

Electronics &
MUSIC Maker

JANUARY 1984 95p

INCORPORATING COMPUTER MUSICIAN

**STAMP
MINDS**



SAGA

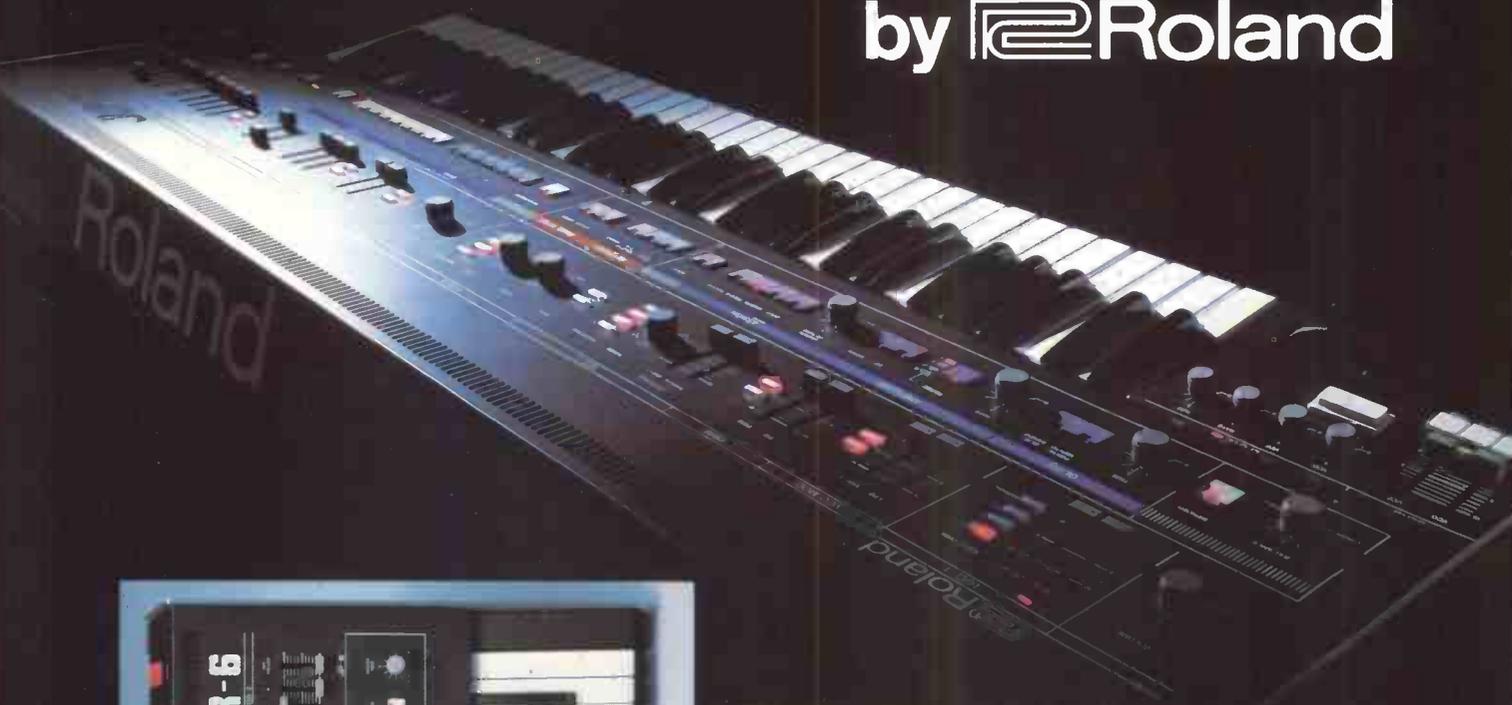
Introducing Sequencers ● Dave Hewson – Producer

REVIEWS Oberheim OB8 and System ● Soundchaser Computer Composer

● Vigier Nautilus Bass ● Siel Cruise Polysynth ● Ibanez DM2000 Delay

JUPITER-6

by  Roland



The Jupiter-6 is a 61 Key, 6 Voice, 12 VCO polyphonic synthesizer.

