's absolutely nothing you can do with the other seven: they're just redundant. So I decided against that and bought a Fairlight instead, because at least that way I had something that could be useful to me in the studio as well.

What I did on the tour was to put one song on each disk, with eight sounds on each song, but one problem was that it took quite a long time to program all that information, so I ended up having to use two Fairlights. While one was playing, the other would be loading up for the next song. They were both very reliable: we only had one minor problem with one of them the whole time we were touring. We did however run into a few problems trying to sync our slide equipment, because that really is another world as far as sync tones are concerned. The computer runs off a continuous square-wave tone, whereas the slide equipment utilises a Q-lock SMPTE tone, so the two were incompatible. We ended up having to convert to click-tracks and it was those that became the problem live – the fact that the clicks weren't as reliable as a SMPTE code.

What role does the Fairlight play in the studio set-up now?

At the moment, Page R on the Fairlight clocks everything. It re-cues all the gear as well, so that when you stop the Fairlight, all the sequences in the other instruments automatically go back to the start as well, thanks to Fairlight's new Conductor board. With the old way of working, if you wanted to run, say, an MC4 and a Fairlight together, you'd have to stop all the other computers in the line and bring them back to the start of the program manually. Now, we're working from one position, and we don't have to keep dashing around the room adjusting everything.

The tone on the Fairlight clocks the MC4, and that in turn programs all the analogue synths. We've started using the MIDI interface on the Yamaha DX7, which is a fairly recent acquisition. It's



linked to the Fairlight via an Emulator Analogue Voltage Interface which Syco Systems have re-programmed for me: basically it does the same job as a Roland OP-8.

Sound Sampling

When we were building Splendid Studios down here, we had the Fairlight upstairs at Blackwing, and while they were demolishing this area of the church to make way for the studio, they turned out all sorts of rubbish down here: bits of wood, china, glass, God knows what else. So I came down here with a hammer and just started smashing everything, sampling all those sounds onto disk. Since then we've sampled most things, from acoustic guitar to Roland TR808, and even a Casio VL-Tone. . .

One thing we have found is that because it's so easy to write things on Page R, it's often simpler to sample a sound from another keyboard and work with it on the Fairlight rather than on the synth itself. When I first got the Fairlight, Page R hadn't been fully developed, so I was using Page C, which is an MCL sequencer. It's not as instant or as visual as page R, because it's really just programming songs the same way you would program a computer, and it takes ages.

The other thing is that when you first get the Fairlight, it takes you a while to become really fluent at sampling sounds. I can remember it took me ages to do anything with it at first, but now its no problem, and of course Page R is a great help for sequencing.

Recording The Fairlight

When we're recording, we take a tone from the Fairlight and put it on one track of the multitrack, and then play the tape back so that it starts the computer automatically. The Fairlight will then either play melodies or cue-in other computers and synthesisers — usually the LinnDrum or the MC4.

We sometimes double-up voices on the Fairlight, putting a pitch-shift between sounds in order to thicken the sounds that are already there. Since we got the Fairlight, we've had the bandwidth improved, which means we can now record its sounds directly onto tape, whereas before we had to do quite a bit of mucking about to brighten the voices up, because there's no doubt they were a little bit dull. Now they're fine though: I'd say the sound are probably comparable in quality with the Synclavier. We did actually use Synclavier on 'Never, Never', the first Assembly single. It's a good instrument, but really once you've used Page R on the Fairlight, I think it's very difficult to accept anything that isn't as instant or visual.

How do you go about writing new material, and do you think your songwriting has changed much during your career?

Well, I began writing songs when I left my gospel duet and started playing in bands. I always wrote on guitar, and even now I still write most of my basic melodies that way. I think it's because I'm a better guitarist than I am a synth player, so I can't really say that any particular keyboard has influenced what I write or the way I work directly.

When I started Yazoo, I don't think anything musical had really changed, though I suppose my lyrics might have got a bit more serious. One of the things I regret is that I don't seem to be able to write as frivolously as I used to. Lyrics seem to be more important to me, even though I know they're not. I've never wanted to say anything of particularly earth-shattering importance in my lyrics. I've got my opinions, but I'm not so sure anybody would be very interested in them. The trouble is that I'm much more conscious of my lyrics now. I think about them too much and they inhibit me quite a bit these days.

There are times when I'm trying to work in here and I just dry up, and it's usually writing lyrics that's the cause of the trouble. If I ever get stuck musically, something normally comes up just through setting-up a rhythm and playing something along with that. Although I still do a lot of writing on guitar, the only time a guitar has actually appeared on record is on 'Never, Never'. That was just an experiment really, though it's possible we'll use the Fairlight to do a similar sort of thing on The Assembly's album. We've now worked out what we consider to be the best way of sampling a guitar, and I think we've now got an excellent guitar sample.

You've also sampled drums on the Fairlight. . .

Yes. When I got the LinnDrum, I forgot about my TR808 totally. But the other day we decided we'd like to sync it to the Fairlight, and we realised we'd have to do a lot of internal fiddling around to make it work properly, so in the end we just sampled each of the sounds, which was really quite interesting. I don't really like any of the sounds themselves; they're not much use unless you actually want to use sounds that are obviously electronically created. The difference between the 808 and the Linn is simply that one sounds like a drum-machine while the other sounds like a real drummer, or at least that's how I see it.

I've never really wanted to use real drummers or real percussion: I don't really see any point in it. Some musicians worry about things sounding automatic and pre-programmed, and use acoustic things to try and introduce feel into records, but when you think about it, the public themselves don't really care how the music is performed. When the man in the street hears a melody, I don't think he's all that interested in the way it's created.

Continued on page 50

Your Person

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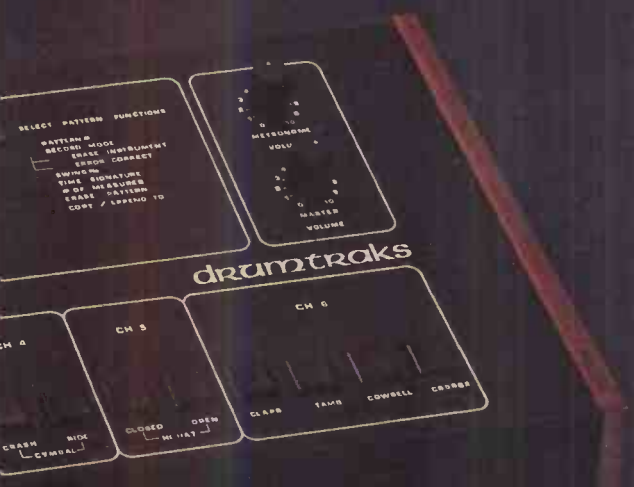

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Downstairs at Eric's Continued

Working Solo

I'm not really wary of other musicians, it's simply that I like working on my own. If I can re-create a brass part on the Fairlight instead of getting in a whole load of other people to do it, then that's what I'll do. It's simply more satisfying to work that way.

Is that one reason why you're not over-enthusiastic about the prospect of playing live?

In a way, yes. Playing live really is too much hassle, and to be honest I don't really see that much point in it. When you play a gig, you're not actually doing anything creative: you're not adding to what you've already done on record. What you've got to remember is that when the public go to see a band, they're expecting to hear pretty much what they've already got at home, so even if I had a whole load of musicians to play with me, I'd still get them to play what I'd played myself in the studio.

New Hardware

What are your most recent equipment purchases?

Well, I got the Yamaha DX7 not long ago. I think it's great, really excellent. When we recorded 'Never, Never', the Fairlight had a much narrower bandwidth than it has now, so we got the Synclavier in, and that was the first time I'd used a keyboard that worked on the principle of FM synthesis. Since then, we've got new voice-cards for the Fairlight, which have made the sound much cleaner, and I've also got the DX7: so in a way I now feel as if I've got almost everything available in terms of the creation of sound. I've got FM on the DX7, digital sampling on the Fairlight, and analogue on the Pro One and RSF Kobol.

The DX7 is very good at voices that *sound* acoustic, but I don't really go out of my way to imitate acoustic instruments. If something ends up sounding like a flute, it's not because I've said to myself, 'I'd like a flute sound here', it just happens more by accident than anything else.

I've also just recently bought a big Sennheiser Vocoder. I'd wanted one for some time – ever since I saw it listed in the credits on the back of Herbie Hancock's *Future Shock* album. I used a Roland Vocoder Plus for the Yazoo tour, but although the basic sounds on it aren't bad, it's not very easy to put external effects on it and it isn't really very versatile. The Sennheiser is linked up to the Fairlight, and it's also got banks of filters that let you change the sound on-board, without having to use any studio effects.

Eric Radcliffe

When I was about fifteen years old the group I was booked into a four-track studio to do some demos, and I first got a taste for recording then. I had an Akai reel-to-reel at home at that time and I built a studio in my front-room, with multicore cable running into my bedroom which acted as the control room. I started off recording my own band, then when word got around that I had a 'studio', other people started coming in to record as well, and really it just snowballed from there. I managed to get a second Akai machine and so spent a little while bouncing between the two, and then eventually I was able to afford a four-track Teac, which very soon became an eight-track one. It was with that machine that I came up to London and set-up the studio here at All Hallows' Church. It was really only then that the studio – which I called Blackwing – took off in earnest.

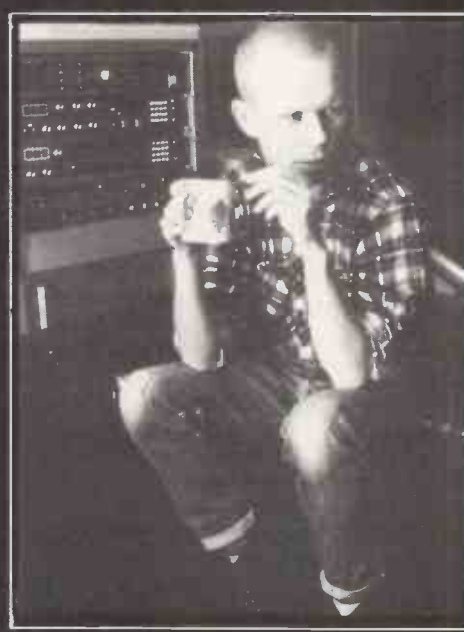
From eight-track I went on to a Soundcraft 16-track machine, and shortly after that I acquired a second Soundcraft and locked the two together to give 32 tracks. We did a lot of Yazoo and Depeche Mode recordings using that system, but I then decided to rationalise the set-up, so that now I've got two 24-tracks, one at Blackwing and the other here at Splendid.

I haven't only been involved with synths, though. I did a lot of demo work with guitar-based bands, particularly when I was starting off here as an eight-track. I've really recorded all sorts of people, from professional bands demoing albums to musicians just starting off who were really new to recording. That diversity is reflected in the fact that there are no keyboards at Blackwing Studio, at least not built-in, though we can get almost anything in at extra charge and it's instantly interfaceable.

What sort of things do you bear in mind when you're recording synths, when you're working on something specifically for a record, for example?

Well, generally speaking, cutting onto disc means a loss of information at both ends of the frequency spectrum. When we get a final mix set up, that's not the end of the story, because you've got to bear in mind that what sounds good on big studio monitors doesn't necessarily make the grade on domestic music centre speakers or transistor radios. So when we've done a mix that we're happy with on the evidence of what we can hear on the big speakers, we then listen to it on three other pairs of monitors of differing sizes, plus a tiny elliptical speaker that we have here for the transistor radio test, and then it's out into the cars just to make sure it sounds OK in that environment. It's only by doing that continuously with every mix you do that you begin to get to know which sounds will work and which won't. Eventually you pick up a bit of a feel for it, and you can select sounds that you know from your experience are suitable for cutting onto vinyl. It's possible to spend something like a day or more making fine adjustments to frequencies, just shifting pitches slightly so that the finished track will fit in with all the available formats. There are some other specialised considerations to take into account as well, because if, for instance, you're working on a potential single, you've got to make sure the mix will survive being put through Radio One's compressors.

Although synthesisers should in theory be easier to record than acoustic instruments, because for one thing you don't have to mike everything up individually, they do in fact present their own set of problems. One very important thing to bear in mind is that when you're recording synths you're



dealing with discreet frequencies from electronic signal generators, as opposed to acoustic instruments where the frequencies are generated naturally over a much broader bandwidth. I think it's for that reason that you've really got to remember the characteristics of the various types of speaker systems the music is likely to be heard through.

What reverberation devices do you use?

We've got a Lexicon 224, a Lexicon 224X, a Quantec Room Simulator and an AMS system. So really that's four very good quality reverbs. We also use quite a bit of natural echo, because there's a long corridor that still has the original church stonework intact, and above Blackwing Studio there is a natural echo chamber which lies under the main roof of the church. When I originally designed Blackwing, I left the area under the roof as a natural echo room, really because it seemed too good to waste. I think nowadays the selection and application of reverb has

become the most difficult – and at the same time, the most productive – area of the recording process, because that is where a lot of the new production work is going on, particularly with things like drum sounds. I spend a lot of time adding reverb to the LinnDrum and the Fairlight, because it is very difficult to get it absolutely right, though when you do of course, the results can be very impressive.

The dangers of applying too much reverb are that if everything is saturated in it, you tend to get a lack of contrast and dynamics in the music, because the reverb fills the spaces that the notes leave. The result is a chaotic, saturated sound. I think the technical term is 'entropy': an increase in chaos. I wouldn't say there's much we record that's absolutely dry, but what does tend to happen is that because we have such a large selection of available reverbs, we often leave that selection until the mixing stage, unless we come across a particularly striking effect during composition.

Quantec

The Quantec doesn't quite have the bandwidth of some of the other reverbs we have, but the suppliers tell me that the top-end has been cut deliberately to make the effect more realistic. It's certainly the smoothest reverb we use, but on the other hand, there are lots of things that say, the Lexicons can do that the Quantec can't, and vice versa. There's no one universal reverb. Each of them has their good points, and the trick is to find them, which is really only something you learn from experience.

What we also do with the Quantec is freeze a sound and then gate that from the Fairlight or the MC4 into the track as a part of the music, so that in effect you're *playing* the reverb into the music.

We often combine more than one reverb device to create a sound. One particular example that sticks in the memory is the snare-drum sound on Yazoo's 'Don't Go', which we did by using the Lexicon 224 and 224X ganged together in tandem, as it were. We came across that sound entirely by accident, but then again, in the final analysis I think you discover almost everything by accident, just by fiddling around. Very little of what we do is pre-planned. We haven't used that sound since then, and in general we try to avoid repeating the same techniques, basically because it's much more fun trying to work out new ones.

We have got a lot of expensive outboard equipment, but that doesn't mean there isn't a place for some more down-to-earth gear. For instance we use a Roland Dimension D chorus unit, which can be quite useful in enhancing certain sounds. It spreads sounds across the stereo soundstage without clogging, I find.

What sort of things influenced your choice of studio equipment?

I chose Studer multitrack machines principally because their transport mechanism is very good – very safe; Urei monitors because they're what I'd call 'representative' studio monitors, in that they sound quite similar to most other commonly used speakers, so that a mix from another studio will still sound much the same through them. The only real problem is that if you record something here and then play it back somewhere else, you often find the other speakers don't have quite the same richness and colour of sound: the Ureis do have a tendency to make everything sound good.

Console Modifications

We've got an English Amek desk, which has had to be modified quite substantially to enable it to be used with predominantly electronic instruments. Basically, the desk is built for microphone inputs or DIs, and if you're recording synthesisers at line-level, you don't necessarily need a DI; if anything it represents a loss in the system. So what we've done is built another set of amplifiers into the system, so that it doesn't need that facility, though everything's still switchable so that if we want the DI facility at any time, it's still available. We've also had a lot of additional patching fitted in order to give us extra insert points and so on.

Could you tell us more about the studio's modular design?

The great thing about this studio is that everything is modular, so that in effect the whole facility is infinitely expandable: we never run out of auxiliary sends, for instance. Everything here at Splendid Studios can be patched to Blackwing via tie-lines, and none of the effects are hard-wired – the entire outboard network is on GPO plugs so that any unit can be patched to any other at any time. It puts us in the enviable position of having almost everything on the mixing-desk controllable from any part of the room. That means we can send tones and so on to any piece of equipment we want to use. It's also very unlikely we'll be caught out by a new piece of equipment appearing in the marketplace. As soon as something comes out that we're interested in, we can patch it into the system and up-date the studio almost instantly. We just assign another couple of tie-lines and it's there.

Digital

I have thought about installing a digital mastering system here at Splendid, based on the Sony PCM-F1. I think the problem I might find with it is that it'll be difficult to edit it for the twelve-inch mixes, which we usually do by recording lots of bits and then editing them together on half-inch analogue tape at 30 ips. I'm used to that way of working and in order to edit the digital format, you've either got to use a lot of additional equipment or go outside and do it elsewhere. I don't really like the idea of that because when we do a twelve-inch mix, it's really a continual process which I'd be a bit loath to interrupt.

As for digital multitrack, I've heard of a few problems with it. I've heard of spurious clicks appearing on tape, which wouldn't be so bad if it wasn't for the fact that they're very, very difficult to remove. Once a click or a noise is on the tape, the only way of getting rid of it is to transfer it to another machine and edit it out. Unfortunately, for that you need two digital multitrack studios, which you've got to have available and be able to pay for. I've heard about this problem from a couple of different sources now, and I think I'm right in saying it can happen to Sony or 3M systems. At the moment of course it's only something I've heard and obviously I'd want to check the problem had been ironed out before I committed myself to digital.

The theory of digital is great, just so long as there aren't any bugs. The mastering system seems to be fine to me, and we may in fact be using it here in the not-too-distant future.'

Dan Goldstein **E&MM**

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Neil Arthur and Stephen Luscombe are two young musicians with a surprising talent for crafting a catchy pop melody and producing impressive-sounding recordings with what has often been the bare minimum of equipment. So far, their unique recipe has been a successful one, and Dan Goldstein **chatted to the duo shortly after the completion of their second album about their background, their philosophies, their techniques and their future.**

BLANCMANGE

What sort of instrumentation did Blancmange start off with?

Stephen: For the first recording we did, we had one snare drum, bits and pieces of tupperware, a speaker and a tiny little amp that we used to call the Polystyrene Fuzz-box, through which we put Neil's guitar and bass and the first keyboard I ever had, an Armon Bunny One organ. I suppose, when we first started, Blancmange was a bit like those dreadful things you do in music lessons when you're about five: lots of random hitting of percussion, maracas and triangles, that sort of thing.

Neil: We made an EP – on our own label – of that sort of music, and eventually Stevo got hold of a copy of it through Rough Trade, and he asked us to put a track on the *Some Bizarre* compilation LP that he was putting together. It so happened we'd been doing a few four-track recordings of some more conventional pop songs at around that time, and so we put one of the songs we'd done – 'Sad Day' – on the album. There wasn't really very much to it. It was just Wasp synth, Steve's organ, a little Korg Minipops drum-machine, and my guitar, with some liberal use of reverb and echo machines.

Stephen: Whenever we did a concert and there was a new soundman at the back of the hall who wasn't familiar with us, he'd see us setting up our equipment and say: 'is that all you've got?', which struck me as being a bit stupid really. There seems to be this preoccupation people have with what instruments musicians use, when really they ought to concentrate on the music itself. Neil used to play a cheap old saxophone on stage, and everybody used to laugh at it, but what mattered to us was that it made a good sound.

Early Tours

We did an awful lot of gigs supporting bands in little pubs up and down the country, and eventually we started playing some more prestigious dates. One night we played a gig supporting Grace Jones at The Venue. There were a lot of A&R men there from different record companies, and the concert was a complete disaster, one of the worst we'd ever played. Despite that upset though we managed to get a spot supporting Depeche Mode on one of their first tours, and we also supported Japan on one tour just before we got a deal with London Records. We released a single – 'God's Kitchen' – and went on the road again with Depeche Mode just after that, and the whole thing really took off from there.

Did signing up to a record company enable you to buy better instruments?

Neil: Not at all! In fact, for most of the first album we still had the same basic line-up of equipment, and where that wouldn't suffice, we just borrowed gear. I played an £18 Gibson SG copy –

I think it was a Torreadour – on 'Living On The Ceiling', though nobody seemed too bothered at the time.

Even the equipment we borrowed was quite straightforward really. We had a lot of Korg keyboards: an MS20, a Delta string-machine and a Polysix, plus a Roland TR808 drum-machine and a Jupiter 8 polysynth.

Stephen: A lot of the songs on *Happy Families* had been written some while before. A couple like 'I've Seen The Word' and 'Feel Me' were very old indeed. In a way I suppose we were reluctant to change their instrumentation too much, because we knew they sounded good the way we'd been playing them before.

What sort of things have influenced your music during your career?

Neil: I don't think there's any one thing that's influenced either of us profoundly. There's been nothing that we've heard and then said, 'I want us to sound like that'. I think we're influenced by lots and lots of different things, not all of them musical. Really you're influenced by just about everything around you. If you like reading you'll be influenced by what you read . . .

Stephen: There was one man – a guy called John Stevens – who taught me musical improvisation, and who I suppose played quite a big part in making me what I'm doing now. Really his teaching helped form the basis for my future musical development. He used to hold Spontaneous Music Workshops at an arts centre in West London, and it was really through them that I met Neil in the first place. We used to play any instruments that would come to hand: there was a big old grand piano in there, violins, flutes, and again, all sorts of different percussion instruments. We used to build sound sculptures from bits of wood and metal, and one Saturday afternoon we did a performance of some of our work – using those sculptures – at the Serpentine Gallery in London. There was also a guy called Max Eastley who did similar sorts of things only on a much more grandiose scale, and I liked his work a lot then, too.

Have there been any particular significant lyrical influences?

Neil: Not really. Again, as we were saying with music, there are really too many different things to mention. You might start to write a song, and then because you're influenced by almost everything that happens to you, by the time you finish composing it, the song's been changed 600 different ways.