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CRUMAR PIANOS

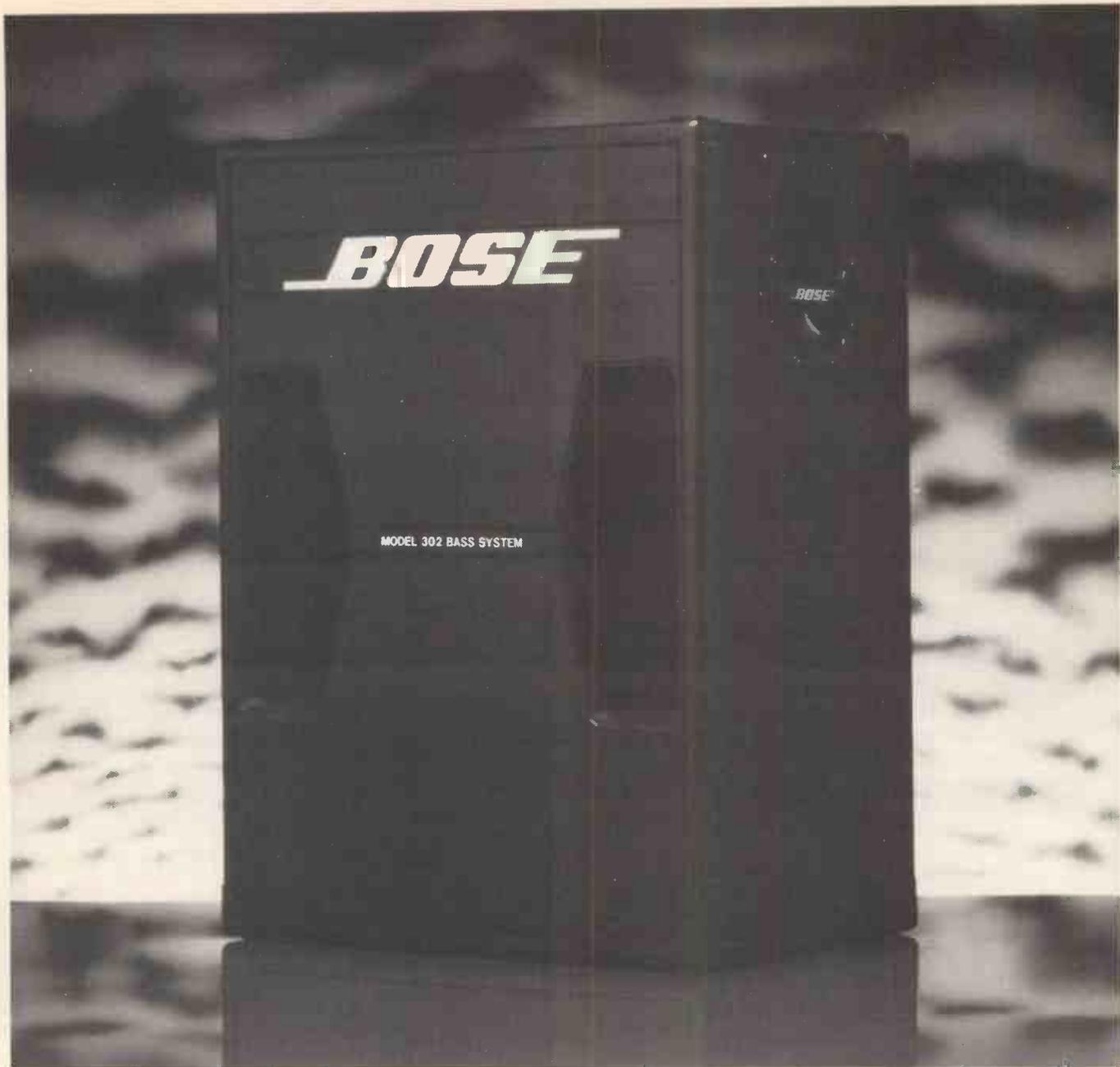
	MRP	CHASE
CRUMAR DP80 PIANO	£1300	£999
CRUMAR DP30 PIANO	£1000	£799
CRUMAR ROADY PIANO	£400	£299
CRUMAR ROADRUNNER PIANO	£300	£249

ALL AVAILABLE ON INTEREST FREE CREDIT

CHASE

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IF YOUR BASS SOUNDS RUBBISH TRY PUTTING IT IN OUR BIN.

Pictured above is the new 302 bass bin from Bose.

It features a two-port design with a lower tuning of 55 Hz and an upper band of 110 Hz. And it's built to handle a healthy 500 watts of programme material.

The 302 is specifically designed for use with the Bose 802 speakers.

As you can see from the photo on the right, it clips on underneath the 802 to form a single stable unit.

And because the 302 has a built-in 180 Hz crossover, it can be used in conjunction with the 802-C System Controller to provide either two-way passive operation or full bi-amplification.

It is, of course, still possible to use the 802 speakers on their own, simply by plugging in to the relevant socket.

All the hookups on the Controller, in fact, are designed to be quick and easy to operate with clear wiring diagrams and an LED display to tell you which hookup is in use.

As bass bins go, the Bose 302 is compact (23" x 31½" x 16," to be exact) and weighs in at just 41 kg.

And since it is so simple to use the 302 in conjunction with the existing speakers, it represents an economical and extremely effective means of upgrading your sound system.

Especially if you don't want to go to the trouble and expense of starting all over again from scratch.

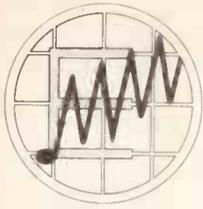
For more details on the new bass bin from Bose, just drop in on your nearest dealer or get in touch with Bose UK at the address below.

It could improve your bass beyond recognition.

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PROFESSIONAL

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Electronics & Music Maker

January 1984

Volume 3

Number 11

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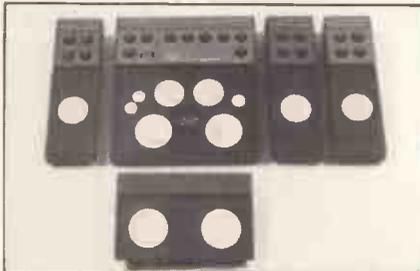
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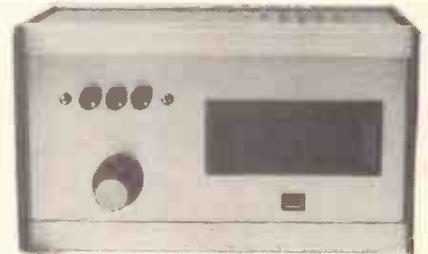
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Publisher Terry Day

Director Dennis Hill

Editorial & Production

Electronic Music Editor Paul Wiffen
Music Editor Tim Oakes
Features Editor Dan Goldstein
Sub-Editor Ian Gilby

Editorial Assistant Patricia McGrath
Accounts Sonja Betts
Mail Order/Subscriptions Cheryl May

Consultants

Electro-Music Keith Emerson
Robert Moog
Hubert Bognermayr

Keyboard Alan Townsend
Patrick Moraz
Rick Wakeman

Wind Dave Bristow
Guitar Bruno Spoerri
Peter Maydew

Percussion Warrén Cann
Drum Ken Lenton-Smith

Stage Equipment Ben Duncan
Projects Paul Bird
Robert Penfold

Hi-Fi Paul Williams
Jeff Macaulay

Editorial Offices Alexander House
1 Milton Road, Cambridge CB4 1UY
Tel: 0223 313722

Advertisement Manager Tony Halliday
Tel: 0223 313722

Advertisements: Graham Butterworth
Tel: 0223 313722

Editorial and Advertising Offices
Alexander House, 1 Milton Road
Cambridge CB4 1UY
Tel: 0223 313722

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Alexander House, 1 Milton Road
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Interface '84

Continuing on our campaign for communication, one aspect of the growing synth and computer boom has been causing no small amount of difficulties. The problem – language.

Different manufacturers have always seemed to put a new label on old facilities, but with so many new pieces of equipment becoming available, the language barrier becomes a mountain range!

Surely there must be some way that a common, standard, series of terms can be produced, enabling the capabilities of all the new items to be recognised. The case for such a move is more valid when viewed in the light of the sheer weight of new equipment being released – and the development of the market to which they will be sold. This includes not only 'old hands' but new faces – with puzzled expressions. Some semblance of terminology is really a must for 1984, but, again, the communications block must be overcome...hello? hello?...anyone there...

New Workshops

Although it is far too early to properly assess the results of the readership survey we published last month, it is becoming very clear already – just from keeping an eye on the responses flooding into the offices (thank you for taking the time to complete the questionnaire) – that the two things that everybody wants more of are features on performers and workshops on synthesis.

Well, we're happy to say that this month we have more interviews than ever before: Michael McNeil and Charlie Burchill of Simple Minds, who talk about their own approach to modern music-making; Jim Gilmour of Saga, with some very revealing comments about the Moogs and PPGs he uses; Hawkwind, the original space rock band with expansive plans for 1984; and Dave Hewson, composer of electronic film scores, who has also turned his hand to producing pop singles. We have a deliberately chosen mixed bag there, with something for everyone.

Now that our two long-running workshops, Advanced Music Synthesis by Steve Howell and Guide to Electro-Music Techniques by Dave Crombie have just about exhausted their respective fields of study, we have two new workshops beginning. The reasoning behind this is that in general synthesiser players fall into two distinct categories. On one hand there are those who want advice on how best to use and expand the modular systems they are assembling whilst on the other are those who have to work within the strict confines of a particular mono or poly-synth and want advice on how to exploit its potential to the full. These two areas seem to be mutually exclusive, so we have come up with two separate workshops to deal with them.

The first of these, entitled Modular Synthesis comes from the pen of Steve Howell as it is a natural extension of his Advanced Music Synthesis work over the years. Dealing exclusively with getting sounds from modular set-ups, it will give insights into the best use of both limited and expanded systems thereby showing which modules are likely to see most use from a potential purchasers point of view.

For Patchwork, the second of these new workshops, we will be calling on a much larger resource to cope with the range of synths that may be encountered by the aspiring player/programmer. Besides pooling our collective knowledge here at E&MM, we will be asking manufacturers and famous synth players for programming tips and interesting patches. But most of all, we are appealing to readers to share their hard-won expertise with us and with each other. If you have a sound on your favourite synth (be it big or small, old or new) that you think other owners may not have discovered, please send it in to us at our Cambridge address (marked 'Patchwork'). We will of course be crediting all contributors.

In this issue there is also a special feature on Using Sequencers with music and programming notation to help you come to terms with this rapidly expanding area of electronic music. Add to this our usual mixture of in depth equipment reviews, new product information, specialist record reviews and reader input (letters and cassettes) and in this issue we have set the standard for 1984.

NEWS



John Jarvis

Hot Licks Piano

John Jarvis, long-time rock n' roll piano great, with credits which include: Rod Stewart, Ringo Starr, Diana Ross, Crystal Gale, Art Garfunkel and Leo Sayer, has created a *Rock Piano Tuition Course* for Hotlicks Instruction Tapes.

The content of each tape is:

Tape 1: Rock n' Roll notation, 12-bar blues, basic patterns for rhythm, bass, chords and melody. Blue notes.

Tape 2: Intermediate time signatures, triplets, shuffle patterns, sharps and flats. Finding keys, transposing.

Tape 3: Intro. to soloing. Technical exercises designed to strengthen the hands for soloing. Intermediate rhythm patterns.

Tape 4: A complete examination of chords and their notation. Practical applications of Rock n' Roll notation. Ear training and intermediate transposing.

Tape 5: Advanced notation. Minor keys. Examination of Rock stylings. Introduction to Reggae, Rock Ballads.

Tape 6: Advanced stylings from jazz, blues and country. Advanced left hand exercises. Modulation. Improvising and songwriting. The art of playing simply. Tips on studio work.

This is the first of a number of instruction courses for key boards which can be expected from Hotlicks over the next few months.

The full Rock Piano course consists of 6 one-hour cassette tapes costing £7.95 each.

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More New Shops

The mounting number of new retail shops in the UK is further expanded this month with the opening of a new London Rock Shop... in Bristol.

It is three years since the opening of the original London Rock Shop in November 1980, and Directors Ed Jones and Jack Brand felt it was time they developed the idea of the shop wider afield. With the demise of Biggles Music in the Bristol area, London Rock Shop has successfully negotiated the exclusive Roland; Sequential Circuits, Fostex and Oberheim franchises for the area.

The new London Rock Shop is situated at 7 Union Street, Bristol. Tel: (0272) 276944.

(The Directors of the London Rock Shop would also like to point out that there is no connection between The London Rock Shops (in London and Bristol) and 'The' Cambridge Rock 'Shop', the Rock Shop in Dudley, or Rockshop in Old Trafford, Manchester)

3Rio

A new cassette magazine/mail order company has come to our attention. 3RIO Tapes, based in Belgium, cover all types of music as well as extensive contacts for independent record and tape companies all over Europe.

They are currently compiling free releases of new music, information from 3RIO, c/o Magisch Theater, Juliaan Dillen str, 22B. 2018 A-Pen, Belgium.

Demo Cassettes

Please note that due to manufacturing problems, E&MM's range of Demo Cassettes are no longer available. Plans are now afoot to introduce an entirely new range of cassettes (with improved quality) shortly - watch this space...