Simplicity

I do like the idea of writing very simple lyrics, which is one reason why I always liked John Lennon's lyrics. He had a knack of putting things across very simply and poignantly, and I try to do much the same thing with my lyrics. That's not to say there's any great prophetic message in our songs or anything, it's just that simplicity that I'm aiming for.

Stephen: We do take our work very seriously. Being in the music business isn't like one of those jobs where a true professional can knock-off at 5pm every day. Being a musician is like being an actor. Someone like Dustin Hoffman has to live whatever character he might be working on 24 hours a day, and it's much the same with us. Being a musician requires a similar amount of dedication, not because you spend all your time playing but because whatever you try and do, you can't get away from the demands of having to write and record new material, play concerts, do interviews (!) and all the rest of it.

Presumably, then, in the early days, music dominated your lives to less of an extent?

Stephen: I wouldn't say necessarily, no, because it did play an important part in our lives. It was just that it did so in a different way, because it was self-imposed rather than being forced on us.

Neil: When we first started playing music, it was like a kind of therapeutic exercise, something to relax us. When I got home in the evening, I didn't want to paint or draw, because that was what I was doing during the day at college. It was nice to just sit down and write lyrics or play a bit of guitar. Now, we've moved on from music being an important sideline to becoming almost our entire lives.

You've just finished work on your second album. How would you say it differs from Happy Families*?*

Stephen: Well, the first thing is that the songs themselves are longer. We've given our melodies and rhythms more time in which to develop, so that the album is almost a collection of twelve-inch mixes, if you like. What you've got to remember is that, as we said before, a lot of the songs on the first album dated back a long way, so that really the new LP is the first real example people have had of what we're interested in doing now.

Feel

The production is different, too. I think this album is quite a bit rawer in feel, and that's largely due to the producer, John Luongo. We'd wanted to work with him ever since he did the twelve-inch re-mix of 'Feel Me' with all that extra percussion on it. He also produced 'Blind Vision' and in fact the new album was recorded at the same studio as that single, Sigma Sound in New York.

In a way I think we've expanded on a few things that we first started experimenting with on *Happy Families*. Things like backing vocalists and Indian and tribal percussion . . .

You're also touring to promote the LP. Will there be any other musicians playing on stage with you?

Neil: Oh yes. We'll be using a couple of the people who played with us on the album. There'll be David Rhodes *(Peter Gabriel, Kate Bush, Peter Hammill)* on guitar, at least one extra percussionist, and two new female backing vocalists. We'll also be using tapes for the bass and drum parts.

Stephen: . . . I'm not particularly fond of the term, 'backing-tapes'; I think it implies some sort of con, and that really isn't the case with us at all. The tape to us is as important as any other instrument, and when we do a tour, we're not miming on stage, we're performing. The tapes are an important part of our music that need to be there, because they're part of the nature of our music. Our music is designed to accomodate tapes: when we write a melody, we don't then say 'right, let's get a drummer and a bass-guitarist in', we perform those parts ourselves using electronics and store them on tape.

There are still a lot of people around who haven't accepted that idea, even in 1984. I'm appalled at how old-fashioned some musicians are, especially young ones that say 'let's get back to guitars'. Synths have been around for quite a long time, but it's only really over the last year or two that they've been in the public eye and become more accessible. Ten years ago you needed a room full of equipment to get what you can get out of a Jupiter 8 now.

Do you have any problems combining esoteric work with the production of commercial music?

Stephen: Well, that's a difficult one because so far we've managed to make a very good compromise. We've been able to write and record whatever we feel is right at any particular time, and some of it has been commercially suc-

cessful, almost by chance really. What has happened is that we've written a song – 'Blind Vision', for instance – and then taken the most commercial elements from it and emphasised them.

Neil: What you've got to remember is that any song is simply as commercial as the record company wants it to be. 'Blind Vision' is a case in point. Really it's just a simple dance track, but it didn't do so badly. It got to number ten.

Stephen: I think in many ways it's silly not to make some attempt at commercialism, because if you're involved in art and you're at all serious about what you're doing, you've got to have some means to fund your work. Anybody, in any art form, you've got to have some means to fund your work. Anybody, in any art form, whose main activity could be classed as an indulgence, has got to support himself in one way or another. For instance, I'd like very much to do an album of Indian music with some Indian musicians who I met recently, but I know that in order to be able to do that, we as a band have got to have some commercial success so that we can justify our less marketable product to the record company, which makes an awful lot of sense, really.

Neil: The other side to it of course is that it's perfectly possible, once you've had some success, to go for the jackpot and simply try to repeat a winning formula. When we had a hit with 'Living On The Ceiling', it would have been very easy for us to have played the lead melody backwards or something and produced 'Living On The Ceiling 2', but we didn't. We don't really work to any formula at all, we simply do what seems right to us.

You said earlier that you were very wary of an over-emphasis on particular instruments, but have you ever wanted to become more involved in the technical aspects of how synthesisers and so on do their job?

Stephen: Not really. I don't really consider it my job. What I'm good at is writing, primarily, and playing. I'm fairly confident I know enough of the basic building-blocks of how a synth works to enable me to manipulate it and get it to do what I want it to do. I'm not really all that interested in knowing how to modify particular instruments, because I find most of what I use versatile enough already.

Neil: I suppose there are times when, for example, you want to trigger one synth from another and you curse the fact that they're incompatible, and you think it might be nice if you knew how to go about making it work regardless of the synth designers, but on the other hand I don't think it's the sort of thing I'm ever likely to lose sleep over, simply because it isn't that important to the design of our music.

Visuals

Stephen: What is important to us though is the way things look. I know that might sound a bit silly, but almost everybody thinks about the way, say, a recording studio looks, and we just happen to think the appearance of the equipment itself is also important. When you look at something like, for instance, the Jupiter 8, its got a very logical layout, so that you can start programming on it and finding things out very quickly, and it also looks well-built, which gives you a lot of confidence.

I'd say almost all the gear we like and use regularly actually looks good in addition to being versatile and sounding good. I know it may sound a strange sense of priorities, but there it is!

Dan Goldstein **E&MM**

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Dynacord GS824 Combo

AMPLIFIER REVIEW

Low key marketing has really kept Dynacord out of the public eye in the UK for some years. One of the biggest music equipment manufacturers in Europe, their factory in Straubing, West Germany, turns out all kinds of equipment that is now being distributed in Britain through the good offices of Gavin Mortimer. We hope to cover more of this range in the future as it becomes more readily available.

And so to the GS824, probably one of the most comprehensive guitar combos available anywhere in the world. Housed in its own flightcase, with a large front panel that is removable to reveal speakers and control panel, the unit is mounted on castors and closes up for optimum protection when in transit. The front is dominated by two 12" speakers with heavy grilles, held in place by eight large steel clips/bolts. Below this are two massive heatsinks for the twin 80W amplifiers that power the combo. To the right of the heatsinks is the mains power switch.

Front Panel

Above the speakers is the control section. From left to right these are: Hi and Lo input-jacks; input volume; send and return jacks for connection of external effects (or more amps); bass tone control; separate parametric EQ controls for Lo Mid and Hi Mid, with corresponding frequency shift controls; treble tone control, chorus intensity control and LED indicator; reverb intensity control and LED; clean channel volume control and LED status indicator; lead channel overdrive control and lead channel volume; standby switch with two LEDs, one flashing for 'ready' and one static for 'on'. Phew!

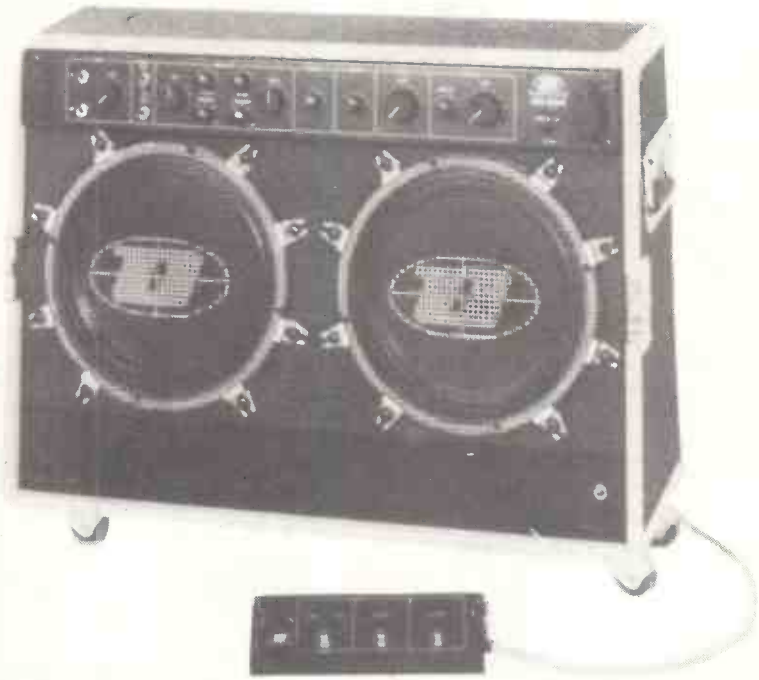
Bear with us, all will be revealed and explained. But first. . . the lynch-pin of the whole operation – the footpedal. This is connected internally to the control section of the combo, with a heavy cable led into the open back. A set of jacks is provided at each end of the pedal, one set on the left for send and return (independent of the set on the control panel), while there is also a 9volt power supply here for powering effects pedals, which is very thoughtful. This can be resoldered internally to supply 15 volts.

On the right edge of the pedal is a second set of input jacks, again Hi and Lo, and both can be used in parallel to the set on the control panel. Three footswitches and four LEDs grace the top – the first switch selects between the clean and lead channels, with an LED for each channel to indicate status, and there's also a switch and LED each for reverb and chorus on/off. The LEDs on the footswitch are linked to those on the panel, and both are lit when the effect/channel is switched in.

The rear of the combo is an open-back slot giving access to the speaker section, while below is mounted a panel. On this are a pair of output jacks direct from the unit's twin 80W amps, and these can be fed to two separate cabinets, left and right. Utilising these will cut out the main speakers. Beside them is a pair of male XLR connectors for studio feed. These supply +6dB/600 ohm unsym, but an extra accessory is available to switch these up via an output transformer (DCN 345).

Operation

So those are the controls and connectors, now to the amp in operation. The instruction manual supplied gives some idea of the scope of the GS824. There are ten 'patches' given, nine for guitar and one for electric piano, and they range from a 'Santana' sound, through 'Jazz' and 'Country' to a wide selection of rock sounds, including two heavy-metal, a 'Dire Straits' out-of-phase tone, and even 'Hendrix'. But these are simply given as a taste of what the amp is capable of. With such a huge level of control over the output, the various sounds that are available span just about every conceivable musical situation.



First, this is *not* a practice amp. It is a professional tool. It can't be run at low levels to any great effect – it needs to be run at a reasonable volume before the reverb and stereo chorus begin to make themselves heard. In operation, the amp is disarmingly silent, and whatever hiss is present can be subtly removed by the use of the parametrics – intelligent use can remove the noise without changing the overall sound. A 'reasonable' volume on the GS824 is, frankly, *loud*! The twin 80W amps coupled to the high-efficiency speakers ensure that the output is as loud as, say, a good Marshall stack of two 4 x 12"s!

So, once an environment is found that can handle this, and really we are talking here of a studio or rehearsal room, then the amp's versatility can be used to the full. The parametric section allows a complete change to the output, while the two tone controls can give a similar cut or thrust to the overall sound.

Reverb And Chorus

The reverb is fairly deep, but seems to lack any real power to it until around 7 or 8 on the dial is reached. On the lead channel, with the overdrive on 5 or 6, the reverb does begin to work a little more noticeably, but on the clean channel, a separate echo device is really needed.

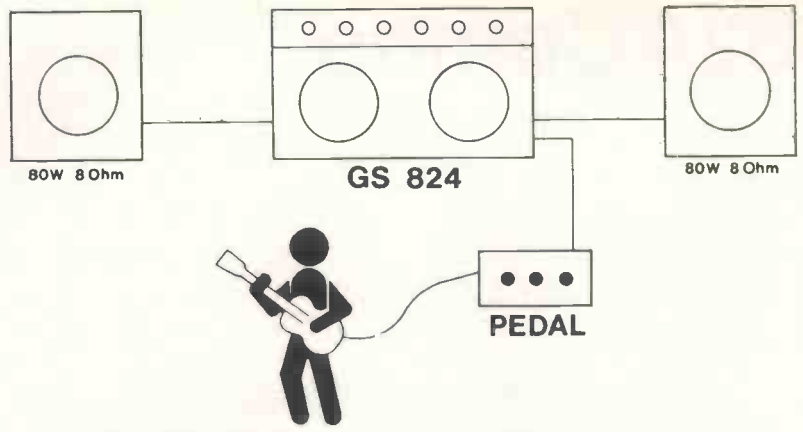
Not so the chorus. In fact, this is so good that it's almost worth getting the GS824 simply for this! To hear the change from the straight clean sound (minus even reverb) to the chorus sound is astonishing. The two speakers are then switched into stereo, and while the separation from two drivers so close to each other is not all that good (you have to be dead on axis to get the best of the effect) the use of the separate outputs puts the sound into perspective. The depth of the chorus is not variable however, though the level of the effect is. Yet despite this limitation, the actual sound from this effect is quite beautiful.

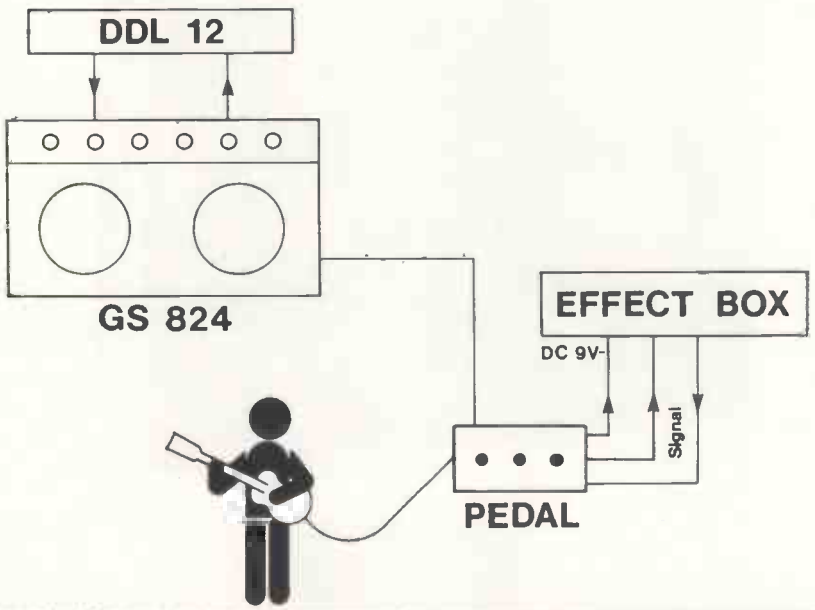
Real revelations, however, start with the lead channel. The distortion/overdrive effect, coupled with the parametrics, gives the player the choice between a harsh biting lead sound (*á lá* Jake E Lee/early Fripp) up to a rich bluesy sustain, something like Clapton or Beck, and anything in between! It is hard to explain in cold print quite what this means, except that the ability to sound like almost anyone means that you can easily engineer a unique sound.

The combination of the overdrive, chorus and reverb opens up new avenues again. For here we encounter the facility to switch between a loud raucous lead sound and a soft chorus rhythm sound. Having the three controls at your feet means there are eight possible permutations of the sounds – and all of them are usable.

Having the opportunity to plug the guitar direct into the pedal is a godsend. It means that the pedal itself forms the link to the amp – so it can be placed in the studio control-room or indeed at the front of the stage, affording a great deal of freedom without the attendant spaghetti of cables that long leads usually entail.

As the GS824 is likely to be recorded from, we took it along to a small studio and





plugged it, first of all, direct into the desk. The stereo separation was tremendous, and while the 'bite' was missing from some of the harder lead sounds, the combination of the lead channel on overdrive and chorus gave full stereo lead guitar. Miking up proved not quite so good. The sheer power of the sounds tends to pose problems unless there are plenty of screens around – but then with the Studio Out available this will seldom be a major stumbling-block. Plugging up to a pair of separate cabinets 'opens' the sound in the same way as the Studio Out – but the instructions for a minimum of 80W capacity (8 ohm) are *not* a joke!

Conclusion

The GS824 displays a level of control over the sound that will almost certainly out-run any amplifier on the market, but at the price, it has to be said that the alternative – that of purchasing the individual components – the chorus, reverb, overdrive etc. – separately would be more cost-effective, as well as allowing for the fact that should any single area of the system go wrong, repairs would not affect the rest.

Having said that (which is, after all, like saying that buying a series of huts is cheaper than buying a house), the GS824 is a remarkable guitar amplifier. The tests run over a series of weeks gave the most consistent results seen in a long time. But what is perhaps the most important point is that the amp has character...and that's a quality that's becoming increasingly hard to find.

RRP is £1,450

Tim Oakes **E&MM**

The Dynacord GS824 is distributed by Washburn UK Ltd., 20 Victoria Road, High Barnet, Herts. Tel: 01-449 7765.

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Rumblings

Sinclair's Quantum Leap

Ever since the BBC's Computer Literacy Project took Acorn's design under its wind as the micro choice for the '80s, there have been mixed feelings on all sides over their treatment of Sinclair and his Spectrum. Wisely, Sir Clive didn't dwell too long on licking his wounds: instead, he's been airing a subtle taunt over the past year that he'd be launching a new micro (dubbed the 'ZX84' by the micro pundits) that would make the BBC Micro seem like peanuts. More importantly, bearing in mind the huge amount of revenue that has been directed in the direction of Acorn and the BBC's corporative coffers (by virtue of the royalty on every BBC Micro sold), the licensing deal for the BBC Micro is now up for re-negotiation, and it'd be a naive man that'd fail to draw any correlation between this fact and the imminent appearance of the so-called ZX84.

Well, all this is set to come to a-head over the next few months when this new 16-bit micro makes its appearance on the market. In fact, the only thing that's common ground between the new Sinclair QL (short for 'Quantum Leap' – this absence of modesty no doubt being a sign of the hard sell to come) and the BBC Micro is its price – £399. However, what makes the QL so exciting to all and sundry are the specs: 68000-type processor, two built-in Microdrives, 128K RAM expandable to 640K with a 0.5Mb RAM pack, analogue-to-digital converter, hard disk interface, RS232 interface, RGB output (very useful if the QL's destined for performing on the box!), joystick ports, modem facility, and a proper keyboard. On top of that, the QL will come equipped with Sinclair's QDOS multi-tasking operating system and four pieces of software, including a word processor, database, spreadsheet, and a business graphics package.

The multi-tasking idea is particularly interesting in the context of sound synthesis, where, for instance, you might want to re-calculate waveform tables at the same time as scaling vibrato and fetching pitch/duration bytes from memory. This mode of operation is also valuable for business software, and no doubt Psion's four QL software packages will use this feature extensively to provide 'windowing', where the output of several concurrently running programs are displayed in different areas of the display.

'What about the sound?', I hear you ask. All I've discovered is that Peter Zinovieff (he of EMS (Putney) Ltd.) has been involved in consultations with Sinclair Research. Whether that means that one of the custom chips in the QL is a special sound chip remains to be seen, but let's hope that Sinclair have been a little more ambitious than IBM with their over-priced and unimaginative PC Junior (or, to those in the vegetarian camp, 'The Peanut'), about which one journalist said, 'even if the Peanut is a lemon it does get a raspberry'...

As far as the future viz à viz the BBC is concerned, it'd take a brave man to predict whether or not the powers that be (and buy) are likely to be swayed by all these yummy specs. There's no escaping the fact that the BBC Micro is an excellent machine, albeit slightly over-priced in contrast to the competition. The real problem facing Sir Clive's crusade against the varlets of the Acorn camp lies with the educational side of the BBC's project. Given that more than 80% of micros in secondary schools are of the BBC Micro type (according to Acorn's advertising copy, that is), who in their right mind would switch over to the unknown territory of a new product – quantum leap or no quantum leap? I'll be watching what happens with interest.

Instant Replay

At one time it looked as if Electro-Harmonix, the darlings of the footloose and fancy-free FX pedal industry, were about to collapse and end up pedalling to Skid Row. In fact, they've pulled all the stops out and gotten back into business with a new range of products catering for those seduced by the digital sampling bug. Though the cheapest of these, the Instant Replay, can hardly be said to fit into the normal scheme of computer musician things, what it does do it does extremely well, with lots of flexibility, and without forcing you to buy a micro and attendant hardware just for the sake of digitising sounds (as with the Apple/Decillionix, Spectrum/Ricoll, and Spectrum/Digisound systems).

Basically, what Instant Replay consists of is a box the same size as their standard FX pedals and an external, touch-sensitive drum pad. Pushing a button on the box puts the unit into record mode (with variable input and trigger levels), and it's then able to digitise up to 2 seconds of sound. Hitting the drum pad then replays the sound with whatever dynamics you choose to add and a pitch that's set by an appropriate knob on the front panel. A continuously looping replay of the sound is also possible. More than that, the Instant Replay also provides the option of external control of the sample playback, with trigger and CV inputs suitable for any 1V/octave synth. And for those of the drumming ilk, you'll be pleased to hear that the unit comes with all the necessary hardware to mount it on Roto-Tom or cymbal stands.

And the price? Well, in the States, Instant Replay is going for $195. So, over here, you can bet on something like the same figure in £s. Still, if you want a monophonic sampling system that's controllable from your own synth's keyboard, rather than an uncomfortable Wasp-like thing (like the Mimic), that seems a pretty fair price to pay. For more info, contact Electro-Harmonix at 27 West 23rd Street, New York, NY 10010, U.S.A. (tel: 212-741-1770).

Passport to Success?

Just in time for the Frankfurt Fair, Passport Designs (the people behind the Soundchaser system reviewed in the E&MM Jan '84) have announced several new software packages. First off is 'The MIDI Network', a package consisting of software, an Apple II/IIe interface card, and a drum timing generator. From what I can gather, the software mimics a multi-track recorder, with 'punch in' and 'punch out' facilities for editing. A real-time polyphonic sequencer, in other words. Of course, as well as the Apple, you'll also need a suitable polysynth equipped with the MIDI interface.

The other Passport offerings are what might be termed 'musical utilities'. 'Pickers' and 'Writers' are basically accounting/spread-sheet programs that aim to tell the musician what's going on in his bank balance. It doesn't take much imagination to surmise that the last of this trilogy, 'Tour', is for the musician on the move. Personally, I can think of more interesting ways of investing my hard-earned royalties...

Unfortunately, we haven't managed to track down prices for the above, but there's no harm in trying Passport Designs themselves, at 116 North Cabrillo Highway, Half Moon Bay, CA 94019, U.S.A. (tel: 415-726-0280).

Alphadac Comeback

One of E&MM's more intriguing projects was the 'Alphadec', published way back in July '81. As it stood then, it was a good, if somewhat expensive, way of controlling multiple analogue synths, whether your own or Digisound's own (excellent) modular set-up. One failing was that no provision was made for saving or loading sequences to and from tape, which meant that memory was non-volatile only for as long as the power was kept on. However, Digi-sound tell us that they introduced a battery back-up RAM last year, and apparently this goes a long way to correcting this deficiency.

To bring things more up to date, the Alphadac system was recently demonstrated on TV, where long compositions stored on tape (or disk) were being played back. Presumably, this means that Digi-sound either have interfacing for other micros than the discontinued (by Tangerine, anyway) Microtan system, or that they've developed further interfacing for the basic system. In addition, the Alphdac development referred to above was demonstrated in a 'Micro-processors In Music Education' conference that was held at the end of January. For more info, contact Digisound at 14/16 Queen Street, Blackpool, Lancs FY1 1PQ (tel: 0253-28900).

David Ellis

The BBC Micro User Show

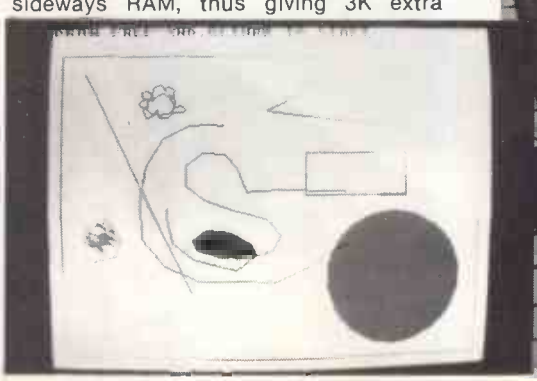
David Ellis braves winter storms and endless video game programs to bring back details of expandable BBC Micros, the Clef Computer Music System and more.

I have to admit that going to yet another computer show in the Westminster Exhibition Centre (the old Royal Horticultural Hall), on a cold and windy Friday afternoon at the beginning of December, after a long, hard day on interminable ward rounds, to be bombarded by hundreds of BBC Micros doing their various things, is more like my notion of purgatory than paradise. Still, I'm always told that going to these things is the way of finding out what's going on, and so off I jolly well went – camera, notepad, and hip-flask in hand . . .

In fact, there was a touch of the Heaven and Hell throughout the exhibition. To start with, there was the physical arrangement of the stands: at ground level, in the maelstrom of human vs. machine/invader/pacman encounters, chaos generally ruled. Looking down on all this was the Acorn stand, placed on high on a convenient split-level end of the hall, with its futuristic tubular construction and serried ranks of BBC Micros giving the air of a quiescent Big Brother keeping an eye on the masses. Not that I have anything against Acorn Computers *per se,* perish the thought, I just wish they'd stop vying for the Queen's Award to Industry and concentrate on supporting sales at home. I mean, where's the fairness in knocking up six special second processors as gifts to the Indian government (along with six complete Econet systems) whilst maintaining a position of obstinate intransignece when it comes to supplying cheap updates of the operating system ROM or fixing the bugs in *View*? How about beginning some charity at home in 1984, you lot at Acorn?

Ramparts

One of the bugbears any BBC Micro owner has to contend with is the fact that 32K of RAM doesn't go very far if you insist on using disks and high-resolution screen modes. In fact, with Acorn's DFS and Mode 0 graphics doing their best to wittle away at the less than well-endowed BBC Micro, you're down to a paltry 5.5K for text storage with a word processor program like *view.* I just wish that Acorn had had the foresight to go for the 64K of RAM that's standard for the Commodore 64 at half the price of the BBC. Still, two companies have come up with different ways around the problem. First, there's the *BBC Sideways RAM System,* from Solidisk Technology Ltd., that puts an 'upgradable to 128K' RAM board in the rightmost ROM socket. The software that's supplied with this board includes routines to move the DFS workspace into the sideways RAM, thus giving 3K extra memory to BASIC, plus the use of the board as a 'silicon disk'. VAT-inclusive prices range from £34.95 for the 16K sideways RAM to £119.95 for the 128K solidisk board. For more info, contact Solidisk Technology Ltd., 17 Sweyne Avenue, Southend-on-Sea SS2 6JQ (tel: 0702-353674).



The second solution is the *Aries-B20* (note the clever astrological pun – 'Aries' the Ram . . .), from Cambridge Computer Consultants, who describe their product as 'unquestionably the most important add-on ever produced for the BBC Micro'. Well, it's also unquestionable that that soupcon of Oxbridge arrogance doesn't impress this reviewer, but the promise of being able to transform the 32K BBC Micro into a 52K machine with just a few twists of a screwdriver can't really be ignored. What Aries-B20 actually does is to use a cunning bank-switching technique that effectively gives back to BASIC, machine-code, or WP text whatever memory is used up by the various screen modes. This means that there's a four-fold increase in text capacity (to 25K) on a disk-equipped machine working *View* in Mode 0. The *Aries-B20* is actually a spin-off from Hybrid Technology's music project, where the idea was to implement a multi-tasking music language by using automatic switching between parellel banks of RAM for different tasks. For just 20K of extra RAM, the *ARies-B20* seems a bit over-priced at £99.95 (inc. VAT and P&P), but I'm told this is because the board uses exclusive CMOS 6116 ASP chips, which, being a mere 1/3″ wide, allow slimline construction of the board and a rather special custom-made connector to the micro.

If there's any negative point about the *Aries-B20,* it's that it won't fit inside the BBC Micro together with one of the various ROM boards being produced by other manufacturers. In fact, an *Aries-B8* sideways ROM board is destined for release early this year (at around £45), but that's obviously not going to help those that already have one of the physically non-compatible ROM boards. Both the *B20* and *B8* are (or will be) available direct from Cambridge Computer Consultants Ltd., Freepost, Cambridge CB1 1BR (tel: 0223-210677).

Beeb, Beep

What was hard to avoid (but extremely easy to resist) at the show was the mind-numbing atmosphere of beeps and other sonic effluents aimed at the unsuspecting ear. It's all very well beeping when you're switched-on, but multiple Xmas carols of

the square-wave variety, where no programmer seemed sure of the original key or even the notes themselves, made me feel I was being subjected to a new and most unsubtle brain-washing technique. Loudest and brashest of all these culprits was System Software's *Music Editor,* which was a shame because this is a rarity amongst the BBC's musical offerings, in that is displays notes on staves and then allows the user graphically to follow the amplitude, duration, and pitch of each note on playback. And for just £9, it's also good value. More on that from System Software, 12 Collegiate Crescent, Sheffield S10 2BA.

So, it was quite a pleasant shock to the system when, going down an avenue of stands which were increasingly taking on the appearance of side-shows at a fair, I realised that a sound of unmistakably musical quality was starting to permeate my consciousness. Not a square-wave in sight, no quantisation of durations according to the 'D' parameter of the SOUND statement, and, what's more, if my eyes weren't fooling me, there was a real, honest-to-goodness music keyboard involved. It transpired that the object of all this intrigue was the prototype of the Clef Computer Music System, designed by Alan Boothman (the man behind the Bandbox et al.), and ear-marked to go on sale at the end of February for 'under £400'.

Actually, the prototype as exhibited was running on an Apple II (no small hilarity in the context of the staunchly British BBC Micro show!), but Clef's intention is to concentrate on getting software up and running on the BBC Micro, with other versions to follow. I'm sure this makes good sense considering the faster 6502 in the BBC and its superior graphics. Also, it's very apparent that BBC Micro owners are getting fed up with the limitations of its rather basic sound capability. In fact, Alan Boothman tells me that the 3-day show generated more than 140 addresses of people interested in putting down a deposit for the system.

To cut a long story short, *E&MM* have decided to back this system, and the April issue will include a *Computer Musician* project series starting with the heart of the system, the 32-channel Programmable Digital Sound Generator, which'll be available as a ready-built module for around £150. The aim of all this is to provide good quality digital synthesis hardware for the BBC and other micros that will encourage the development of musical software. I guess we're fortunate in that we've the alphaSyntauri and Soundchaser systems for models, and the initial software may well reflect a distillation of what's good and bad about these. However, the musical guts of the matter will ultimately be up to feedback as to what's required in this wholly British computer music system. So, keep on thinking of all those opportunities for its uses in music education, MIDI interfacing, pulse-time sequencing and the like.

Going it alone

If there's one good thing to have come out of Acorn's poor delivery record for promised extensions to the BBC Micro, it's that independent companies have taken the initiative to produce their own versions of Acorn's overdangled carrots. For instance, there's the *Amcon* DFS and disk interface kit, which was being exhibited by Pace Software. At a VAT-inclusive price of £95, this amounts to roughly the same dent in the wallet as Acorn's version, but, in this case, the disk interface really can be fitted by anyone with a modicum of grey matter, the interface doesn't use the difficult-to-get-hold-of 8271 disk controller chip, and the DFS is notably superior to Acorn's. Pace Software Supplies can be found at 92 New Cross Street, Bradford BD5 8BS (tel: 0274-729306).

Watford Electronics are another company that have really swung into action in a big way in the BBC Micro marketplace. Apart from their own DFS ROM (£44.85) and disk interface kit (£97.95), they've also developed a wide range of utility ROMs, including new ones such as *Beebfont* (£51.75), which allows the user to develop customer character sets, and *Disk-Fix* (£21.85), a set of disk maintenance facilities. I only wish I'd had the latter last week, when the disk controller chip in my BBC Micro went bananas and scrubbed the catalogue from four *very important* disks.

However, what was really pulling the crowds was Watford's own second processor add-on. Housed in a twin disk drive case, this contains a 4 MHz X80A processor board with 64K RAM, 4K monitor EPROM, parallel printer interface, and a double density disk drive interface. Whereas Acorn's second processor isn't expected before the end of March, and will cost about £400. Watford's is expected by the end of January at a cost of £345. What isn't clear is whether either of these will include the sort of package deal of CP/M software that will make such a relatively expensive option attractive to the business fraternity. For more info, contact Watford Electronics at Cardiff Road, Watford, Herts. (tel: 0923-40588).

On the subject of twin disk drives, Advanced Memory Systems were showing their range of 3" disk drives, starting off with the single 3" drive, complete with DFS EPROM and utilities disk, at £225, and going up to the twin drive at £399. These drives use the double-sided 'turn over like a cassette' plastic-cased Hitachi disks, and though each side has only 100K capacity with the normal disk interface, adding the double density interface of Watford's second processor add-on would boost the total storage capacity to a very respectable 400K. Mind you, these 3" disks don't come cheap at £46 for a pack of ten. There's also the problem that Sony are using a different 3" standard, so exchangeability of software is likely to be a thorn in the flesh unless you've got friends, colleagues, etc. with exactly the same type of drive. Still, don't be deterred; the good thing about these disks is that they're impervious to sweaty fingers, cat haris, and being run over by a ten-ton truck (or so it's claimed). Advanced Memory Systems reside at Woodside Technology

The Clef Computer Music System plus crowd-puller.

The Aries B-20 successfully fitted in the BBC Micro.

Centre, Green Lane, Appleton, Warrington, Cheshire WA4 5NG.

The plot thickens

Putting together BBC graphics with the long-winded MOVE, PLOT, and DRAW commands is enough to exhaust the patience of Job, let alone the average member of the human rat-race, so any product offering side-steps to pixel perfection is of considerable interest. Computer Concepts were showing off with their new Graphics ROM, which includes over 28 new graphics-related commands for doing some of the design dirty work. These include the tools for constructing sprites and animating them, the manipulation of LOGO 'turtle' graphics, and sundry other joys such as fast circle drawing, filling in, and some 3D graphics routines. The Graphics ROM sells for £33.35 (inc. VAT and P&P) and is obtainable from Computer Concepts, 16 Wayside, Chipperfield, Herts. WD4 9JJ (tel: 09277-69727).

To cater for the more artistic punter, a couple of companies had graphic tablets on offer. First, there wass 'Beebplotter' from Watford Electronics, which connects to the BBC Micro *via* the analogue port. At £80 (+ VAT), this is hardly cheap, but it has a nice large drawing area (32cm x 23cm) and a good range of drawing routines. Secondly, there was 'Grafpad' from British Micro. This is more expensive at £125 (+ VAT), but it's a better-made product – even taking into account the fact that the drawing area is smaller (24cm X 19cm), the resolution (0.75cm, translating to 320 x 256 pixels) less than that required for serious design work, and the software somewhat simplistic. For more details, contact British Micro, Penfold Works, Imperial Way, Watford, Herts. WD2 4YY (tel: 0923-48222). Actually, Acorn themselves were previewing the BBC Micro version of the Bit-Stik CAD system originally developed for the Apple II, but no firm price or release date has so far been decided upon.

Buggies and beasties

Finally, a run-down of some of the more unusual bits and pieces for the BBC Micro, without which no micro show would be worth its salt. First off is the *BBC Buggy* from Economantics. This 3-wheeled robot sells for £189 (inc. VAT) in the form of a supposedly simple-to-build FisherTechnik construction kit, complete with the software required to get it moving. And if you get fed up trying to make it into a K9, there's always the Beeb option of using it as an expensive (very) dumb waiter. Economatics (Education) Ltd., are at 4 Orgreave Crescent, Dore House Industrial Estate, Handsworth, Sheffield S13 9NQ (tel: 0742-690801).

Commotion were showing their *'Beasty'* interface, which enables the BBC Micro to control up to four servo motors in whatever robotic situations that take you fancy. The *Beasty* module is available for £49.95, and a standard type of servo for £13. Commotion's address is 241 Green Street, Enfield, Middlesex EN3 7SJ (tel: 01-804 1378). The big question is: what the hell do you do with this sort of mini-robot apart from picking up (and usually dropping) cups of coffee? Any ideas for turning the *Beasty* into a musical maestro? Micro-controlled baton-waving, perhaps...

On the video side, there was the R.H. Electronics 'Video Digitiser' doing its best to digitise against all the odds (too many people wanting their mugs immortalised in dot-matrix format and a recalcitrant prototype PCB that kep on forgetting it was on show). In fact, each time I went back to see whether they'd got their problems ironed out, they hadn't, so here endeth the report

on that front. Here's their address all the same: R.H. Electronics Sales Ltd., Chesterton Mill, French's Road, Cambridge CB4 3NP (tel: 0223-311290).

More tangibly successful were the products of Video Electronics Ltd. Their *'Beeb-Lock'* is a box of tricks that synchronises the interlaced RGB output of the BBC Micro to a standard 625-line composite video signal from a camera, studio, video, or whatever. The idea behind this is that you can then use the BBC as a low-cost alternative to expensive TV caption and graphics generators. VEL also offer a 'Micro-Mixer', a two-channel vision mixer with a computer interface so that it can be controlled by programs running on the BBC. Unfortunately, these units aren't cheap (in fact, I was sufficiently phased by the prices that I promptly forgot them), but that's quality video stuff for you. VEL are to be found mixing away at Wigan Road, Atherton, Manchester M29 0RH (tel: 0942-882332).

Well, that concludes my look at the BBC Micro User Show – I flatly refuse to apologise for not including any mention of games! Till next year, then...

David Ellis **CM**

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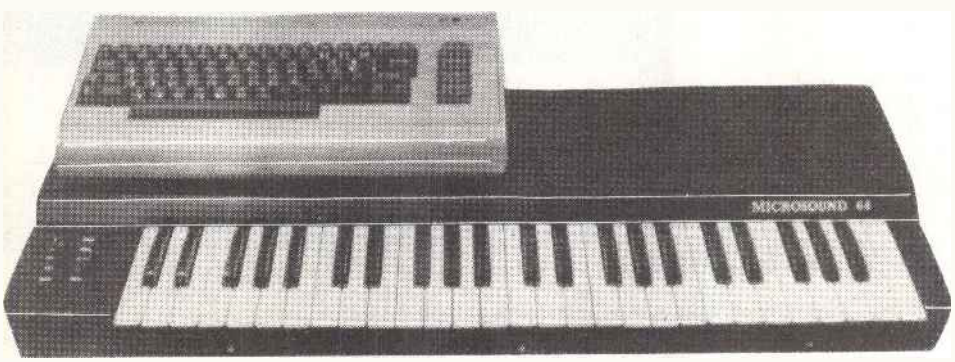

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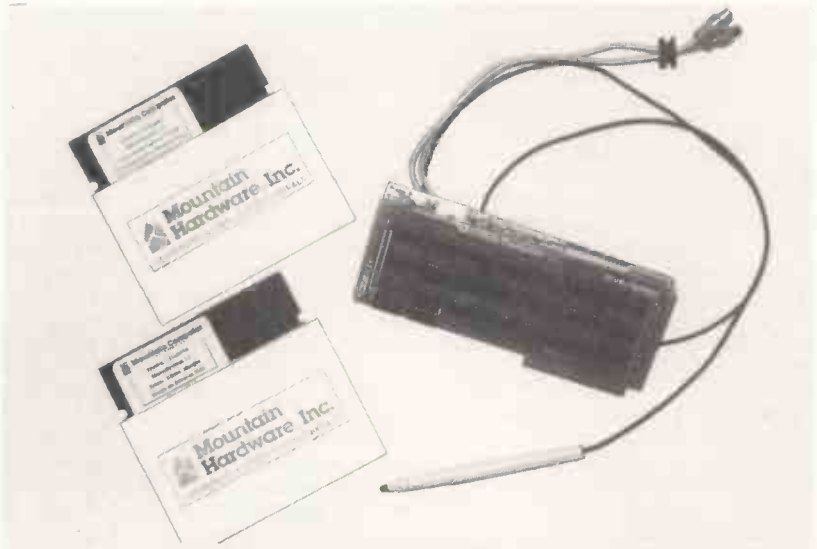
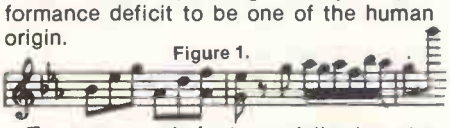
Music Composition Languages – Part 3

The idea behind this series of articles is to follow the path taken by musical notation, from the traditional principles to be found on any sheet of printed music to the development of special high-level languages for the synthesis of music on computer-based equipment. In the third part, David Ellis **takes a look at how well a couple of commercial MCLs – the Mountain CME and the Fairlight Composer – are singing for their supper .**



The major problem encountered in putting an MCL into practice is one of making it all things to all men. Nobody has exactly the same ideas when it comes to creativity, and the ways in which musicians go about ordering their musical building blocks is about as variable as any other aspect of human existence. Unfortunately, life doesn't revolve around one-off personalised MCLs, so compromises are generally the order of the day – particularly when it comes to tailoring one's requirements to what technology is able to offer in the way of cutting the cloth. Whilst it is true that microcomputers sometimes impose too much of their own character on their musical activities, both from the standpoint of sound synthesis itself and getting an MCL to work efficiently enough so that it's a help rather than a hindrance, technological advances are rapidly sweeping aside many of the limitations, leaving the only real performance deficit to be one of the human origin.

Figure 1.

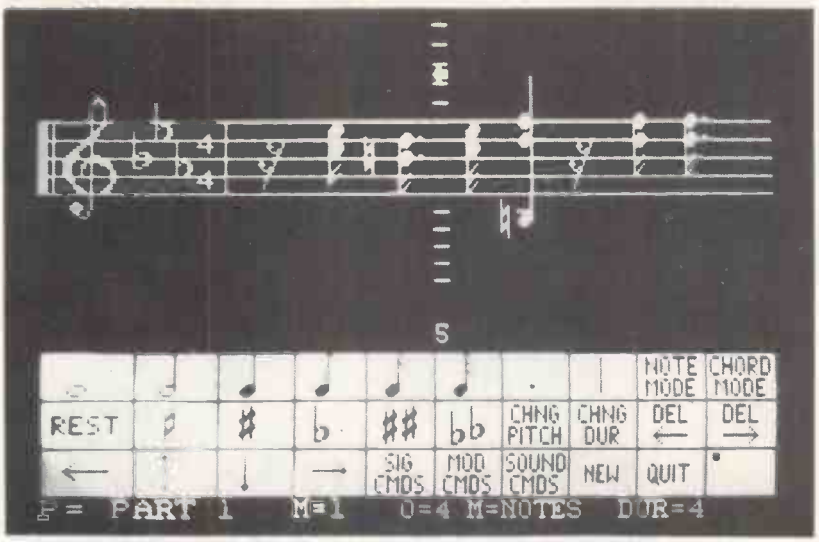


To anyone who's been following the digital disc saga, it'll be pretty obvious that the professional audio engineer's view of the audio obtainable from 8-bit systems is generally as damning as he can get. In some senses, that's justified (256 steps of resolution isn't quite like what Mother Nature intended), but we're now seeing the emergence of special custom VLSI (Very Large Scale of Integration) chips, such as those developed by Texas Instruments (the TMS 320 Digital Signal Processor) and Yamaha (the FM operator chips in the DX-7 *et al.*), which do the lion's share of the huge number of arithmetic operations and so on required in these synthetic situations, and at significantly better than 8-bit resolution, leaving the standard Z80-type host processor relatively unburdened by the task in hand.