Philips D6550

Philips have entered the karaoke market with the introduction of their D6550 Cassette Recorder/Amplifier. Basically a small combo amp with cassette attached, it measures just 210 x 360 x 500mm and offers three inputs (all mono). The tape gives varispeed, and there is an output for headphones or line out to PA system.

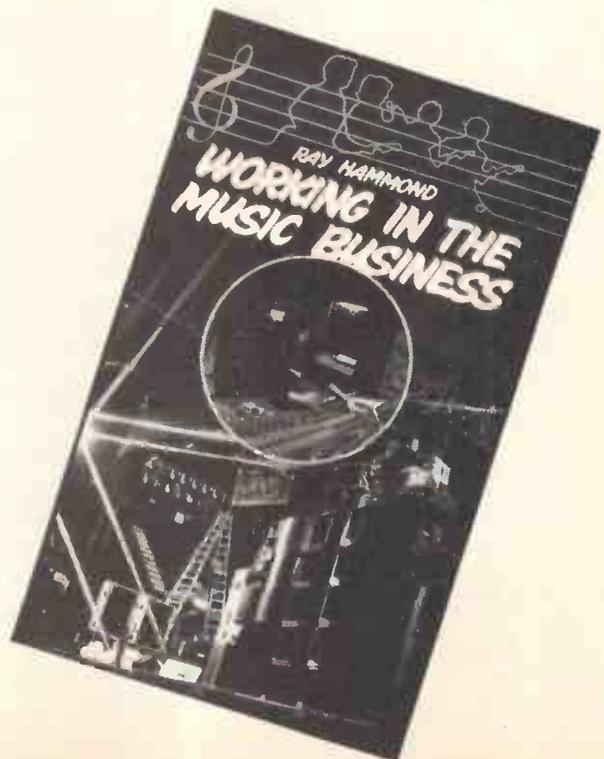
The price of the D6550 is around £99 and it should be available from most electrical retailers.

Working in the Music Business

Ray Hammond has just released an interesting new book (through Blandford Press) entitled '*Working in The Music Business*'. With chapters on sound recording, record companies, media, retailing, road crews, management and others, the book gives a large number of contacts and advice for anyone thinking of a career in the music business.

With some omissions (it doesn't list E&MM for instance in the UK magazines) the book offers a concise and valuable source of information previously hard to find. The book costs £4.95.

Information/Orders to Blandford Press, Link House, West Street, Poole, Dorset.



Readers Letters

Send to: Readers' Letters, Electronics & Music Maker
Alexander House, 1 Milton Road, Cambridge CB4 1UY

Gift of the Garb

Dear E&MM,

With so many bands relying on their visual approach, can you suggest a company who can make up some stage costumes for my group 'Exodus' — we have some designs roughly drawn up but there doesn't seem to be anywhere to make them into clothes. We would also like to make a video promo of the band (once the costumes are made!) but again, we don't know anywhere.

Evelyn Price
Rushden
Northants

The short answer is, no! The few costume designers and makers are very expensive indeed, but it seems that most groups use family/friends to create their garb. Try a local tailor, if all else fails, since they make up suits etc to customer requirements. Alternatively, approach a local clothes manufacturer and ask (you never know your designs could be the vogue for '84!). Or how about an E&MM sweatshirt if you want to look really State of the Art.

On the video side, there are several companies working in this area, the 'Video Directory' in your local library will give you a list. (Also see Future Music story in E&MM, December 1983).

Please Release Me ...

Dear E&MM,

I have been reading your magazine from the beginning of the year, and would like to thank you for all the great information you have given me — in just 12 months I can now wire up all my plugs without the need for a circuit diagram!

Seriously though, I just visited my local retailer recently and got all the spiel on a whole stack of new synths I was interested in — my problem being unique: I have the money saved for a new keyboard (around £1000) but I'm so confused as to the release of the latest models. I have decided twice now on a specific model but changed my mind when I was told that a 'new model' was imminent. How can I keep up? I really want the most up to date model my money can buy, but the times they are a-changin' and I keep getting overtaken.

I thought I was unique but I met a guitarist in exactly the same spot just a few days ago and we compared notes. He wanted a Telecaster, but waited for the de-luxe model to arrive in his local shop. In the meantime the 'Elite' came out! He's waiting now for that.

It isn't just a case of 'keeping up with the Joneses' it's just that I want my new instrument to be current for as long as possible. I'm a session player (in my spare time) and need the newest to get work. Is there a way the manufacturer/distribution could give firm release dates for gear so we can plan on. I'm sure there are lots of people who are still waiting for a DX7 — and how long will it be before they get a DX8 out? (I hope they don't overlap ...).

Dave Ellerist
Coventry

Construction Course

Dear E&MM,

I have made a few electric and acoustic guitars in the past, and now, being redundant, I would like to learn the finer arts of the craft, and perhaps make a career of it — do have to get an apprenticeship or is there a college course/university course I could take. If there was such a course could I get a grant to study there?

Ian Mayhew
Norwich
Norfolk

There is a course available at the London College of Furniture which covers instrument making, but as far as grants go, this depends on your personal circumstances and your age. Write to: The Admissions Secretary, London College of Furniture, 26, Commercial Road, London E1. There are also courses in repairing at Newark Technical College and Merton Technical College.

Truvox

Dear E&MM,

With reference to Chris Hill's letter in the November issue, I have managed to find a service instruction manual for the Truvox Series 100 tape recorder. I managed to get this from Kaytronics Ltd, (formerly Truvox), 32/34 Bevois Valey Road, Southampton SO2 0JR.

P.A. Tipping
Tadmorton
Lancs.

We contacted Kaytronics, and found that while there is no service manuals available (with the exception of some old ones), they do have a circuit diagram for the Series 100, and this is available for 75p from the address above.

Mono/Poly Trouble

Dear E&MM,

Thankyou first of all for providing me with an inseperable companion — E&MM. Unfortunately, I get through it so quickly that the next issue always seems years away!