A further limitation to the musical extravaganzas perpetuated on the ever-so-humble microcomputer is that the amount of memory available for storing instrument specifications and the music itself is fairly restricted. An example is in order, so let's take the alphaSyntauri as a representative of mid-price digital synthesis systems. In fact, this system uses an Apple II with 48K of RAM, which sounds like a fair whack of memory from a music storage point of view, but this rapidly gets whittled down by all the system requirements:

System space	1K
Page 1 text	1K
Waveform tables, etc	6K
Page 1 HIRES graphics	8K
Program space	16K
Notes storage	16K

Note that the Apple's DIsk-Operating System doesn't appear in this list – that's because the 10K that this takes up is moved onto a 16K RAM card. If this wasn't the case, ie. if DOS was in its normal position at the top of available memory, then there'd be just 6K left for note storage.



Anyhow, given that DOS is elsewhere and that 16K is sufficient for about 2,500 notes, we're a simple division away from the stark realisation that each note uses up six bytes on average. So, where do all those bytes go? Well, the bulk of them go to determining the pitch and duration of the note, but others assign a part to a particular instrument, set velocity-sensing, and so on. Not surprisingly, the disappearing bytes game holds equally true for Sequential Circuits Model 64 MIDI sequencer for the Commodore 64, where the 64K of memory provides space for around 4,000 notes, or the Fairlight CMI, which has space for something in the region of 10,000.

The point to realise is that the multi-dimensional nature of music demands a whole mass of parameters to describe even the simplest pitched event, and these tend to eat up memory like there was no tomorrow. Of course, there's always the option of adding more memory, but that means more expense, more power consumption, and, anyway, that's escaping from answering some highly pertinent questions: namely, a) what can the user leave out in the way of note parameters without compromising the end result, and b) what ways are there for making better use of the available memory?

Well, one way of answering those questions is to look at some idea of where to go next. And that, in a nutshell, is really the *raison d'etre* of this series. After all, if *'Wordstar'* can become the word processor of choice for CP/M systems, I don't see why we shouldn't be allowed our own *'Musicstar'* (sic) on MIDI/MSX systems. Well, we'll see.

To start the ball rolling, here are a few basic guidelines worth bearing in mind when looking around the Wonderful World of MCLs:

1 Are the characters used to represent notes, durations, and so on easy to remember?
2 Are default values used to minimise the number of keystrokes?
3 Are notes entered in one part immediately visually comparable with notes in another part?
4 Are parts immediately playable after entry?
5 Are there comprehensive editing facilities, including search and copy?
6 Are repeat sections specifiable without re-entering the same notes?
7 Are different parts capable of accessing the same sequences?
8 Are the operations of the program the limiting factor for the rate at which music can be entered?

When you think about it, all we're really after is the musical equivalent of a decent word processor. It shouldn't matter whether you're a two-fingered stabber or a 100 wpm Pitman-trained typist; the 'music processor' should work efficiently for either. But what you certainly don't want is a program that imposes its (or the programmer's) own character on your music. In other words, the MCL should be 'transparent' – like dyeline MS paper, in fact. A good example of the pitfalls that may beset the user of a less than 100% transparent musical amanuensis is the Music Editor program that Mountain Computer includes in the software for their Apple II-based MusicSystem.

Mountain Computer Music Editor

The Music Editor provides two means of entering notes: first, by using a light pen to select options from multiple menus; and second, by employing an MCL from the Apple's QWERTY keyboard. Now, the light pen, though superficially exciting (echoes of the Fairlight), is actually a complete disaster, because, a) it's unbelievably slow, and b) it's insensitive to anything less than retina-scorching levels of brilliance. So, let's get one thing straight at this juncture: man-machine interaction requires a modicum of mutual agreement as regards prevailing lighting conditions.

Fortunately, using the Music Editor from the QWERTY keyboard isn't nearly as much of a strain on the old eyeballs. So, to get a taste of this flavour of MCL, let's do our dirty deeds on the couple of bars in figure 1.

The key entries needed to specify this are shown in figure 2.

The characters used to represent notes and durations are certainly easy to remember, and default octave values and durations help to keep the number of keystrokes to a minimum. The fact that the Editor is unashamedly diatonic could be a pain to those of chromatic inclination, but that's the least of our worries. More annoying is the use of CHORDS and NOTES to switch between entering chords and individual notes (the Fairlight Composer approach of brackets is much more efficient – see later). Let's not carp, though, because one major point in favour of this program is that it converts your string of MCL code into pretty impressive HIRES music graphics (see photo) and that's something that most MCLs shy away from (for good reasons usually).

However, all that glitters is far from being gold, and the manner in which these graphical delights have been realised leads to a couple of problems: first, only one part at a time can be visualised (guideline 3 vanishes in a puff of smoke); and second, the graphics updating is so slow that there's a 1 to 2 second time lag between entering keystrokes and their notational effect appearing on the display (guideline 8: ditto). To be honest, it really isn't much fun when the creative psyche is being held to ransom by a recalcitrant keyboard buffer and snail's pace display updating.

When it comes to the other guidelines, the program tends to fare equally dubiously. First off on the black-list is the fact that you can't hear a part unless you exit from the Editor, run the Play program, and then reload the saved part, a process that takes minutes rather than seconds. Next, there's the hassle of the note buffer, a sort of 250-note scratch-pad, which obliges you to join Wimpey & Son, since multi-part pieces can only be constructed by a sort of pre-fab constructional process (where LOGO meets LEGO, you might say), the cement in this case coming from a Merge program that joins bits together by hook or by crook.

If it turns out that your maximum of 2,500 notes don't quite cohere into a meaningful mass, then you can at least be assured that the Merge program will do its utmost to inform you of of your momentary mental aberration. In fact, it takes great delight in stopping and sulking in a highly singular fashion after eliciting the customary user-error bleep from the micro. To add insult to injury, the Editor program resolutely believes in enforcing a principle of 'one man, one note' to those interacting with its MCL, and doesn't provide any means of programming repeats, copying sections from one part to another, or allowing anything that can be said to save time for the hard-worked muso. So, as far as those guidelines are concerned, the Music Editor gets the thumbs down with a score of just 2 out of 8.

Still, notwithstanding these problems, there's an interesting feature of this MCL to be found on the last line of the example: the coding of different sorts of accents. An MCL that takes the guesswork out of programming anything other than straight notes sounded in a straight way for their entire duration should be welcomed with open if sceptical arms. In fact, I'll go further and say that any MCL that's sussed out how to code all the nuances of articulation must be pretty damn clever, albeit probably living in a fool's paradise. But, just considering what this MCL is suggesting it can do, what alterations to the basic parameters of a note are needed to produce the effect of a staccato? Is it just the fact that the note is played shorter than its written length, or is there also an element of dynamic accentuation? It'd be nice if Mountain Computer had the answer to this quandary, but they don't, and it's sad to relate (sad because they at least made the effort to think of this sort of thing) that their idea of a staccato is most unlike anybody else's.

So, this is clearly a case where the programmer is trying to impose on the musician his own idea of what music is all about, and I can't see many people taking to that lying down. A better way of going about the coding of different sorts of articulation would be if the Editor had the provision to accept 'macros' – pre-defined sets of dynamic adjustments and note shortenings that the particular user felt adequately represented his case for whenever he wanted a note played staccato, staccatissimo, sforzando, or whatever –

```
KEY 3*      TEMPO 96  :4

key of      96        4th
E flat      crotchets/ octave
            min

E1  B  :5  E  G  :4  A  :5  D  CHORDS  F  :4  A  M
eighth                      set entry          bar
note                        for chords         line

G  :5  E  NOTES  R

          back rest
          to notes

G  S  A  G  A  F  B  A  M

   sixteenth
   note

E1  G!  :6  B!

   staccato
   accent
```

Figure 2.

```
0010 !bA : bB : bE: B = 48 : 0 = 3 : V = 8

line
number

key of E flat

48 time
units/
beat

3rd
octave

velocity
rate of 8

0020 B : E : G+ : A : D : (A : F+)

Up an
octave

chord

0030 (G : E) : R : 0 = +

rest

4th
octave

0040 G : B = 24 : A : G A : F : B : A

double
speed

0050 G = 0.5 : GV+2,2 : B+V2,2

half-beat
gap for
staccato

2 beats because speed
is double and +2 points
for velocity rate
```

Figure 3.

that are entered with keystrokes reserved for that purpose. Again, this is just part and parcel of the facilities that should be offered by any decent word processor.

Fairlight Composer

Now, the Fairlight Composer is widely considered one of the best examples of MCL around, and from the experience of my own ears, it certainly seems that it's capable of coding subtleties that do in fact reflect what the composer is trying to say.

Let's have a look now at the key entries you'd use to code the same snippet we fed to the Music Editor program in Fairlight MCL (Figure 3).

The first immediate difference is in the conventions department: the Fairlight Composer is working as a specialised sort of text editor, not as a means of putting notation on the screen, and so it goes the whole hog of using line numbers rather than bar lines, and provides a full range of editing facilities, including such useful things as string searching (in search of the lost chord . . .) and block copying. The Composer wins yet more bonus-points for providing the optional facility of using the CMI keyboard to enter pitches directly, which the program then turns into MCL text.

Unlike the Mountain Music Editor, there's no pregnant pause before a part can be played. In fact, the Fairlight interprets the entered MCL code as it goes along, and, what's more, if it comes across a human mistake, it'll inform you when, where, and how you made it – right down to the particular bit of code on a particular line number. Neat.

The Composer gets around the problem of different types of articulation by bringing everything up (or down) to the level of a sort of ghost keyboard. Thus, the parameter 'V', with values from 0 to 15, determines the key velocity of any one note; 'G' (for 'Gap') specifies the time between the end of one note and the start of the next; and 'H' (for 'Hold') specifies the duration of the conceptual key depression. Though the equivalence of the latter two as far as the MCL is concerned is a moot musicological point, the combination of these parameters makes for an MCL that's capable of ample shading. Furthermore, because the time resolution of MCL playing is as good as 1ms, alteration of the 'B' ('Beat') parameter can cater for any number of subtle timing offsets to de-mechanicalise a performance.

What really strikes me about the Composer is its transparent quality; if you hear something duff then you can bet *you're* to blame rather than the program. Just as the average word processor caters for situations as varied as sending the occasional begging letter to the bank manager (eg. if you've mortgaged yourself to the hilt to acquire a Fairlight!), or setting up the text of a book for direct printing, the Composer raises an equal gamut of possibilities, whether it be writing 3-part canons of the 'Three Blind Mice' genera (the example quoted in the Composer manual!), or an all-the-stops-pulled-out, multi-part, multi-sequence piece that makes full use of the nested repeats facility and the MCL's tree structure (Figure 4).

If there's any negative points to the Fairlight MCL, it's in the area of non-rock applications. It's all very well for any part to be able to play any sequence, but that's not likely to be of much interest to the composer who's main preoccupation is scoring the maximum amount of variation. (One could argue that he's the wrong sort of character for this sort of MCL, but that might be construed as a recipe for off-the-peg humans!) What the Composer does lack is the graphical means of assisting the musician to see relationships between notes. OK, there's no harm in persuading a rock musician to use his ears to sort out harmonies, but classically-trained bods are going to be a bit phased until they get used to perusing screeds and screeds of MCL printout. In fact, Fairlight's new music printing software goes some way to putting back the missing link, but that's another story.

So, a little nit-picking apart, the Fairlight Composer does what it sets out to do extremely well (a score of 7 out of 8 from the guideline point of view, in fact). However, there are areas that the Composer doesn't touch, and it's in one of these, the 'silent compositional processing' alluded to in Part 2 (*E&MM* November 83), that Algorithmic Music Language takes over from where the Fairlight MCL leaves off. That's for Part 4 . . .

David Ellis **CM**

MCL tree structure **Figure 4.**

PIECE

Part 1	Part 2	Part 3	Part 4	*maximum of 8 parts*
Sequence 1	Sequence 2	Sequence 3		*maximum of 32 sequences*

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Computer Musician Questionnaire - The Results

First of all, many thanks for your response to our questionnaire. That's not to say that it was exactly brilliant as far as numbers went, but it was enthusiastic, and it certainly looks like being a good pointer as to what the 1983/84 micro musician is up to. A number of readers also sent in letters with their questionnaires to clarify certain points, and we'll be including some of these in the Letters page over the next few months. Anyway, onward to the results and analysis.

Question 1/2

Of 215 questionnaires returned, 170 readers owned up to having their own micro. Eight had two machines (usually a ZX81, either languishing in a drawer or used as an elegant door-stop/paperweight, plus something else), and had three (obviously musos making a packet out of PRS royalties . . .). This grand total of 182 micros breaks down into makes as follows:

Model	Number	Model	Number
BBC Micro	59	Pet	2
Spectrum	36	Video Genie	2
ZX81	22	Sharp MZ80K	1
Commodore 64	15	PAiA 8700	1
Vic-20	20	Sage II	1
Oric-1	7	Transam	1
Dragon 32	6	Electron	1
Atari	6	Acorn Atom	1
Apple II/IIe	5	UK101	1
Microtan	4	Jupiter Ace	1

There were a good few surprises buried in these results, not least the domination of the market by the BBC Micro and the Spectrum (together making 52% of the total), and unpopularity of the Apple (a miniscule 0.03% of the sample). Perhaps we'll take this as a gentle hint to switch our attention away from the Apple to more popular pastures. . . Actually, on a ranking basis, these results aren't too dissimilar to the weekly Top Twenty charts that appear in *Personal Computer News*. For instance, comparing the questionnaire's results with the *PCN* chart for the week Nov 17-23, 9 of the first 10 micros are to be found in *PCN*'s Top Ten, though admittedly with a good deal of position-changing:

CM Questionnaire		Personal Computer News	
Model	Rank	Model	Rank
BBC Micro	1	Spectrum	1
Spectrum	2	BBC Micro	2
ZX81	3	Commodore 64	3
Commodore 64	4	Vic-20	4
Vic-20	5	ZX81	5
Oric-1	6	Oric-1	6
Dragon 32	7=	Dragon 32	7
Atari	7=	TI99/4a	8
Apple II/IIe	9	Atari	9
Microtan	10	Apple IIe	10

So, how do these results compare with the conclusions of the *Which Micro? At A Glance* in the November issue? Well, the

Top Ten status of the BBC Micro and Commodore 64 seems to be fairly unequivocal wherever you look. The biggest difference of opionion lies with the Spectrum (which benefits in terms of sales from the vast number of games written for it) and the Apple (which does badly in the UK because it's over-priced and long in the tooth).

Question 4

49% of respondees said that they did have access to a micro at school or work, 33% replied in the negative, and 18% didn't respond at all (the unemployed, perhaps?).

Question 5/6/7

68% said that they had written their own music programs, and 32% said they hadn't. These covered the entire gamut of complexity, ranging from a large number of Beep sequencers on the Spectrum to some sophisticated-sounding MIDI programs for the Commodore 64. Here are some tasters of our readers ingenuity:

Simple sequencer for Yamaha DX-9 and drum-machine *(BBC Micro)*

OMDAC control of Syntom/Synbal drum modules and synths *(Spectrum)*

3-note polyphonic synth from QWERTY keyboard *(BBC Micro)*

Multi-part stochastic composition *(Pet)*

Qwerty keyboard synth with sequencer and MCL *(Vic-20)*

Multi-channel MIDI composer *(Commodore 64)*

Composer program for analogue synth and drum machine *(Vic-20)*

Drum-machine controller *(Spectrum)*

Sound sampling *(Vic-20)*

Drum sequencer and OMDAC driving program *(BBC Micro)*

3-channel sequencer *(Oric)*

Drum program using E&MM percussion generator board *(BBC Micro)*

Casio 202 sequencer *(Commodore 64)*

Of the 68% (146, in fact) that had spent time burning the musical midnight oil, wading through GOSUBs (or PROCs, if of the BBC ilk), 42.6% (62) said they weren't contemplating sending in their efforts to Program Corner, 37.7% (55) said they were, ad 19.7% (29) said they were thinking about it. In a few cases, the reasons for not sending in programs were simply that their authors had £ and $ flashing in their eyes. And who can blame them? If you've spent the time developing a sophisticated bit of MIDI software, why not flog it to the highest bidder?

However, in the majority of cases people seemed to be belittling their efforts at programming. Please, if you've got some anywhere near decent software, send it on to us. Shortish, listable programs will earn £60 if they're accepted, and longer programs will be subject to favourable royalty deals if they're distributed on cassette or disk.

Question 8/9

Probably a badly-phrased question, this, but most people seemed to get the gist of what we were getting at by using the adjective 'serious' being not so much an actual professional musician as a state of musical mind. In fact, only 27.4% put themselves in this category, with 71.1% content to retain their 'unserious' status, and 1.5% (rightly) questioning the meaning of 'serious'! It's a dog's life sometimes... Still, here are how some of the serious folk are using their micros:

Studio synth control via OMDAC/PAiA/ custom interfacing
Alphadac control of synths in rock band
Interfacing with JX-3P/DX-7
Transcription to hard copy from MCL
Control of stage light show
Computer graphics synced to sound
AlphaSyntauri/Soundchaser systems in studios
Making soundtracks for slides and videos
Compositional teaching aid

Questions 10/11/12

29.2% of readers said they did have hardware add-ons; 70.8% said they didn't. Of the latter group, a resounding 81% said that they were contemplating something along these lines. This question brought out the major groan of musical micro owners: why the lack of cheap(ish), high quality sound hardware for adding on to machines like the BBC Micro? Well, watch out for the May issue of *E&MM* and you should see some of your prayers answered... In the meantime, here's what that 29.2% have been using:

OMDAC (4)
Phonosonics D/A converter (2)
Electronics & Computing D/A converter (1)
E&MM Percussion Generator board (2)
Top-octave generator plus dividers, EGs, *et al.* (1)
I/O ports to Wasp and Clef drum-machine (1)
Zon-X sound generator (2)
Mountain Computer MusicSystem (4)
Interface for Yamaha MR10 (1)
William Stuart Systems soundboard (2)
Soundchaser system (2)
MTU DAC board (1)
Interface for DX-7 (1)
AlphaSyntauri system (2)
Polyphonic keyboard interface (2)
E&MM Spectrum MIDI interface (5)
E&MM Signal Processor (2)
Roland Compu-Music CMU-800 (2)

Questions 13/14

Surprise, surprise. Only 13.8% thought that the musical exploits of their micro were adequately covered by the micro press. The less easily-satisfied put the following topics on their list (arranged in approximate order of popularity): Sound sampling; External sound hardware; MIDI interfacing; Interfacing to analogue synths and drum machines; Multi-channel sequencing software; Music Composition Languages in practice; How to make a start in computer music; The potential of computer music; Emulating acoustic instruments.

Question 15

Arranged in order, here's what readers are doing with their micros other than the obvious musical pursuits:

Activity	Number of readers partaking	% (of 215)
Games	133	61.9
Graphics	32	14.9
Databases	25	11.6
Accounts	24	11.2
Word processing	17	7.9
Learning to program	15	7.1
Homework (!)	14	6.5
Business	11	5.1
CAD	10	4.6
Education	9	4.2
Utilities	8	3.7
Technical	4	1.9

Well, it just goes to show that even musicians need to get their fingers in a Hobbit's cave and around a joystick now and again...!

Questions 16/17

Considering the plethora of micro magazines on the market, it's hardly surprising to find that attention is scattered fairly widely over the available reading matter. A number of readers own up to the technique I generally adopt – that of browsing through all the mags each week and only buying one if the contents page takes my fancy. WH Smith's may not thank you for that, but it sure does avoid a whopping great dent in the household budget!

Magazine	Number of readers buying it	% (of 215)
Nothing (!)	48	22.3
Your Computer	42	19.5
Personal Computer World	31	14.4
Acorn User	31	14.4
BBC Micro User	27	12.5
Practical Computing	19	8.8
Personal Computer News	17	7.9
Popular Computing Weekly	15	7.0
Byte	12	5.6
Electronics & Computing	11	5.1
Computer & Video Games	9	4.2
Commodore Computing	8	3.7
Computing Today	7	3.2
ZX Computing	6	2.8
Which Micro	6	2.8

Obviously, the 22% of readers who read 'nothing' are getting all they need from the pages of *E&MM*! The reason for asking who had come across the Computer Music Journal was simply that this is more or less the official mouthpiece of the more respectable side of computer music. Over the six or so years that this has been going, it has undoubtedly become more professional and glossy. However, it frequently seems inclined towards academic overkill and, at $29 for an overseas quarterly subscription (i.e., just 4 issues), is something of a luxury for all bar the most dedicated computer musician. In fact, only 11% of questionnaire respondees said they'd ever read a copy of the journal, though an equal percentage expressed interest in getting hold of it. There are two ways of going about this: first, direct from the publishers, MIT Press, at 28 Carleton Street, Cambridge, MA 02142, U.S.A.; or second, try ESSP, PO Box 37b, East Molesey, Surrey, KT8 9JB (tel: 01-979 9997).

Questions 18/19/20

	Good	Average	Rather not say
BASIC	48.9%	36.7%	14.4%
Machine code	17.2%	25.3%	57.5%

Well, it was really encouraging to see such a terrific degree of computer literacy amongst our readers, especially when it comes to programming in machine code. Given the exacting demands of musical programs, perhaps that's not surprising. Of course, it could be argued that it's only those readers with a high degree of computer literacy who felt up to filling in the questionnaire. For those who feel left behind, look out for *Musically BASIC* in these pages, a sort of 'teach yourself programming' series that's specifically angled at the musician.

It was also gratifying to find out that 64.4% of this sample of *CM* readers were interested in joining the Software Panel. That works out to the impressive number of 132 programmers with at least average competence in BASIC, machine code, or both. Once we've assimilated the questionnaire's results and charted the course for *CM*'s future, we'll be contacting some of the above hopefuls with ideas for them to mull over.

David Ellis **CM**

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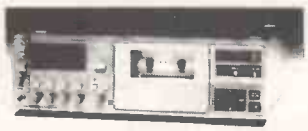

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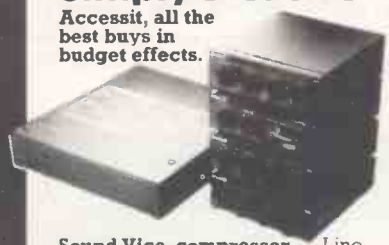

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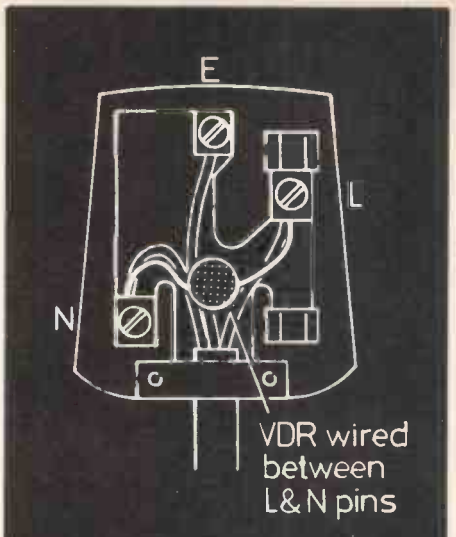
In E&MM October '83 we featured a DIY mains plugboard with filtering against interference and 'spikes' on the mains supply. In case you didn't know, 240V mains is randomly afflicted by short-term spikes (excess voltages) of 1000 volts or more. Higher voltages typically occur if a local thunderstorm involves a direct lightning strike on power lines. In both instances, sophisticated digital gear can be well and truly zapped, and if your DX7, Drumulator (or whatever) dies, it goes without saying that the event could prove a nasty blow to your bank balance.

So, for musicians who are not of great practical bent or haven't got the time/space to get into constructing a complete DIY mains filter system, here's a cheap and simple way of protecting your gear. You simply wire a small, wire-ended component known as a voltage-dependent resistor across the live and neutral pins inside every mains plug belonging to equipment which needs protection. The VDR exhibits a very high resistance to 240V mains, and effectively 'isn't there' under normal conditions. When a 1000 volt spike arises, however, the VDR's resistance drops to a few ohms, effectively shorting-out or 'clamping' the excess energy.

When wiring, sleeve the leads, and take care not to bend them too close to the seal – otherwise they may break off. If you don't find a VDR suitable for 240V mains in your usual electronic supplier's catalogue, ask your dealer to obtain one for you, from RS say, stock no. 238-609. The cost should be around 70p, which is very cheap insurance if it saves a £250 repair job, not to mention the inconvenience of being out of commission for a few weeks.

Ben Duncan **E&MM**



Wiring a VDR inside a 13-amp mains plug.
- Use one VDR per item of equipment.
- Sleeve exposed wire.
- The closer to the equipment, the more effective the VDR. It is therefore not worthwhile attempting to protect all the equipment in one go with a VDR connected at the far (source) end of the master mains extension lead.

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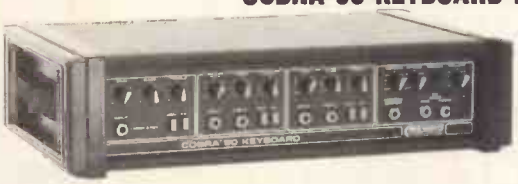

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RX.PATCHWORK.PR

First of all, our apologies to Martyn Phillips, the creator, and to all DX7 owners who attempted to use his patch we printed in last month's issue. Due to circumstances beyond our control several parameter values were printed incorrectly, while others were omitted altogether. The correct patch reads as follows:

Funk Bass for DX-7

Source: Martyn Phillips

Parameter	Value
Algorithm	8
Feedback	5
LFO Waveform	Triangle
LFO Speed	35
LFO Delay	0
LFO PMD	0
LFO AMD	0
Key Sync	Off
Pitch Mod. Sens.	3

	OP 1	OP 2	OP 3	OP 4	OP 5	OP 6
Amp Mod Sens	0	0	0	0	0	0
Oscillator Mode	R	R	R	R	R	R
Sync	On	On	On	On	On	On
Frequency	0.5	5	1	0.5	1	4
Detune	0	+5	0	0	0	0
EG Rate 1	99	99	99	99	99	94
Level 1	99	99	99	99	99	93
Rate 2	62	34	62	42	45	62
Level 2	93	84	95	71	85	79
Rate 3	23	0	23	68	0	60
Level 3	84	53	84	70	0	0
Rate 4	58	0	58	40	0	55
Level 4	0	0	0	0	0	0
Break Point	NA	NA	NA	C3	C/2	NA

	OP 1	OP 2	OP 3	OP 4	OP 5	OP 6
Left Curve	NA	NA	NA	NA	NA	NA
Right Curve	NA	NA	NA	+L	−L	NA
Left Depth	NA	NA	NA	0	0	NA
Right Depth	NA	NA	NA	12	20	NA
Keyboard Rate Scaling	2	2	2	0	0	3
Output Level	99	69	92	83	85	88
Velocity Sens.	2	0	2	0	0	0

Parameter	Value
Pitch EG Rate 1	NA
Level 1	50
Rate 2	NA
Level 2	50
Rate 3	NA
Level 3	50
Rate 4	NA
Level 4	50
Keyboard Transpose	C2

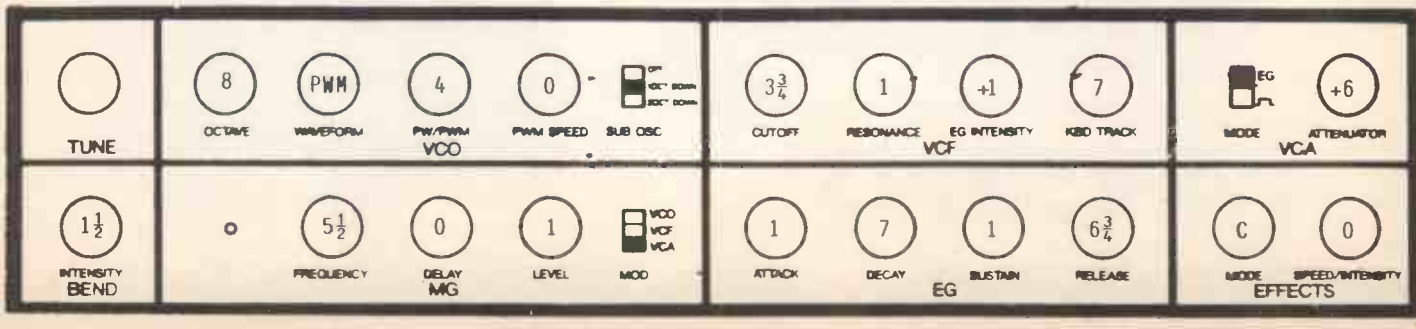
The Korg Polysix is capable of providing fat bass synth sounds in the Unison mode (where its six voices are assigned to one note ie. playing monophonically), and an even thicker sound can be produced by selecting 8′ Octave and using the Sub Oscillator to provide the lower 16′ frequencies.

The Cutoff Frequency is set quite low to give a rounder sound, so it may be necessary to store this patch with the Attenuator at around +6dB in order to balance its level with previous stored programs. Envelope settings (particularly the release time which can vary depending on the bass riff being played) and the Cutoff Frequency controls are best fine-tuned to taste, and bass lines constructed over the lowest octave and a half of the keyboard.

The (non-programmable) Pitch Bend should be set to bend a precise semitone for a realistic 'fretless bass' effect (see *Guide to Electronic Music Techniques*, *E&MM* Feb '83, for a guide to Pitch Bend and performance control technique), and the MG Frequency (LFO) control programmed at a moderate speed if use is to be made of the VCO Modulation Wheel. Remember that bass players cannot bend thick bass strings easily!

Bass Synth for Korg Polysix

Source: Patricia McGrath, E&MM



CHWORK.PATCHWO

Continuing the DX7 theme (will owners of other synths break the domination next month? We ask ourselves) an interesting patch from reader Ken Campbell:

'Stringbell' for Yamaha DX7

Source: Ken Campbell

Parameter	Value
Algorithm	6
Feedback	0
LFO Waveform	Ramp
LFO Speed	39
LFO Delay	0
LFO PMD	0
LFO AMD	0
Key Sync	Off
Pitch Mod. Sens.	7

	OP 1	OP 2	OP 3	OP 4	OP 5	OP 6
Amplitude Mod Sens	2	1	2	2	3	3
Oscillator Mode	R	R	R	R	R	R
Sync	On	On	On	On	On	On
Freq. Course		0.5	1		0.5	
Freq. Fine	0.99			1.25		0.99
Detune	+7	+7	−3	−2	+1	0

EG Rate 1	99	46	99	99	99	99
Level 1	99	0	65	99	52	99
Rate 2	39	39	39	39	39	39
Level 2	98	98	98	98	98	98
Rate 3	32	32	32	32	32	32
Level 3	80	24	81	81	81	88
Rate 4	51	39	55	59	60	58
Level 4	0	0	0	0	0	0
Break Point	D3	C/3	C3	C4	C/3	D/3
Left Curve	+L	+L	+L	−L	+L	+L
Right Curve	+L	+L	+L	−L	+L	+L
Left Depth	63	28	0	92	85	10
Right Depth	38	38	0	0	0	0

	OP 1	OP 2	OP 3	OP 4	OP 5	OP 6
Keyboard Rate Scaling	1	0	0	0	1	1
Output Level	99	82	90	90	84	80
Velocity Sens.	0	0	0	0	0	0
Pitch EG Rate/Level			Not Applicable			
Key Transpose			Not Applicable			

This is a good demonstration of the purely synthesiser capabilities of the DX7, rather than the imitative ones which have been used to form the vast majority of the presets. It is neither a string sound nor a bell sound, but displays characteristics of both plus some of its own.

Algorithm six consists of three pairs of modulator-carrier configuration each with a different fundamental and a different frequency ratio. All the carrier envelopes have a fast attack which provides a chime-like quality to the start of the sound. Looking at the modulators, although 4 and 6 have the same attack as the carriers, the attack levels are quite low, and it is the climb up to level two which provides the rush of different harmonics that give the sound its main character. The late entry of operator 2 gives the impression of movement within. As the sound settles on level 3 it leaves a hollow harmonic sound that almost, but not quite, obliterates the fundamental.

If you use a sustain pedal with your synth, you will find that occasionally, depending on how you pedal it, a second wash of sound rolls after the first couple of seconds later. It does not work if you merely hold the pedal down continuously. I have no explanation for this, but would be interested to hear one.

Also try this sound an octave up and/or with operator six frequency set to 0-75.

Finally, and most topically, a patch for Sequential Circuits' latest polysynth, the Six-Trak, like the Polysix patch above, makes use of a polyphonic keyboard's unison mode.

Parameter	Name	Value
00	Coarse Frequency	24
01	Fine Frequency	0,1,2,3,4,5
02	Glide Rate	05
03	LFO	00
04	Envelope Amount	00
05	Invert/Normal	00
06	Attack)	00
07	Decay) Pitch	00
08	Sustain)	00
09	Release)	00
10	Sawtooth	01
11	Triangle	00
12	Pulse	01
13	Pulse Width	32
14	LFO	01
15	Frequency	02
16	Amount	31
17	Waveshape	00
18	Osc/Noise	05
19	Cutoff	67
20	Resonance	03
21	Envelope Amount	15
22	Normal/Invert	00
23	Attack	00
24	Decay	09
25	Sustain	08
26	Release	06
27	LFO	00
28	Key	02
29	Osc Mod Amount	63
30	Attack	00
31	Decay	00
32	Sustain	15
33	Release	05
34	Volume	15
35	Unison	01

Program six different voices with identical parameters except for Parameter 01 (Fine Frequency). Set Voice 1 at 00, Voice 2 at 01, Voice 3 at 02, and so on up to Voice 6 at 05. This means that when you stack all six voices together, the maximum richness of sound is obtained from the 6 oscillators all slightly de-tuned from each other. Other things which make this sound MiniMoog-like are the bit of noise added (Parameter 18), Ring Modulation (Parameter 29), Pulse Width Mod (Parameters 13, 14, 15, 16, and 17) and the hint of Glide (Parameter 2). Liberal use of the bend wheel is suggested, along with legato playing over the whole keyboard to bring out the gliding. **E&MM**

Talking SHOP

MONKEY BUSINESS

Despite the recession, there seems to be an upturn in the retail trade and a surprising number of shops have opened their doors over the past few months. One of these, Monkey Business in Romford, first opened up some six months ago. Romford, for the uninitiated, is a medium-sized suburb, that serves as a shopping centre for the East End of London and a large area of Essex. Surprisingly, apart from one notable exception, there has been a tradition of general music shops not doing well here – but Monkey Business look set to break that duck.

Phil Straker (ex-Honky Tonk Music and CBS) and Trevor Holliday (ex-pro musician) started out with the idea of a shop that was the antithesis of the normal stereotype. Against all odds, they have succeeded.

The first impression that you get when you enter the portals of Monkey Business is that the place *feels* like a living-room. It's warm and friendly, there's no 'hard sell' and there's even a carpet on the floor! Gone is the cracked lino of the norm, and also gone (thank God!) is the practice of *not* putting prices on the equipment. Everything in the shop has a tag on it.

The store is spread over three rooms. The largest is the central area, and this houses keyboards, amps, guitars and basses, while an annexe holds the drums and percussion section. At the back of the shop, a smaller room is used for PA gear, and for closetting anyone who wants to test equipment at high volume.

With over 100 guitars in stock (Fender, Tokai, Aria, Ibanez, Steinberger (sole Essex franchise), Status, Washburn, Epiphone, Gibson and Westone), an excellent selection of amps (all plugged in!) from Trace Elliott, Fender, Roland, Marshall, Carlsbro, Session and Vox, the main room is surprisingly uncluttered. All the equipment is to hand, and there is a 'no holds barred' approach to trying out the units.

Phil Straker commented: 'The whole idea of the shop was to have a nice atmosphere, where people could come along and actually play the equipment and instruments that they see in the press. In that way, we've kept the keyboards with headphones on them and amps with leads all ready for the guitars, so that people can come in and experiment – find the gear that suits them.'

This creditable attitude covers all the keyboards they have in stock, with Korg, Yamaha and Kawai to the fore, and a wide selection of secondhand keyboards, including some nice Moogs.

Their secondhand section really deserves some close attention: Monkey Business have developed a system for part-exchange on the premise that 'everything has its price' and they will offer part-ex deals on almost anything. This means that their guitar range covers everything from secondhand electrics at around £30 right up to the top Gibsons. Nice.

An area that they have recently cultured is that of home recording. While they don't have a really enormous range of gear available, they do try and stock as many varied systems as they can, with names like Tascam, Aria, and the Cutec system which MB are selling at £399.

'The home recording area isn't one that we've covered extensively, but having a small range actually 'in stock' in here means that people do have the opportunity to come and try some multitracks,' commented Phil. 'The Cutec system is our best-seller, because even though there is no EQ system on there, people seem to be able to get round that, and the price is so low that it's worth trying out a separate EQ for it.

But they don't just stop there. As well as being a shop, Monkey Business have also taken a real interest in the local musical community and have started a unique idea in live concerts. They have taken over Ben's Discotheque at the Bitter End Pub (next-door to the Brewery!) every Friday night. They supply the PA system, backline, drums and all the necessary lighting, and just invite bands down to play. They usually manage to get three bands on in a night and the response to the idea has been overwhelming – they are booked up several months in advance, and there is a long waiting-list of hopeful applicants. They call the scheme Musicians' Workshop and all in all, a staggering 88 bands have played there to date, mainly from the East London/Essex area. If only other shops would follow suit...

But back at the store, the most significant change the staff have experienced has been in the keyboard department, where there's been a steady switchover from home organs to polyphonic synths. 'It all started really with the Casio keyboards. Parents were buying them for children and playing them themselves. I think they must have realised the possibilities that synths have over the traditional organ, and of course the fact that there isn't a huge pile of nicely polished hardwood in the corner!' said Phil. 'We are now selling the larger synths into what must be a totally new market.'

So, take the train to sunny Romford, turn right, first left, third right, and you're in Business. With a shop like that, there'll soon be plenty of people apeing them....

Tim Oakes **E&MM**

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MODULAR SYNTHESIS

BASS SOUNDS

This month, Steve Howell **concentrates on the lowest two octaves, and comes up with some interesting variations on the bass synth theme.**

Strong bass sounds have always been important to musicians as a means of providing a solid basis to any piece of music, and a weak bass end will nearly always have a detrimental effect on the rest of the piece, however good the rest may be. To illustrate this, try turning the bass control down on your hi-fi – I think you will find that the depth and strength will disappear and this probably accounts for the fact that so much modern music (especially dance music) has a very strong bass end.

For synthesists, it's important to set up a good bass sound as this is usually the part that will be laid down first in the multitrack process, especially if a sequencer is being used.

The most simple patch can be found in Figure 1. Here we have one or more VCOs being fed into a VCF and then into a VCA, both of which have an EG applied to their CV inputs for independent shaping. You can use as many VCOs as you like and they can be tuned to unison, an octave apart or whatever. Normally I use three VCOs and for a deep bass sound I tune two VCOs to unison and the other an octave up, but for a sharper bass sound tune VCO1 and 2 to unison an octave down. For added depth I like to use at least one square-wave with a variety of waveforms from the other VCOs dependant on the effect I want. Two sawtooth waveforms will give a rich texture whilst using a pulse-wave will give you a sharper, Clavinet-type bass sound. Using pulse width modulation will enhance the detune effect but care has to be taken not to make the sound too 'swirly' which can sometimes happen if the detune and PWM effects are set to extremes. The filter and EG controls can be altered to suit and this patch should serve a variety of purposes from deep pedal notes to high-speed sequencer riffs, and these effects are available to the owners of even the simplest synthesiser. One point to watch out for, however, is that when VCOs are tuned to unison they can sometimes 'null' on you – that is, the phase relationship of two very closely tuned VCOs can sometimes cancel each other out, leaving a momentarily weak sound. This happens totally at random, so to retain that fullness I suggest you detune the VCOs quite considerably. On the other hand, you can use just one VCO, and this should give a clear, uncluttered bass sound. Remember that just because you have the hardware, doesn't mean you *have* to use it, and simplicity can often be more effective. Thomas Dolby said recently that he prefers to use a single VCO for his bass sound, but that doesn't prevent him having a solid bass sound in his music. Afficianados of the Jan Hammer, Joe Zawinul school of synth bass playing will probably prefer to have that rich, phasey, detuned VCO effect that two or more VCOs will give you, so it's really a matter of taste. There are no hard and fast rules.

That, then, is the basic method of producing bass sounds. Experimentation with just that patch will provide you with some 'fruity' (for want of a better word) bass-end sounds but there are a number of ways in which you can produce some less commonly-used bass textures which require a little more thought (and hardware!). The extra effort is well worth it if you want to avoid the usual clichés.

Simple Extension

First, as a simple extension to Figure 1, try feeding an unprocessed sine-wave from another VCO directly into the VCA, as in Figure 2. This can be particularly useful on high-resonance VCF settings where the depth tends to disappear – the extra VCO will make up for this. You might like to try routing the sine-wave into a separate VCA/EG – this will enable you to have a separate envelope for the two 'channels', so that the basic sine-wave will give you the basic bass sound, and then the filtered VCOs can be shaped to give a punchy front-end to the sound. Many varied synth and acoustic/electric bass sounds are possible using this method, and if you find the single sine-wave a bit static you could route that element into a chorus unit or a mild flange to give it more movement.

Another way of producing an interesting bass sound – particularly good for fast sequencer riffs – is to employ a similar technique to that in Figure 2, but substituting a noise generator in place of the VCO. In this way, you can add a percussive 'chiff' to the attack portion of the sound which could, if you so desired, be processed by another device such as a flanger. A deep, slow flange will give you the Japan/Duran Duran-type sequencer sound, but a slow filter sweep on just the noise element could give you a very similar effect.

Sample And Hold

Another technique you might like to experiment with is shown in Figure 3. Here we are stepping through a Sample and Hold (S/H) device with the trigger output of the keyboard. The random CV output from the S/H is routed to just one of the VCOs and the modulation level is set to give a slight random detune effect. The knack with this sound is setting the modulation level; too much and the effect will be almost unusable – too little will make the effect so subtle that by the time you add the other instruments on top you probably won't even notice it. When set up properly, however, you can create some very interesting and realistic fretless bass sounds *á la* Mick Karn, especially with lots of pitch-bend and vibrato. It can be equally effective on sequencer riffs as well, but here the trigger input to the S/H is derived from the sequencer's gate or trigger output.

If your VCOs have a Sync facility there are a number of additional possibilities available to you offering some very distinctive bass sounds. The most elementary sound using Sync is simply to tune the VCOs at a variety of intervals with the Sync switch 'on' (or with the Sync in and out sockets connected with a patch cord), which will give you a variety of textures depending on the waveform and Interval selected. Wide intervals with a square-wave will let you create some fascinating PPG type, digital sounding textures but if you find these too delicate (as they sometimes can be) do as we did in Figure 2 where the sine-wave was also used to add some depth to the sound. Alternatively, you could use another VCO detuned against the two Synced VCOs and routed via the VCF for a richer sound. This will give you the best of both worlds as the Synced VCOs will give you the unusual waveshapes and the third VCO will give you the 'fruitiness' of detuned VCOs.