Now to my problem. I have a Korg Mono/Poly which I find very useful for my work, but I have long been puzzled by an annoying event connected with the white-noise generator. There is an audible and, surely, quite unacceptable beating whenever this generator is used.

Recently, a friend told me that he found the same problem on a Mono/Poly that he was putting through it paces.

Do you or any of your readers know just why this beating occurs and how, if at all, it can be defeated?

Thanks again for a publication full of erudition and good sense.

Robert Thompson
London N10

Amp Construction

Dear E&MM,

Firstly let me congratulate you on a really useful publication. E&MM has filled a real void!

Next let me get right to the point and tell you that my own knowledge of electronics is very limited (I could tell you what a resistor looks like — but

then I expect you know). I have, however, a desire to build myself a small combination amplifier. Cheapness being important, as you can see by the writing paper, I thought I would be well advised to try using the 75w Master amplifier as described in the June 1981 issue of E&MM. I will most probably be using the 35-0-35V 160VA transformer but I am at a loss as to what I might use as a pre-amp. Bearing in mind the fact that the amplifier will be used for electric guitar and/or bass guitar, I would be most grateful if you would point me in the right direction. I have been examining the various pre-amps listed in the Maplin catalogue but unfortunately because of my not being able to understand them well enough, I am no closer to building the amp now than I was two months ago.

Paul E. Powell
Holt
Norfolk

Complaints Dept.

Dear E&MM,

Having laid bare my innermost secrets in your reader-survey, perhaps I could ask some favours of you... I am but a humble musician and sound engineer who runs P.A. hire to churches in my spare time, (merely for love — certainly not for the money!) I purchased E&MM from the first issue, mainly because it seemed to have the correct balance of music and electronics. Over the years the balance has shifted (quite reasonably) to computer music, but it seems to have left the ordinary musician/constructor a little behind. I know that very few will want the projects that I'd like to see, but I'm getting cheesed off with endless MIDI interfaces for toasters and ZX81 controlled tin whistles. How about:

A communications system — for stage or studio (the headphone/mic sets are easy enough to get).
A lighting desk — like Pulsar.

A 27 band graphic (are you listening Powertran?!)

A modular stage mixer (your studio one was OK, but how about one with all the gubbins for live work?)

O.K. so not many people will want these things. Perhaps I'll have to buy commercially again. It's a pity that a mag that seemed to have the answers has become further and further removed from my field of interest. Can you do something before I stop buying your mag and invest the 95p in Carlsbro's Christmas Club?

Simon Lewis
Derby

MS10

Dear E&MM,

At the beginning of this year I bought my first synth, a Korg MS-10. For around £200 I think it is a very good instrument and I have had no complaints from it. I decided once I managed to find some more money to add to it and buy a drum machine, I decided on the Dr-Rhythm. As well as programming my own rhythm I wanted to use it to trigger my synthesiser to get some melodic-rhythm patterns. Unfortunately synth and drum machine don't see eye-to-eye and don't trigger. I'm not very hot on electronics myself but I'm beginning to learn as I work for a well known electronics firm. I've asked people at work if they can help. I've used a scope on both synth and drum machine and somebody has built an inverter but still they don't work. I'm considering getting a X-15 but I really need to get these damn things to trigger. An interesting thing is that my friend has a Roland Drum and my synth is triggered by his drum machine. So please can you give me any advice, I would be very grateful.

Martin Eve
Milton Keynes

MS20

Dear E&MM,

Thanks for a great mag. I have been buying it since May last year and I also receive "Home Studio Recording."

Help! I have recently bought a Korg MS20 patchable synthesiser, unfortunately minus its instruction manual. I have tried in vain to get hold of a copy and was wondering if any fellow readers could help.

John Birchenough
Wythenshawe



Missed anything?
Most back issues of E&MM are
still available.
See page 94 for a complete
listing.

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Genuine Reductions

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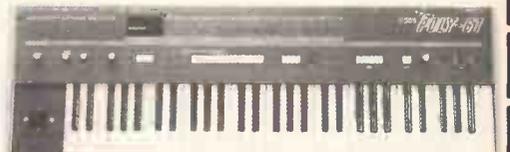
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MUSIC MAKER EQUIPMENT SCENE



Electro Harmonix 64 second Delay

NEW YORK – Electro-Harmonix, always a leader in solid-state delay units beginning with the first analog delay for musicians, the Memory Man, announces their latest achievement, the 64 Second Digital Looping Recorder.

This rack-mountable unit is the "big brother" of Electro-Harmonix' 16 Second Digital Delay. It has all of the functions of the smaller unit – built-in click track, sound-on-sound recording with Infinite Hold, reverse playback, double (or half) speed capability, digital chorus and flanging – plus these new features:

The maximum delay time is now 64 seconds – four times as long as the smaller unit. This means that full bandwidth (15Hz to 12kHz) is possible at 8 seconds.

The minimum delay time can go to

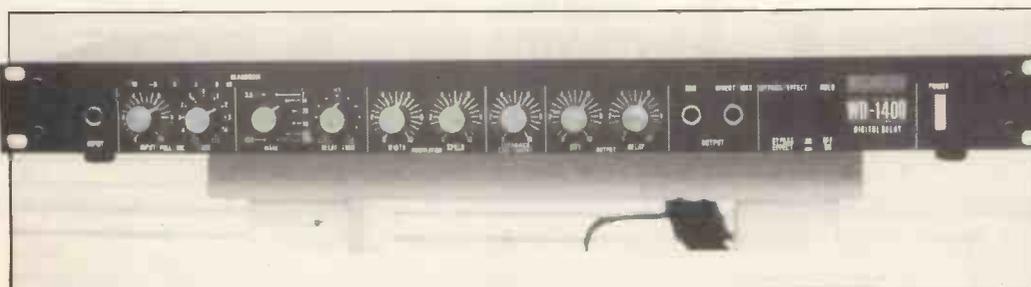
virtually zero. This gives the user the ability to set precise short slap-back echos. There is a four-digit display of the total loop length, reading from 8.00 seconds to 64.00 seconds, an Echo Tap Control providing short echos that can be in time with the beats of a rhythm machine. These short echos can be "frozen" in and made part of much longer echo loops that can be overlapped. The dual-purpose display of 10 LED's simultaneously shows the echo tap setting and the actual progress through the loop, while Fast Erase button records silence throughout the entire memory in just four seconds so that new material can be quickly recorded. This feature is automatically activated when the power is turned on.