Sync-Sweep

Of course, we are all familiar with the Sync-sweep sounds so beloved of many synth players but I feel care has to be taken to avoid the usual clichés using this sound. The patch for Sync-sweep is given in Figure 4. This allows you to vary the frequency of VCO2, and as its pitch changes so the harmonics in the resulting waveform are 'torn apart' giving this characteristic sound. The control device could be anything and the simplest you could use is an LFO set very slow, but you could use an EG, giving you a Sync-sweep effect that varies in accordance with the ADSR controls. Alternatively, you could use an S/H as in Figure 3, which would give you a slightly different waveform on each note. If you replace the S/H with a sequencer and step through that instead, you can reprogram the waveshape, whereas with the S/H the waveshape will change in a random fashion.

As always, there are a number of points to watch out for when recording bass sounds and in the technique you employ to play them. First, as with nearly all sounds, the lower down the register you go the longer the envelope times will be, so it might be a good idea to use a Keyboard Follow on the EGs if you have such a facility, but to be honest it is not essential for most bass sounds.

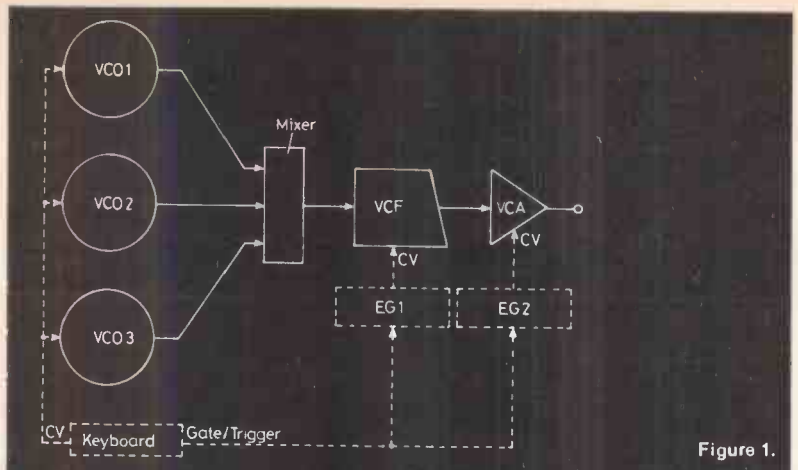


Figure 1.

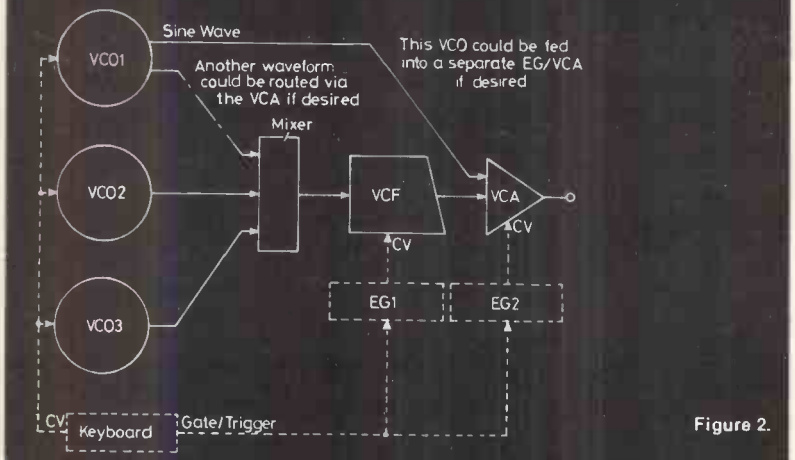


Figure 2.

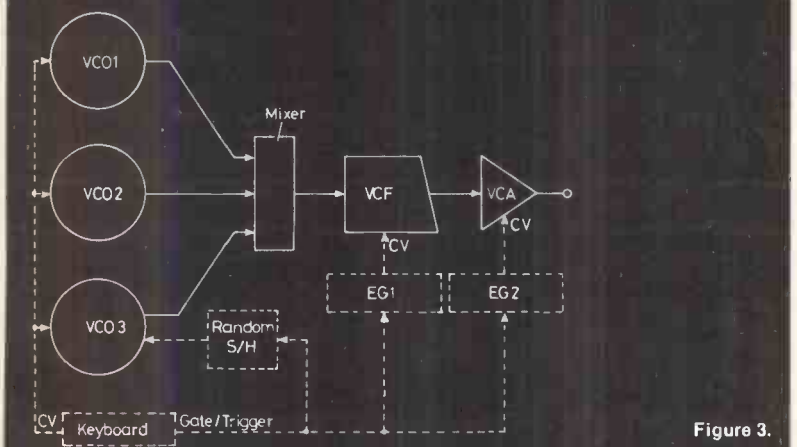


Figure 3.

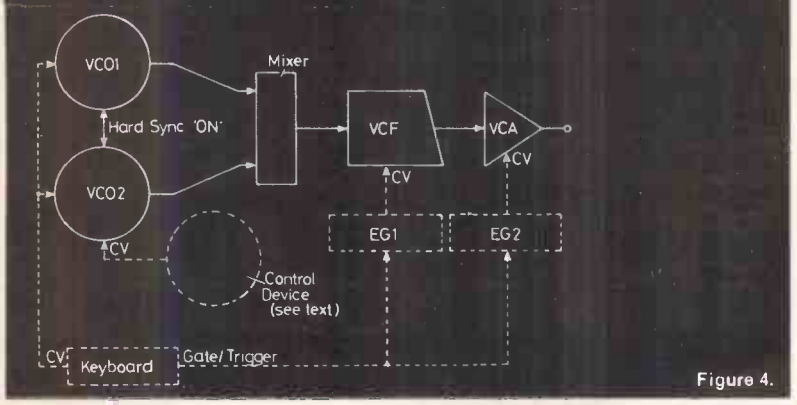


Figure 4.

Useful Tips

If, however, you feel your bass sound is still somewhat lacking in the necessary 'welly', here are a few tips which I think you might find useful.

1: Try using a square-wave as the basic waveform for your sound. The harmonic structure of a square-wave is particularly suited to low sounds that require depth, so try mixing it in with other waveforms.

2: Try lowering the resonance setting of the VCF. The response of most lowpass filters is such that the fundamental and lower harmonics are attenuated below the cutoff point of a high-resonance setting and this can severely 'weaken' any bass sound. If a high-resonance setting is essential, try mixing in the raw sine-wave as in Figure 2.

3: Chorus or a mild flange will animate the sound if it's sounding a bit static. Stereo chorusing via the effects send on the mixer – with the straight sound on one side and the chorused sound on the other – will spread the sound out and give it an extra sense of thickness. This technique can also be usefully employed to alleviate the problem you sometimes get when a bass note occurs at the same time as a bass-drum beat and you end up losing the definition of both sounds. To rectify this, spreading the bass sound hard left and right with chorus or flanger, with the bass-drum dead centre, will help to retain each instrument's clarity. You should have a tight and punchy rhythm section which can be very powerful if you are using a driving sequencer and drum computer rhythm.

4: Try boosting the bass end on the mixer. Simple though this sounds, many people struggle for ages trying to get the sound right at their synthesisers where a simple tweak of the EQ will give them what they require.

5: Double-tracking the bass part will also create a dynamic sound. Many bass-players do this and there is no reason why the same technique shouldn't be used with synth bass parts. A band renowned for their synth bass sound is the Thompson Twins, and I believe they utilise this technique. If you are unable to double-track your bass line, either because it is of a very improvised nature or because you are using a sequencer which is unable to be driven off a click-track (or because you don't have enough tracks on your tape-machine) you could try using a fast delay in the region of 20ms or so as this will give a similar effect.

6: Using a compressor will also add a degree of 'punch' to your bass sound. Again, bass-guitarists use this technique as it evens out the envelope and tightens the sound up considerably, so why not try it on your synthesiser?

After recording your bass part, and having added further instruments over the top of it, you might find that what was once a solid and punchy sound on its' own doesn't sound quite so good with everything else. If this is the case, there is no reason why you shouldn't use any of the methods outlined above with the recorded bass part on tape to improve the sound; so if you can, try and keep the bass part on a separate track of tape so that you can mess around with it later without affecting anything else when mixing down.

Playing Techniques

As for playing techniques, there are no hard and fast rules. It all depends on the piece you are working on, and all I can suggest is that you listen to bass parts, be they synth, electric or acoustic, to see how they are constructed. Different styles of music have different styles of bass playing, but one thing you can be sure of is that when drums and bass are playing together, the bass usually appears together with the bass-drum, especially on downbeats, so if you are programming your bass and drum parts into a MicroComposer and drum-computer, that's worth bearing in mind, I feel. If you are playing with a 'live' drummer then that sort of interaction often takes place naturally, but it's worth thinking about nonetheless. When a band is accused of not being 'tight' it's usually because the interplay between drummer and bass-player is sloppy and this can have a profound effect on the feel of the music and out interpretation of its 'solidness' so it's important to get this element right before moving onto the chordal and melodic overdubs. After all, you can't expect a house to be very substantial if the foundations are weak.

And with that stunning analogy, I leave you to fiddle with your bottom ends until next time, when we'll be looking at percussive noises.

Steve Howell **E&MM**

A USER REPORT

BY IAN BODDY

ROLAND SYSTEM 100M

In a special feature, respected electronic composer and performer Ian Boddy **gives a personal overview of one of the few modular synthesisers currently available. He tells us how some of the principles introduced in Steve Howell's** *Modular Synthesis* **series work out in practice, and proves also that such designs don't necessarily have to be as big as a wall to yield impressive results.**

The System 100M is not a new synthesiser by any means but at present is the only such system readily available from retailers in the UK (although Korg do produce the semi-modular MS system). This lack of choice is very frustrating but the fault may very well lie in our own laps. The biggest disadvantage of modular synthesis is that it takes time, sometimes hours to produce sounds of great subtlety and it impractical for live work as a solo instrument and so many people buy preset synths, and this lack of demand may well have forged the lack of choice already mentioned.

However, modular synthesis offers the great advantage of versatility, because as each component of the synthesiser is broken down into modules the user is not restricted by the manufacturer's signal path and also has complete control of how to patch-up the synth. This, together with the fact that you have functions not normally found on other synths, means that you can produce sounds of great subtely and interest and it is possible even after years to come up with new sounds on your modular synthesiser. These synths can be very useful for live work as they can perform several functions simultaneously; the system described here, for example, which I have used in concert several times, can generate a voice to be driven by a sequencer, produce a sound effect and treat an external polysynth through one of its filters all at the same time.

Roland produce a large number of modules but I will only describe the six that would be most useful for a small set-up together with the polyphonic keyboard produced specifically for operating this system.

Dual VCO Module

Each identical oscillator has a rotary knob for switching between 32, 16, 8, 4 or 2 feet and a fine-frequency tuning knob. Unfortunately, no sub-oscillator is provided which on most synths can get you down to 64 feet, useful for earth-rumbling bass drones! The waveforms available are also fairly limited, being switchable between triangle, ramp and square waves and only one waveform is available at any one time. The PWM facility however is very good, having two sliders for manual amount and external amount (a mini-jack input is provided). Both strong and weak sync modes are available for phase-locking of the VCOs, and mini-jacks are provided on each VCO for sync in and out. There are two inputs and three modulation inputs (one of which is pre-patched to the keyboard CV input).

Dual VCF Module

These are standard – 24dB/oct low-pass filters with sliders for cutoff frequency and resonance. However, there is also a built-in high-pass filter with a switch for turning the HPF off or selecting one of three cutoff points (1, 2 and 5kHz). Two LEDs are also provided, green for signal level and red for distort condition. There are two signal outputs and three inputs, plus three modulation inputs, one of which is pre-patched to follow the keyboard CV input.

Dual VCA Module

Each VCA has three signal inputs and three modulation inputs. There are two outputs (low and high levels) as well as a rotary knob providing overall gain. There are green and red LEDs performing the same functions as on the VCF, and finally the VCAs are switchable between linear and exponential outputs.

LFO & Dual Envelope Generator Module

Each identical envelope generator has four sliders for attack (1.5ms-7.5s), decay (4ms-15s), sustain (0- + / – 10v) and release (4ms-15s). There are four triggering modes, internally by gate; gate and trigger; externally (mini-jack input provided); or manually via a red pushbutton. Each ADSR has two normal outputs as well as an inverted one.

The LFO is very comprehensive, having a rotary knob to switch between the five waveforms (sine, triangle, square and rising or falling ramps). Two outputs are provided with switchable output levels of x1/10 or x1. Two sliders cater for frequency and delay-time (0-7s) and a three-way switch for low, medium and high-frequency ranges which in conjunction with the frequency slider gives a frequency range of 0.05-30Hz. A frequency CV input is provided which is extremely useful: if the keyboard CV is used the LFO can then track the keyboard, and rates of vibrato can be faster at the top of the keyboard than at the bottom. Finally a keyboard trigger switch (on/off) allows phase-locking of the LFO output to the keyboard trigger pulse and a red LED gives a visual indication of the clock-rate.

Ring-Modulator/Noise Generator/Sample & Hold/ LFO Module

It's amazing how much is crammed into this module. The LFO is identical to the one described above so I'll start with perhaps the most interesting section of all those described in this review, the sample and hold function. Many synths have these modules but are in no way as comprehensive as the one provided here. Sliders cater for the clock-rate (0.2-25Hz) and lag-time (this smooths out the CV changes). There are outputs for the S&H and the clock-rate and an input for an external clock. This latter is very useful as a trigger pulse from a sequencer or drum-machine can then be used to control the rate of the S&H. The sample can be taken from an external source or from the LFO or noise sections of

this module, the latter of course providing the random source (if you happen to want to sound like a space-invader!).

The noise generator consists simply of two outputs each for pink and white noise, and note that like the other sections such as the VCO, VCF and LFO no output level control is provided, so that levels are controlled instead at the input stage of each module.

The ring-modulator has two inputs, X being pre-patched to the noise generator and Y to the LFO, and a single output.

Basic Synthesiser Module

This module was obviously designed initially for budget systems and by squeezing a VCO, VCF and VCA into one module many of the features which make the individual modules so attractive are omitted and as one would primarily wish to buy a modular system for its flexibility, purchasing this module would seem to be rather counter-productive. I shall therefore describe briefly the features which have been omitted from the modules described above.

VCO: Only one VCO out and two modulation inputs are provided, the sync facility being omitted. The PWM has also been reduced to one slider making it less flexible.

VCF: Only two signal inputs and two modulation inputs are provided. No HPF or LEDs are available, the omission of the former greatly reducing the versatility of this section.

VCA: Again, the signal and modulation inputs have been reduced from three to two each, and there is no switch to choose between linear and exponential modes.

The Rack

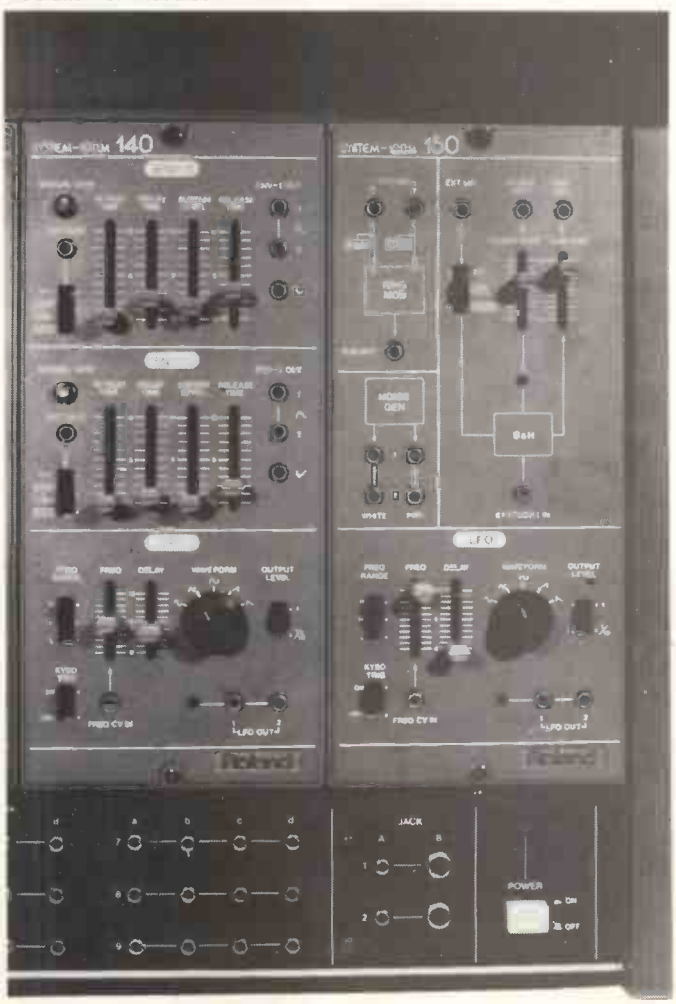
The racks to hold the modules have to be bought separately and can hold either three or five modules. They consist of a black metal base housing the power supply and patch-panel, two wooden end-blocks and a dark grey metal top. It takes just a few seconds to assemble the rack and each of the modules slide into place, secured by two small screws at the front.

On the back of each rack are DIN plugs which connect up to the modules to supply power and prepatched keyboard CV, gate and trigger signals. There is one other DIN socket for connecting to another rack of modules. The advantage of this rack and modular system of course is that you buy as much as you can afford at any one time, adding to it at intervals as the time goes by.

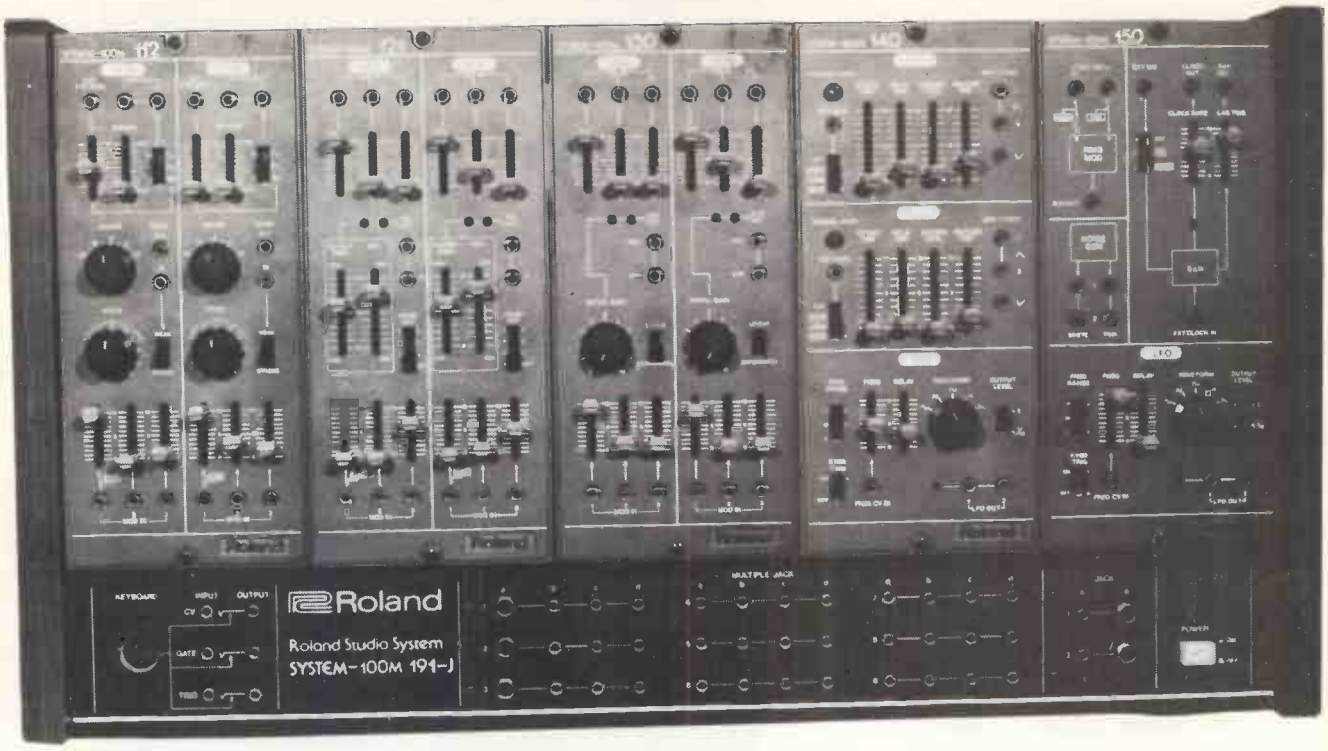
On the front of the rack is the patch-panel, which is very useful for complex patches and interfacing with other equipment. Starting at the left-hand side there is a DIN-plug and three pairs of mini-jacks which are the prepatched inputs for keyboard CV, gate and trigger signals. Then there are nine multiple jacks; three have one ordinary jack input with three mini-jack outputs while the other six are all mini-jack sockets. To the right of these are output-jacks which convert from mini-jack to ordinary jack to phono-plug (on the back). Finally the power on/off button is on the extreme right.

The five-module rack only measures 558(W) x 314(H) x 192(D)mm and with five modules the total weight is just 15kg, so all in all it is an extremely compact package, much of this being achieved by the use of mini-jacks. The System 100M is designed primarily as a studio instrument, so if you do want to take it on the road, be very careful because the sliders are fairly delicate and can bend easily. A flightcase is therefore essential unless you want the hassle of continually assembling/disassembling the system. I don't know of any commercially available flightcases for the system so

VCO and VCF modules.



Envelope shapers, LFOs, sample + hold, etc.



The author's five 100M modules.

you'll have to search for somebody who is good at metalwork!

Polyphonic Keyboard

This is the most recent of the three keyboards produced by Roland for this system and by far the most useful. Although it is not essential – any synth with 1V/oct CV and positive-going gate outputs can drive the module – it is very useful since it can drive up to four independent voices.

The keyboard has four octaves (C-to-C), the action is similar to all the newer Roland keyboards and is quite pleasant to use. To the left of the keyboard is the control panel which provides some useful functions. There is the standard Roland spring-loaded bender which has a rotary knob for pitch-bend sensitivity – note that if the bender is used for anything other than pitch-bend, this knob must be set to zero. Above the bender are a row of eight push-buttons. The four white buttons on the left provide the arpeggiator modes of Up/Down/Up & Down/Random, but one annoying omission is the lack of a facility for setting the octave-span of the arpeggiator. The four blue buttons on the right are the keyboard trigger modes, two Unison and two Poly modes being provided.

Above these are rotary knobs for overall tune, arpeggio-rate, pitch-bend sensitivity and portamento amount as well as two switches for normal/one-octave-down and portamento on/off.

On the sloped back of the keyboard is the power button as well as all the inputs and outputs. From left to right these are arpeggio clock in; bender CV out; keyboard CV outputs 1-4; gate outputs 1-4; and total gate output. Each socket has both mini-jack and normal jack connectors. This keyboard can produce some startling effects. For example, if you have enough modules you can have a completely different sound for each voice, all triggered from the same keyboard. If you only have enough modules for two voices as described here, other synthesisers can produce the other voices. For example, I have linked up the System 100M with a Roland SH2 and SH09 to produce four voices. The gate outputs are very useful when used with the arpeggiator, as it will step through them in turn and you can use them to trigger up to four independent synth voices. As a socket is provided for arpeggio clock-in which can be controlled by a trigger pulse from a drum-machine, some unusual and interesting rhythm patterns can be produced.

Other Modules

Some of the other modules available are as follows:

Phase Shifter/Audio-Delay/Simple LFO/Gate Delay.

Analogue Sequencer (2-channel, eight steps in each).

Output Mixer for mixing four voices.

Dual CV/Audio Mixer and Voltage Processor.

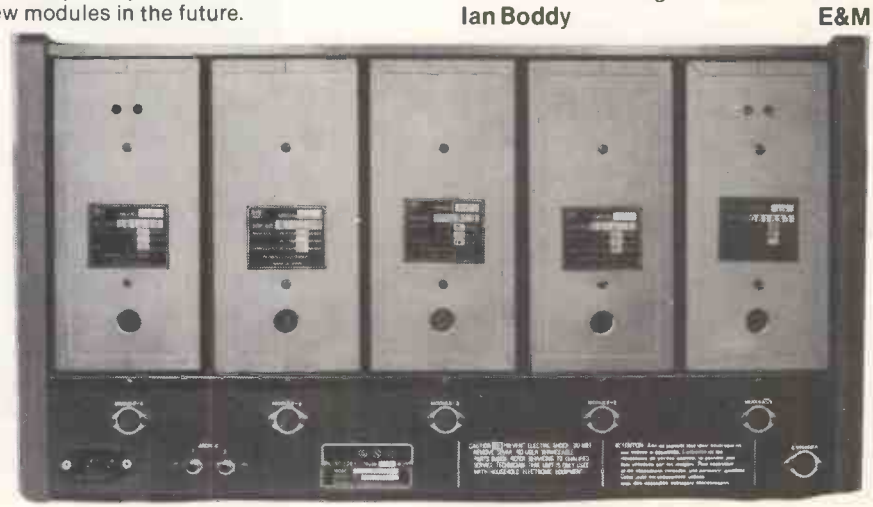
As far as I know Roland have recently introduced some new modules including a portamento controller for up to four voices, and I hope they will continue to introduce new modules in the future.

Conclusion

The Roland System 100M is an almost ideal introduction to the world of modular synthesis. It can be hard work at times, not to mention a little frustrating, but your reward will be sounds that are far more complex and satisfying than your average mono-synth can produce, and some of these sounds may indeed be unique to you. It will also teach you a lot about synthesis (Roland publish two books called *Practical Synthesis for Electronic Music, Volumes 1 & 2*, which describe the various modules and their functions and provide plenty of fascinating patches) as for any voice you have to patch together the various modules using mini-jack leads. As with all Roland equipment, the interfacability to other machines is excellent and the overall sound quality of the system is extremely high.

So although the world seems to have been flooded by polysynths offering sounds at the blink of an eyelid, if you take your synthesis seriously, make room for a modular synth such as this system and you'll have an instrument capable of producing sounds of tremendous individual character. It's also great fun to use!

Ian Boddy **E&MM**



Rear panel.

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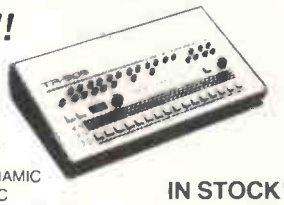

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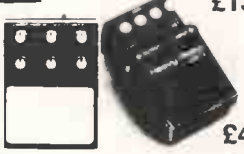

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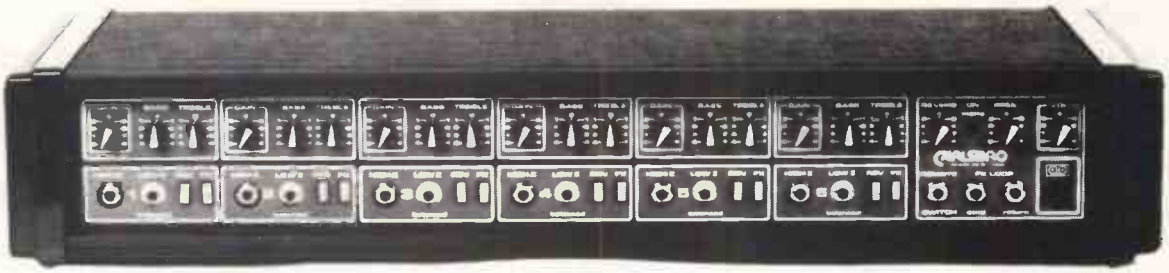

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Fill in your name and address and send your entry to **Carlsbro Star Prize, E&MM, Alexander House, 1 Milton Road, Cambridge, CB4 1UY.** Entries must be on this competition form *signed by your dealer.* The judges' decision will be final. The winner will be notified by post and no other correspondence can be entered into. Closing date is 30th April, 1984.

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C Two-Year guarantee
D Includes cover, leads and footswitch
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Finally tell us which single extra feature you would have designed into the amp to give more value and make it more attractive. You will have to think carefully about the market, performance, cost, technology, panel space etc. . . The winner will be the one who agrees most accurately with the judges and offers the most practical and useful idea.

Name .....

Address .....

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My top five Star Features are:

.....

Write below which extra feature you consider would give more value and make the Marlin 6-150 more attractive

.....

.....

Dealer Stamp (signature)

Washburn 'Stack In A Box' AD3

The name says it all really. This is a standard-size effects pedal designed to turn a straight guitar signal into the sound of a 'stack'; an overdriven valve sound.

Basically, it succeeds. With just three controls, for Level, Distortion and Tone, the unit can be set up in-line with any other effects, and will give a range of distorted sounds, that are guitar-dynamic – ie. the louder you play, the more distorted the output is.

The Level control seems to both set the threshold where distortion begins on the dynamics, and also sets the overall level, so that the sound can be balanced in volume against that of the dry signal. The Tone control allows the guitar's sound to be switched through from a basic ES335-type growl up to a clipped-out Strat sound. The LED indicator is illuminated continuously when the unit is in use, rather than just a flash as you switch it on. The legends on the front-panel of the AD3 are fluorescent pink(!) that really stand out both on stage and in dimly lit studios.

Operation

So, to operation. The level of noise from the Stack In A Box is a lot less than a normal stack. In this way, I suppose that the replication of sound is not perfect. A valve amplifier creates a level of HF noise which is part and parcel of the overall sound, but the AD3 does not have the capacity to generate noise, so a certain 'feel' is lost from the sound. But despite this, the overall sound is very close to that of a valve-amplifier being overdriven. The level of sustain is good, though perhaps not as hot as I would have expected. On slow ballads and blues the effect is perfect, but for hard rock or heavy metal, it's better to link two of the units together. This enables the overdrive to really 'sing' through a loud backing, and presents the characteristic 'honk' on the midrange that both Marshall and HiWatt amplifiers are renowned for.

If your motto is 'Happiness is a warm valve' but you don't want to have the problems of carrying valve amplifiers around, then this is a logical and effective alternative.

In recording, the line taken straight from the pedal into the mixer provides a superb signal, and eliminates the noise problems so often encountered with overdriven speaker cabinets.

Tim Oakes **E&MM**

The Washburn Stack In A Box is RRP £54 and information is available from Washburn U.K., 20 Victoria Road, High Barnet, Herts.

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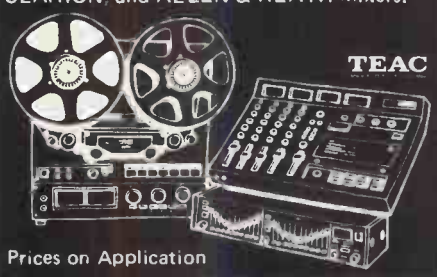

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Seiwa SR100 Rockman Guitar

Bottom of the Seiwa range, the SR100 is one of six guitars now being distributed in the UK by the *Musicians' Direct Supply Company* – part of Alligator Amplification. Their philosophy is that by selling their products direct to the public, they can lower retail prices right down. Certainly, the SR100 is incredibly cheap – cheaper even than a secondhand guitar of this quality would be.

The Seiwa is a conventional six-string electric guitar with a 22-fret neck, twin single-coil pickups (see later), a one-piece tailpiece/bridge, volume and tone controls and a pickup selector. The headstock is fitted with six (closed) individual machine heads and two dual-string guides for the first and second, and third and fourth strings respectively.

All the hardware (with the exception of the pickups and controls) is finished in chrome, while the body is covered in a thick coat of tough gloss polyvinyl paint, highly polished. Access to the inside of the guitar is through the scratchplate, a strange way of doing things and one that requires a fairly tedious level of work before the internal hardware can be inspected. However, Musicians' Direct Supply guarantee all their instruments to the original purchaser for a year, and this should cover any teething problems that might be experienced, making internal adjustment unnecessary for most users.

Bridge Construction

A single flat steel plate is held onto the body of the guitar by five crosshead screws. At the base of this is a ninety-degree bend which takes the screws whose job it is to hold the individual string supports. These are pushed forward on springs, allowing the string length to be varied for intonation discrepancies. There are two 'legs' to each string support, and these are moved by the use of a tiny Allen key. This allows the action to be raised or lowered, and while this is a little fiddly, it's still a better system than many, and certainly a lot better than the loose poles that were the trend a few years ago.

The two pickups are mounted directly onto the scratchplate and can be raised and lowered by screws mounted either side. Their sound is bright and powerful, and any hum that does rear its ugly head is probably attributable to the pickups' single coil configuration. Frankly I think this is just one of those things that has to be borne. After all, what do you want for £129?

With an excellent maple fingerboard, the neck is very Strat-like – narrow but with a traditional curvature. The fingerboard itself is fitted with wide frets, more Gibson than Fender in feel, and black markers are repeated on the edge strip. It's a comfortable neck, and the slimness aids playing speed a great deal.

Pickup Sounds

The sounds from the SR100 were good, if a little predictable. The bridge pickup gave a tight, biting treble, though it wasn't in any way harsh. The neck pickup gave a warm, rich sound, which could, by judicious use of the tone control, be mellowed right down to a muddy '335' sound – perfect for rhythm work.

The lead sound is also a mite predictable, but surprisingly clear for a guitar in this price range. The SR100 is capable of delivering both searing lead sounds and deep, forceful tones in the lower registers.

Conclusions

The Seiwa was featured in the *Rockschool* television programme and a lot of people became aware of the potential of the Seiwa range as a direct result of that coverage.

All in all, the SR100 is an exceptional guitar for the price. Anyone who is interested in embarking on guitar-playing should give it a very close examination, but don't write it off simply as a beginners' guitar and a beginners' guitar only – nothing could be further from the truth. It outperforms many guitars of twice its price, and the standard of workmanship and overall feel of the guitar are very fine indeed. Add to that the fact that the distributors supply a hard case free of charge, and you have a rather special bargain on your hands.

Tim Oakes **E&MM**

The Seiwa SR100 is available in Red, Black, or White finish for £129 (plus £12 carriage) from Musicians' Direct Supply Co., 176B Field End Road, Eastcote, Middx. HA5 1RF. Tel. 01-866 7414.

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USING SEQUENCERS

SWING

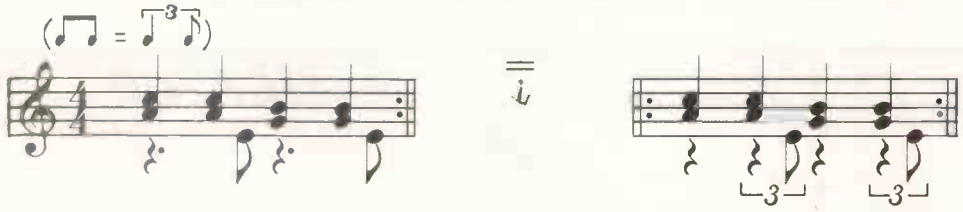
In the first article in this series, we mentioned briefly some of the problems involved in programming pieces of music containing triplets. Now we're going to look more closely at this and a musical technique which relies on it, that is, introducing a 'swing' feel. Although this is a term, and indeed a technique, which comes from jazz, many rock and pop musicians unconsciously write and perform numbers based on this feel. Not having had any jazz training, or perhaps even classical music theory, which would allow them to analyse what they are doing when they play like this, they continue in blissful ignorance until the day when they try to enter a 'swing' piece, or even a single 'swing' phrase into a sequencer.

Emerson, Lake and Palmer's verion of 'Fanfare for the Common Man' is a good example of a piece of classical music which takes on a swing feel and Jacques Loussier is always doing it to Bach. The bass-line in the first example is actually the 'swing' quavers (crotchet triplet followed by quaver triplet) we shall look at that in a minute and with the Loussier it is usually the ride cymbal which plays this phrasing.

So what exactly is 'swing'? Jazz musicians have many colourful phrases to describe it, but for our purposes it is perhaps best analysed in terms of standard musical notation. You will see the shorthand for it just above the first piece of music. Normally when smaller divisions than a crotchet are played, two quavers for example, they are all allotted an equal length of time. Previous to this century, any other playing style would have been considered poor timing or sloppy technique. But what jazz musicians began to do was 'lean' more heavily on the beat (the first quaver, say) extending its official duration at the expense of the off-beat, ie. the second quaver of two. The way we measure this can be expressed as a percentage, in the same way as we refer to the positive component of a pulse wave as part of the total wavelength, ie. how much of the total crotchet the first quaver takes. Fifty per cent is the 'no-swing' amount where the first and second quavers are equal (like a 50% pulse wave, eg. a square wave, where positive and negative components are of equal time duration). Normal 'swing' range, if you look at it like this, is between 50% and 70%, with the effect becoming more and more marked the higher the percentage. Lower than 50% would presumably be 'contra-swing' with the second quaver longer than the first. 75% would of course be a dotted quaver followed by a semi-quaver and technically, therefore, no longer a 'swing' feel.

The most common 'swing' amount is 66%, and this of course is two-thirds followed by one third. But because classical musical notation has a symbol for a one-third note, a triplet, we could write this in 'proper' notation. For each quaver note on the beat we would put a crotchet triplet and instead of the off-beat quaver, a quaver triplet. However, as each triplet note (however long or short) requires marking with a figure three above it, this would considerably increase the complexity of the musical score and the time it takes to write out. So we adopt the notation shown below (a pair of quavers equalling a crotchet triplet, followed by a quaver triplet) as a form of shorthand telling us to 'swing it'.

Here is a 'swing' phrase written out first in the shorthand version and then how it is actually played. Notice how the upper crotchets are not affected by the 'swinging' and it is really only the E which gives the phrase its 'swing' feel:



So how do we actually go about putting this piece into a sequencer? We know already that to program triplets we need to allow more clock pulses for each bar and to compensate by running our clock faster, but fortunately with 'swing' we don't have to allow for quavers mixed in with quaver triplets. So we can get away with 3 pulses per beat (12 pulses per bar). Now we must program every on-beat quaver for 2 pulses and every off-beat quaver for one. Note that crotchets now take 3 pulses, minims 6, and breves 12. So our three programming lines come out like this:

```
C h h C h h B h h B h h )
A h h A h h G h h G h h )   repeat (ie. loop)
r r r r r E r r r r r E )
```

Have a listen to how this sounds (with a piano or other percussive-type sound) and then try programming the phrase as it is written (ignoring the swing abbreviation) ie. with 8 pulses to the bar, like this:

```
C h C h B h B h )
A h A h G h G h )   repeat (ie. loop)
r r r E r r r E )
```

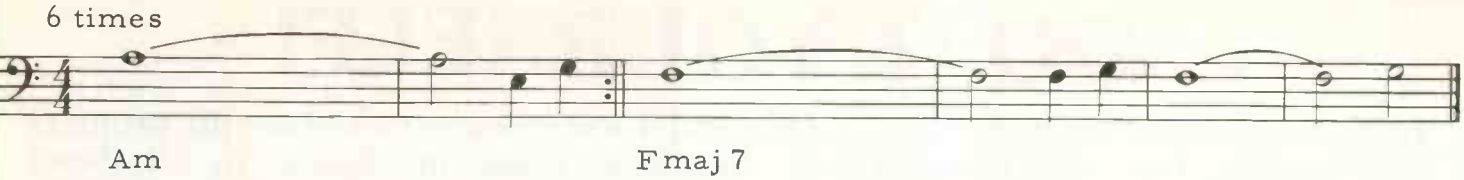
Hear how plodding and ordinary this sounds in comparison to the first phrase? This is the peculiar magic of 'swing' – it breathes new life and feeling into the simplest, most banal phrases.

Of course, it is also possible to program in different swing amounts into our sequencer. On several drum-machines currently available, it's possible to set a swing percentage between 50% and 70% as an auto-correct feature (on the Oberheim DX and SCI Drumtraks, for example). Unfortunately, no one has developed the software to do this on a sequencer yet, so we have to do it the hard way. A 60% swing could be programmed by allowing 5 pulses per beat (20 per bar) and giving the first quaver 3 pulses and the second quaver 2. Our phrase would now be programmed thus:

```
C h h h h C h h h h B h h h h B h h h h )
A h h h h A h h h h G h h h h G h h h h )   repeat (ie. loop)
r r r r r r r r E h r r r r r r r r E h )
```

However, the fifth-notes (used to program this 60% swing) use up memory space even faster than triplets and to get other swing values, you would need to use even more pulses per bar (40 for 55%, 60%, 65%, and 70%) and 100 for 52%, 56%, 64%, 68%, and 72%). Of course, by now we are into diminishing returns, for each minute extra subtlety we pay dearly in terms of memory space and number of bars.

Let's return to our phrase programmed with the more common 66% swing. Here's a bass-line to go with it, which containing nothing smaller than crotchets is independent of any swing amount:

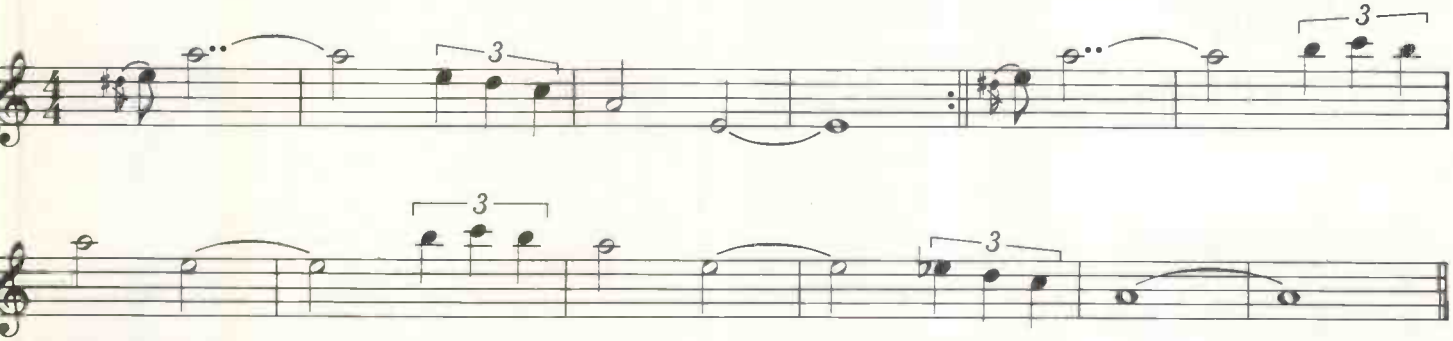


If you're programming this on a separate sequencer and you can arrange a 3 to 1 clock divide (ie. the polyphonic sequencer is triggered three times as fast as the bass sequence) then you can save memory space and program it like this:

A h h h h h E G (repeat 6 times) F h h h h h F G F h h h h h G h (repeat all ie. loop)

However, if it is on the same machine you will have to put three things in for every symbol above ie. A (h h) h (h h) h (h h) h (h h) h (h h) E (h h) G (h h) etc. Try more sustained sound, perhaps with PWM or a slow filter sweep on this languid bass-line.

Now let's add a melody line, which can be played over the top in real-time or programmed in step (pulse). Leave 4 bars before you begin playing:-



If you want to program this on the sequencer here are the step-by-step instructions (put in 48 rests first):

D E A r r r r r r r r r r r r r r r E r D r C r A r r r r r E r r r r r r r r r r r r r r r r (repeat)

D E A r r r r r r r r r r r r r r r B r C r A r r r r r E r r r r r r r r r r r B r C r B r

A r r r r r E r r r r r r r r r r r E♭ r D r C r A r r r r r r r r r r r r r r r r r r r r r r (repeat all ie. loop)

Use a smooth brassy sound to play this melody. The observant amongst you will notice that the grace note at the beginning uses up one triplet space and the next note which it steals from also has one triplet space. The A, which would have fallen on the third triplet anyway, then takes its normal place.