The clock of one Recorder can control the clocks of several other units. This allows for parallel track recording on separate units and the

Rhythm Unit Clock Out has a "flywheel" circuit which lets you synch up with rhythm units having only a Clock Input. This will work with units that require 12, 16, 24 or 32 pulses per measure, also an extra Input allows you to mix in the output of a rhythm machine without recording it.

Physical features include: Power On switch and Fuse; 19" rack-mountable in two standard rack spaces; professional XLR-type connectors for main input and output with signal level compatible with that used in most studios; convenient internal switch to accommodate either 110V or 220V AC current supply; provision to use Electro-Harmonix' six function remote Foot Controller.

Priced at \$1195.00 in the U.S.A. the 64 Second Digital Looping Recorder Information is available from Electro-Harmonix, 27 West 23rd Street, New York, NY 10010, (212) 741-1770.



Washburn WD1400

Washburn (UK) Ltd recently announced the release of their new WD1400 Digital Delay. Featuring a delay time up to 900 m/sec (from 1.75 m/sec), 30Hz to 8KHz (allowing vocal, guitar, keyboard and PA operation), noise reduction, normal and inverse phase stereo outputs, 'Hold' control from 225 m/sec to 900 m/sec.

Inputs and outputs appear on both front and rear panels for operational versatility.

The price of the WD 1400 Digital Delay is around £369.00 (or less) and details are available from Washburn UK, 20 Victoria Road, New Barnet, Herts EN4 9PF.

(There is also a new colour catalogue available of Washburn electric guitars – from your local dealer or the address above).

Marlin Mixers

A new pair of high power mixer amps, the Marlin 6-150 and 6-300, are just two of the new products that appear in the 1984 Carlsbro brochure.

The two new mixer amps offer six separate channels, 150 or 300 watts output, reverb and effects control on each channel, high balanced low inputs on each channel, two separate effects loops and a headphone output. They both come complete with reverb, footswitch, cover and mains lead, and are covered by a two year guarantee.

Prices are £294.11 for the Marlin 6-150, and £392.15 for the Marlin 6-300.

Information is available from Carlsbro (Sales) Ltd, Lowmoor Industrial Estate, Kirkby in Ashfield, Notts.

Power Distribution Panels from Imhof-Bedco

Two types of 13 amp power distribution panels – one ten way, the other four way – for enclosure mounted power distribution applications, are available from Imhof-Bedco.

The ten way version is housed in a 50 mm channel section, and is supplied with one metre of mains cable.

The only way panel (also with one metre of mains cable) is a 2U version which fits a normal 19" panel aperture, and is supplied with a neon indicator on the Isolation switch, and reversible end lugs for mounting flush with front panels, or inboard at the rear of the cabinet. Further information from Imhof-Bedco Standard Products Limited, Ashley Works, Ashley Road, Uxbridge, Middx UB8 2SQ. Telephone (0895) 37123.

Vox Venue

With up to date styling, transistor electronics and a whole new range of equipment, Vox have made a major break for 1984 with their new Venue range.

The new series comprises a Vox 100W Lead Combo with LED Indicated reverb and overdrive, at £199. It produces 100 Watts RMS before distortion through a Fane 12 inch Vox custom Vox speaker. The Vox 100W Bass Combo (at £189 has another custom Vox speaker made by Fane, this time 15 inch together with three band active EQ and an effects send and return. The Vox 100W Keyboard Combo has three separate channels, reverb, effects send, and a smooth 15 inch speaker linked to a high frequency horn. The amp will list for £299 The Vox PA system is 120 Watts RMS with four channels, switchable reverb and effects send per channel, and Vox 80W speakers each 1x12 plus a professional high frequency horn. The amp will be £199 and the 160Watt capability speakers £199 per pair.

Each of the new Vox Venue Series will contain facilities including D1, Line Out, Headset Out, Extension Speaker Out, together with tough practical fittings and simple accessory addition of castors, speaker stands, and foot switches. For further information contact Rose Morris and Company Limited, 32 Gordon House Road, London NW5 1NE or telephone 01 267 5151.

Ambit Opens Further Sales Counter

Ambit International have opened another sales counter for electronics and computing products and components as Park Lane, Broxbourne, Hertfordshire.

The new counter is located in the Broxlea building, which has on-site parking facilities and is conveniently situated near Broxbourne's High Street with easy access to major routes and British Rail. It will service high technology industries and the rapidly increasing number of electronics and communications enthusiasts in the surrounding areas.

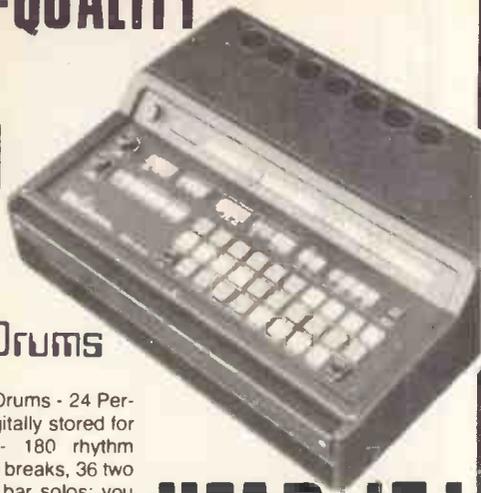
Products which are available over the new Ambit counter include electronic components of all types, DIY kits, test equipment, assembly hand tools and a special opening offer of low cost rechargeable cadmium batteries (NICADS).