You may also have noticed that whilst the chords and bass-note change the repeated one-bar sequence doesn't. This is a very common technique especially when using sequencers with traditional instruments. Good examples of this are 'On The Air' and 'San Jacinto' by Peter Gabriel. We will be looking at more complicated examples of this compositional technique in the next instalment. Until then, happy sequencing.

Paul Wiffen **E&MM**

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DO IT YOURSELF!

Two easy-to-build circuits from Paul White **kick-off a new series of simple projects this month. The lead checker will doubtless prove invaluable to all those musicians *still* wondering whether or not faults are attributable to their connecting cables, while the S-trigger converter answers many a synthesist's prayer, since it offers the facility to trigger Korg and SCI synths from Roland drum-machines, and at a ridiculously low cost-price.**

S-trigger Converter

It has now become clear to me that the Tower Of Babel was only a minor exercise in inept industrial communication. The outcome of that escapade was only a small tragedy compared to the potential commercial disaster that may yet be caused by the major synth manufacturers' lack of ability to agree on a workable standard (prior to MIDI, of course) for trigger interfacing levels so that any synth or sequencer can just be patched to any other, by anybody, at any time.

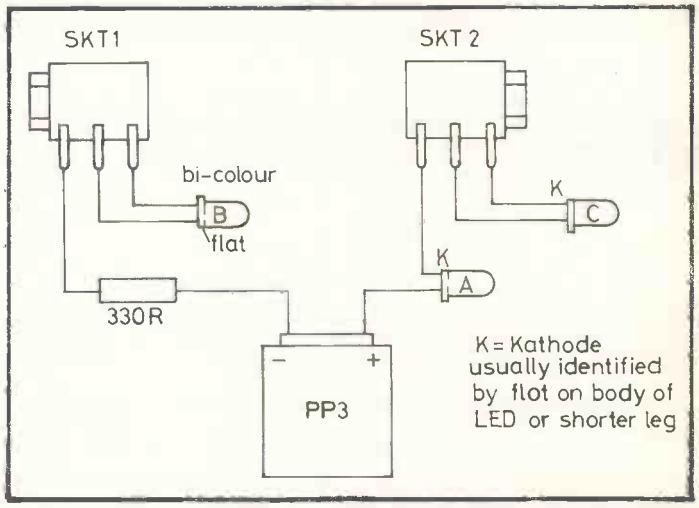
The advantages of one uniform standard are obvious. Instead of trying to untangle all the problems he has unwittingly inherited, the musician would be free to concentrate on the business of actually creating music. However, the problem of incompatible triggering standards remains as important and as unfathomable as ever: perhaps we should all be glad that the makers have at least agreed on a fixed number of semi-tones per octave, though there is a rumour of a Belgian synthesiser with only ten. Well, that's decimalisation for you...

Anyway, to the matter in hand. This little gadget was devised when a friend of mine came to me with a problem. Her Korg Polysix arpeggiator would not trigger properly from a Roland TR606 Drumatix. The Korg trigger input has what is termed an 'S-trigger' input which in layman's language means: shorting the two contacts together causes a trigger. Several models of synth, including some Moogs, have these 'S-trigger' inputs although it is not unheard of for the same manufacturer to change his trigger arrangements every year or so, just to keep electronics designers and constructors on their toes.

Roland equipment produces a 14-volt trigger output which goes positive with respect to 0volts and, in the case of the TR606, lasts some 20ms. Other manufacturers have trigger pulses which go negative with respect to 0volts, while Sequential Circuits compromise by using a positive trigger pulse of only 5volts or so.

What had to be produced, then, was a device that would accept any positive- or negative-going pulse of any reasonable amplitude and convert it to a switching action. Several obvious circuits sprang to mind but what I finally arrived at is probably the simplest circuit that will do the job reliably.

The DIL reed relay output device was chosen for two main reasons. First, the switch contacts are completely isolated from the rest of the circuit, thereby avoiding level-shifting problems or ground-loop hum; and second, the resistance of the contacts when closed is as near to zero ohms as makes no difference, so even the most pedantic synth has no excuse not to trigger reliably. If you come across an 'S-trigger' that wants to operate in reverse, ie. it operates by shorting out all the time except during a trigger pulse, then substitute a relay with normally-closed contacts or, better still, change over contacts so that you can have both types available should they ever be required.



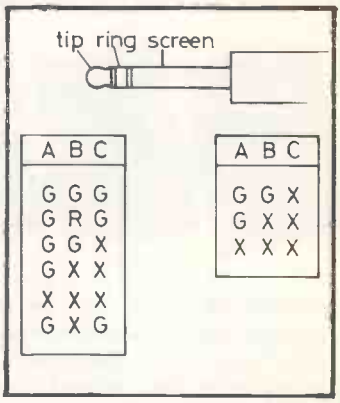
Circuit Operation

The incoming pulse is rectified by the bridge formed by four IN9916 diodes, and consequently becomes positive-going. Providing the pulse is high enough to overcome the forward voltage drop of the diodes and the base-emitter voltage of the transistor, the BC107 will turn on and pass current through the relay coil. In practice, any pulse over about 2.5 volts should operate the circuit, and in any event, I don't know of any synth that produces pulses of less than 5volts, so you should by alright there.

The LED is wired in series with the relay coil and gives a visual indication of correct triggering. The voltage drop across the LED ensures that the maximum safe relay coil voltage is not exceeded, and the relay coil provides the current-limiting resistance required for the LED. The extra diode between the base of the transistor and the positive supply rail is purely a mark of paranoia on my bahalf and could probably be omitted in most cases.

Assembly

Construction is best carried out on a small piece of 0.1" veroboard, and the circuit should work first time without any problems, so long as you don't solder the LED in back-to-front. The whole board should fit neatly into a plastic instrument-case and no difficulty should be experienced in obtaining the parts either from usual mail order outlets or from your local component shop.



One last tip. If you want to trigger your Sequential Circuits synth (we used a Pro One) from a Roland trigger-pulse, simply pot down the Roland output using a couple of 1K resistors. It should then work directly into the SCI trigger input.

E&MM

Parts list for S-Trigger Convertor

1 small toggle-switch for s.p.s.t.
1 two-pole jack socket
1 two-pole switched jack socket (n/o)
5 IN916 diodes
1 10K quarter-watt resistor
1 100K quarter-watt resistor
1 BC107 transistor
1 type-A 5 volt reed relay (DIL package)
1 plastic case
1 battery clip

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"Hibi"
6. Erik D. Huber (11. USA)
"The Lost Valley"

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"Speed Way"

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Lead Checker

This project is not intended to compete with the more elaborate lead-testing equipment which is available to the industrial user; rather, it is designed to provide a quick and reliable method of detecting damaged or wrongly-wired cables.

Construction has deliberately been kept simple in the hope that those readers who up to now have been spectators only will be persuaded to take up a soldering iron and join the revolution.

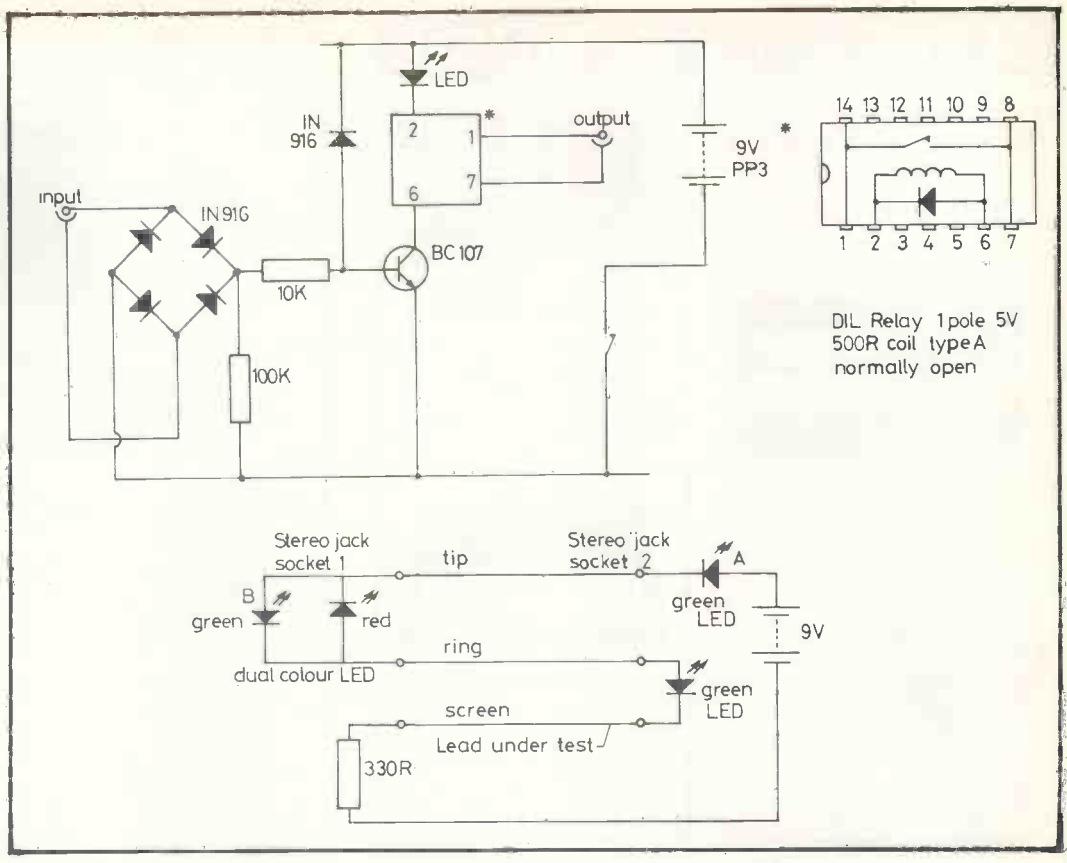
The only unusual aspect of this design is the bi-coloured LED which is to be found in position B on the panel. LEDs are such a convenient source of coloured light that it is easy to forget that they are diodes, and the bi-colour device exploits this fact by incorporating a red and a green LED into a single package. The two devices are connected in opposite directions so that either the red or green part illuminates, depending on the direction of the current flow, but because of the package design, both colours appear to emanate from the same source. By applying an alternating current, both LEDs light alternately, giving the effect of yellow light.

Circuit Operation

In this circuit, when a correctly-wired balanced lead is plugged into the lead checker, all three LEDs light up green. If, however, the two signal wires are crossed over at one end, the current flow through the bi-coloured LED is reversed, resulting in a red light being emitted.

An unbalanced lead will short together the ring and screen connections and so LED C will remain extinguished, only A and B being illuminated.

The operation of the lead tester should be apparent from the schematic diagram, where it can be seen that the lead under test is connected such that its two signal wires and screen are joined by means of the LEDs connected to the jack sockets, so that any break in continuity will prevent any of the LEDs from lighting.



When the lead under test is removed from the sockets, the battery Is removed from the circuit and so there is no possibility of the unit being left on and flattening the battery. The 330R resistor limits the current through the LEDs to a safe value.

Assembly

Construction should provide few problems, even for the complete novice. If however, the current circuit does not work first time, the chances are that you have connected one of the LEDs backwards.

LEDs are generally marked by a flat on the body which corresponds to the cathode lead, but in some cases the manufacturer opts for the system of making the cathode lead shorter than the anode lead. This system is fine unless you get a second hand LED where both leads have been cropped to the same length.

If you have any doubt about which way to connect a particular LED, simply connect it to a 9V battery via a 330R (or thereabouts) resistor and make a note of which end has to be made positive in order to coax light out of it. If it won't light either way, then the chances are that it's dead! Don't connect up an LED without a series resistor or it will soon fall into the last category.

In order to avoid damaging the LED by the application of excessive heat (clumsy solderers take note), it is best to leave the legs long and to solder the wires to their ends, not forgetting to fit a price of plastic sleeving for insulation.

All parts including the bi-colour are readily available from most of the mail order component suppliers or from a shop such as Tandys, so there is really no excuse for not building one of these. Seriously though, it's no joke when your synth starts cutting out during an important gig attended by the representatives of the only record company that could be bothered to listen to your demo tape.

In Use

So – having bullied you into agreeing to build one, I'd better tell you what it can do for you.

As there are quite a lot of unpleasant things that can happen to a three-conductor cable, I will present the possibilities in the form of a table.

When testing leads, don't forget to bend them and apply a little controlled violence to show up any intermittent fault. The system can be adapted for use with XLR connectors simply by connecting them in parallel with the existing jack sockets.

E&MM

Balanced or two-core coax leads

A	B	C	
G	G	G	**OK**
G	R	G	**tip and ring crossed over**
G	G	X	**ring to screen short**
G	X	X	**tip screen and ring shorted**
X	X	X	**open circuit**
G	X	G	**tip to ring short**

Single-core coax leads

A	B	C	
G	G	X	**OK**
G	X	X	**short circuit**
X	X	X	**open circuit**

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This is the smaller brother of the Amdek delay kit described in July '83 E&MM; it uses the same basic circuitry, and gives the same delay range, but without some of the frills. Echo is the major effect produced, including 'slapback' (a single short repeat) when the intensity control is at minimum. On shorter delay times, still with the intensity at minimum, ADT (automatic double tracking) is available; this thickens up your sound without being an obtrusive effect. Phasing, flanging and chorus, which are also associated with time delay, are not available because the minimum time delay is not short enough and no modulation is available. However, some weird sounds can be produced by turning the delay time control by hand (or foot!) whilst sustaining a note.

The Kit

The delay machine is supplied in a bubble pack, complete with detailed step-by-step instructions, a spanner for tightening the nuts on pots and sockets, and a length of solder which should be sufficient even if you make a couple of mistakes and have to do some joints over again.

You will need the customary fine tipped sholdering iron, a pair of wire cutters, pliers and a cross-head screwdriver: Pozidriv no. 1 point is the right size. You will also need a PP3/6F22-size battery, or a suitable 9V adaptor to fit the unit's 3.5mm jack. The device takes about 11mA.

The first thing to do is to check all the components are there, and tick them off against the drawings in the leaflet. Use the 'bubble' from the front of the pack as a tray to stop the smaller parts rolling away. The circuit board is supplied ready assembled and tested, so the next steps involve connecting up the LED, battery clip and pots using the wire supplied. All the wires are cut to length first with the help of the scale printed in the instructions.

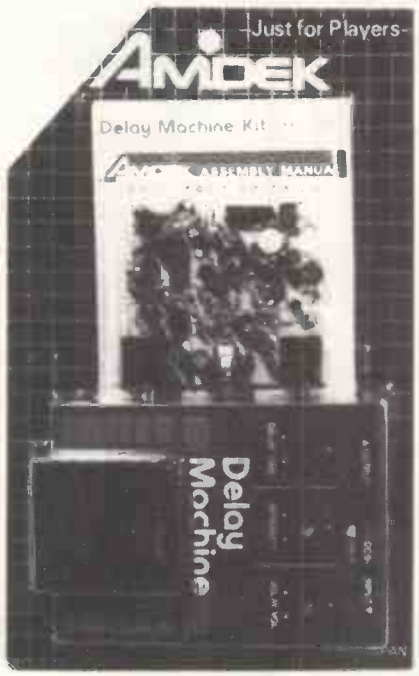
The footswitch is not connected until it has been screwed to the case, and the pots and LED can then be mounted. Since the pots must have their locating spigots broken off, do the nuts up fairly tightly (but don't gorilla them!) or the pots may turn in use.

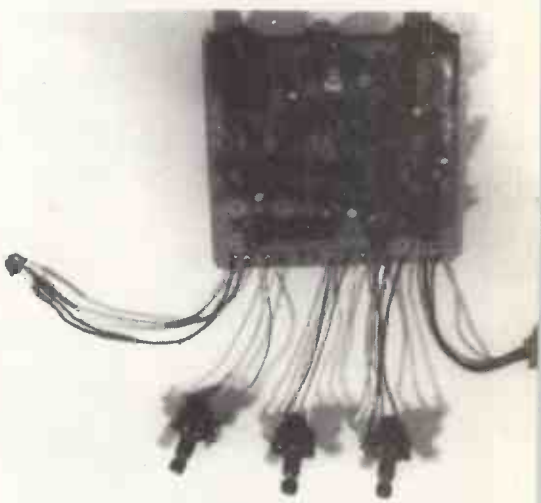
The PCB is held in the case by the jack socket nuts. Roland recommend that the wires to the Delay Time control are routed away from the rest of the circuit to avoid interference, and the surest way of keeping them that way is to tape them to the front of the case. You will probably need to bend the LED leads to one side before the PCB will fit: exercise great care when doing this, and support the leads with pliers to avoid breaking them.

The unit may now be tested before finishing the casing. An insulating sheet goes in the case bottom – place it up against the protruding lugs – and a piece of sponge goes in the top to retain the battery. This is meant to be self-adhesive, but ours wasn't; a piece of double sided tape soon fixed that. The case is screwed together, the knobs are fitted, and finally two stick-on feet and a rubber battery hatch/foot complete the unit.

Circuit

The heart of the unit is a so-called 'bucket brigade' delay IC, IC4. This has 4096 'buckets', or





Pots, LED and battery clip connected to the circuit board.

Parts laid out for checking.

Pots, LED and footswitch ins the case.

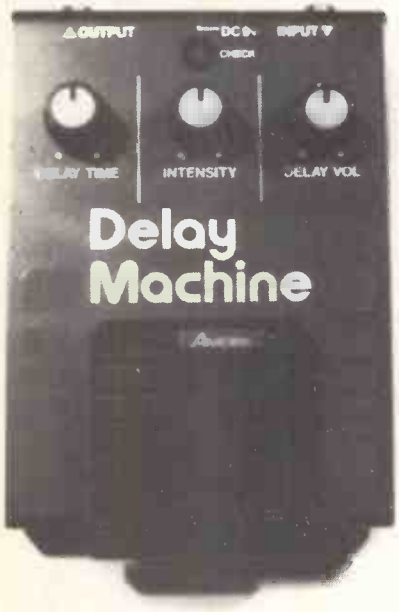
capacitors, and the signal is passed from one to the next at a speed determined by the clock oscillator IC3, giving a delay time variable from 20 to 300ms. Filters around Q5, 6 and 7 prevent the clock and signal frequencies interfering with each other.

Bucket brigade delays tend to be noisy as they get longer, and so a noise reduction system is incorporated using IC2. This compresses signals (raising all of them to nearly the same level) prior to the delay, then expands them back to their original levels afterwards. As a further aid to noise reduction, pre-emphasis (treble boost) is applied by the first half of IC1, followed by a matching de-emphasis after the delay. This helps cut the more annoying high frequency elements of the noise. Q4 is a FET, a silent electronic switch, operated by the footswitch via flip-flop Q2 and Q3.

Operation

The functions of the switches are given in the panel drawing. Note, however, that the Delay Volume control does not affect the direct sound at all, so it is not possible to have a delay-only sound, nor can the echoes be made louder than the direct signal. Also, the bandwidth is limited (about 3kHz) but this is adequate for use as a floor effect on guitar or keyboards. The Delay Machine worked first time and gave excellent results. If you have trouble getting your kit to work, contact Amdek on their special number: (01) 847 1671, in the UK. **E&MM**

PCB fitted to case.



Finished!

Panel Description

OUTPUT Jack: for connection to the input of an Amp or other effect unit.

LED: This indicates ON/OFF mode of the DMK-200. Also, this can be used to check battery. If the LED fails to light or become dimmer, the battery should be replaced.

DELAY TIME Control: Rotating this knob clockwise will increase the delay time.

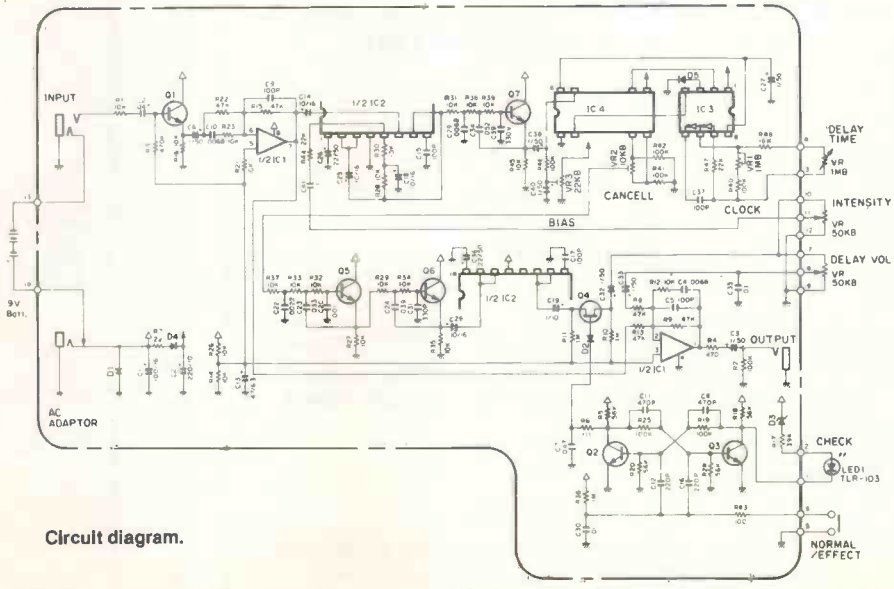
INTENSITY: If this knob is turned fully counterclockwise, a single delay will be obtained. For multiple repetitions of delay sounds, this should be rotated clockwise.

External Power Input Jack: This is to connect the optional Power Pack (PDK-500, AC Adaptor).

INPUT Jack: This is to connect to a guitar, etc. Plugging into this jack automatically turnes the DMK-200 on, so please disconnect the cord when not using the unit.

DELAY VOLUME Control: This knob is to control the level of the Delay sound. If it is turned fully counterclockwise, only the Direct sound is obtained, and if clockwise, Delay sound.

Foot Switch: This turns the effect on or off.



Circuit diagram.

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