Another feature over the counter is a carefully selected range of books on the subject of electronics and computing.

Manager of the new sales facility is David Scott.

In addition to Broxbourne, Ambit has other trade and retail counters at the Solent Component Supplies building in Burfields Road, Portsmouth and at the Ambit headquarters in North Service Road, Brentwood. For further information contact: Ambit International, 200 North Service Road, Brentwood, Essex CM14 4SG.

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| <p>A</p> <p>CLASS C</p> <ol style="list-style-type: none"> 1. Markus Gries (18, W. Germany)
"Bensoul" 2. Shawn Lucas (20, USA)
"The Telephone" 3. Guy Gross (16, Australia)
"Bye Bye Bach" 4. Geoff Durrant (20, UK)
"Men of God Go Forth" 5. 阿比留 健 (16, 福岡)
"七世" Ken Abiru (16, Japan)
"七世" 6. Erik D. Huber (11, USA)
"The Last Valley" <p>CLASS B</p> <ol style="list-style-type: none"> 7. Perry R. Cook (26, USA)
"Ethnos I: British Isles Section" 8. 小野 文人 (28, 東京)
"Speed Way" Fumita Ono (28, Japan)
"Speed Way" | <p>B</p> <p>CLASS B</p> <ol style="list-style-type: none"> 1. 佐藤 博也 (21, 大阪)
"静け" Masaya Matsura (21, Japan)
"Resurrection" 2. Alain Thibault (25, Canada)
"Space-Time Distortion (Quarks Muzik)" 3. Gary St. Germain (25, USA)
"Dragon Dance (Tatsu Odori)" 4. Kalel Bernard (26, France)
"Distance" 5. 吉川 真樹 (27, 京都)
"安房山部五郎 運命 酒 - 豊後 土市" Yoshio Yoshikawa (27, Japan)
"Symphony No.5 (1st. Mov.) Beethoven" <p>CLASS A</p> <ol style="list-style-type: none"> 6. Edward Patterson (38, Canada)
"Angel Dance" 7. Mignault Jacques (25, Canada)
"Naissance et Epanouissement (Birth & Growth)" 8. Amin Bhatia (21, Canada)
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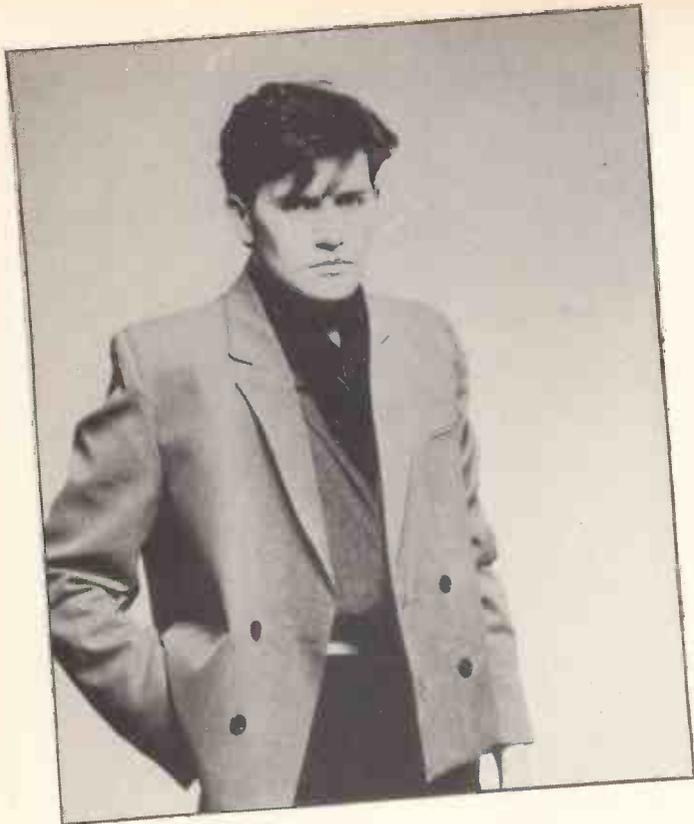
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E&MM/1/84



'Somebody Up There Likes You'

The unique musical chemistry that is Simple Minds is born of a rigid and long-held belief that no one musician within the band should be considered more important than any of the others. Thus nothing about them stands out except the band itself, leaving vocalist and lyricist Jim Kerr as the focus for most media attention.

During the short break between recording sessions for their new album with producer Steve Lillywhite and the start of rehearsals for a forthcoming British tour, two of the band's founder members, keyboardman Michael MacNeil and guitarist Charlie Burchill, talked to Dan Goldstein about their techniques, their attitudes, and their music.

Michael MacNeil

“The instruments I'm using at the moment are an Oberheim OB8, a Jupiter 8, and a Yamaha DX7 that I've just bought. I got it when we were about halfway through recording the new album, so I've only really just started using it. I was really surprised by the DX7, first because it was so cheap, and second because the digital sound quality is very high. No matter how softly you're playing, the DX can still lift your sound above the other instruments in the band, and that's something very few other keyboards that I've tried can do. The main reason I use the OB8 is that

I've had on Overheim for about two years now, so I'm very well used to the way it works, and I can use it on stage very easily. I used to use an old Farfisa organ a lot in the early days, and I used it now and again right up to New Gold Dream. I'm now using a Yamaha electric baby-grand live as well.

Drum-machines

For this album we used the Oberheim DMX, and at first we thought it was a bit too close to the sound of a real drummer, but it turned out to be the perfect vehicle for our songwriting.

With all our previous albums, we've used drum-machines of one sort or another for writing with, and sometimes they've sounded so good we've ended up keeping them

in the final mix, though they've still obviously been drum-machines. But this time, the DMX sounded so much like a real drummer, we felt people listening to it might think we were trying to imitate the sound of a real drummer, which we're not, so we took the drum-machine out of the final mix completely.

The problem we've had is that even with cheap units, there's a lot of different percussion things going on that a drummer just can't do, little Latin effects like congas and hi-hats. So if you use that machine to write with, and you replace the unit with a real drummer when you record, you end up with a rhythm-section that sounds lifeless and empty, so you have to leave the drum-machine in.

But with the DMX, you can write



with it knowing that a drummer is going to make the same sort of sound; you can program it the same way you would play a drum-kit.

On the other hand it wasn't perfect, because I remember when we were rehearsing for the new album, we were really pleased with the DMX. But when we came to play the songs with a real drummer, our attitudes changed and that threw us a bit at first, because even the DMX sounds like a drum-machine when you compare it to the real thing.

Playing Live

I can't understand bands that use backing-tapes – I don't agree with that at all. The music ends up sounding more like maths! It's all a bit of a con, really. The band gets an audience into a hall to try and create some sort of live atmosphere, and then they just play them their album all over again. Tapes and sequencers and microcomposers really tie you down to playing a certain way.

I've never been interested in using them, but the thing about a lot of bands today is that they record with sequencers, and so they have to use them live because it's the only way can play their music.

Playing live is the only chance we get to work on songs we've already recorded. We do change arrangements and things, especially in the first few days of rehearsal. Then we spend a bit of time getting used to

the songs in their new form, and once we've done that, we start to improvise on stage, too. If we did 30 gigs all the same way we'd get stagnant – you have to keep it interesting for you to play, and that's why we've never done two gigs that have sounded the same.

It requires a lot of application, doing something like a 26-date tour, because there might be a few nights when you don't feel all that great, and there's a temptation then to withdraw some of your effort and sit back and relax. But you've got to remember that for a lot of people at the gig, this is maybe the only chance they'll get to see the band play live, and you've got to do your best for the people who've paid to come and see you. When Roxy Music played in Glasgow quite a while ago, it was as if it was the only gig they'd ever played, though in reality it was probably only one of about 17 or something. They obviously had a very good moral attitude, and we've got to retain something like that.

It would be very easy for us to forget about touring altogether and just sit back and make records and make loads of money, because over the years we've lost a lot of money on gigs. Almost every tour we've done has cost us money, and even nowadays the tours bring in very, very little.

But I don't think we'll ever stop doing them, because when you play live, it gives you a chance to play material that you never previously

thought you'd play in that situation, so in a way you can lose all your preconceptions about what it should sound like in the studio and start all over again. The whole point of doing gigs is that it gives the audience a chance to see the band without any overdubs or cosmetics.

Writing

The way we write as a band, we manage to create size without using the usual trademarks. We don't create size by using power chords or solos. We try to create power in a more visual way. We've been playing together for about six or seven years now, and we've got to the stage where we know each other's playing styles very well. We're all heavily influenced by each other in a way. These days we don't even have to talk to each other; we just communicate through the music as we play.

It's really hard for us to talk to each other in a musical way. We talk to each other about the atmosphere of things, but to break it down any more than that is a waste of time for us, really.

Jim (Kerr) is in a very good position because he doesn't play an instrument, so he can step back and look at how things are going in a way that we can't. Because so much of what we do when we're writing is started in improvisation, there might be a lot of new things going on at the same time that we might not even notice, and when

that happens Jim often sees things that we don't, and he can suggest things on that basis.

In the studio Steve Lillywhite actually started assuming that role, because there were five of us all making music together and you always need someone there to absorb what you're doing and put it in perspective. That's why we've never produced ourselves: we need someone to take decisions from a different standpoint."

Charlie Burchill

“As far I'm concerned, I mainly use a Strat, a new white one. Recently I bought a Les Paul and a Fender Thinline. I've also got an old solid-body Gretsch. I've started putting them all through a new Mesa Boogie that they've just brought out called the Mk2C – it's really got an incredible sound. I've also got a 12-string acoustic and a Gibson 335 semi-acoustic, which I use on quite a lot of songs including the new single, 'Waterfront'. I haven't really got one particular favourite guitar. The instrument I use on each song just depends on how I think that song ought to sound.

I use some effects, too. A Roland 555, a Yamaha E1010 analogue delay, plus Roland stereo flangers and phasers. I've just got an MXR Omni unit, though so far I haven't used it much: I'm not quite sure how useful it's going to be.

The New Album

I'd say the new album is probably the biggest step we've taken so far in our career. When we recorded *New Old Dream*, the last album, it seemed great, but looking back on it, it seems a bit clinical now. This one is much more live from a performance point of view. We've been influenced so much in the last year by playing live, because we've done such a big variety of gigs, from small halls to big festivals.

Before every album we've promised ourselves we'd make a really live-sounding album, but we've never actually managed it before now. It's not like the U2 record, where you can hear that they've actually gone out of their way to make it *sound* live. It's not really a question of the quality or competence of our performance, it's more to do with atmosphere and feel.

I suppose a lot of it comes down

to improvisation. We've always improvised to a certain extent in the studio, although this time when we went in, we thought we had all the songs planned out; in fact we thought we were the best-prepared we'd ever been. But as it turned out, we were only about halfway through preparing everything. A lot of it was due to Steve Lillywhite. He really let us relax, so that we never felt inhibited when we were trying out something new. So we ended up changing everything again; doing things that weren't quite in sync, that sort of thing. And most of the time it worked really well.

I think this time we had a brilliant seven weeks' recording, with no restrictions, no inhibitions. Everything that needed to be done got done: there was nothing that didn't come to the surface. Usually when you do an album, you have a sort of middle period where things are a little bit iffy, but this time everything went all the way through. We were still changing arrangements of songs right up to the last day!

Steve really enthused about almost everything we did, and likewise we had an engineer called Howard Gray, who's a great fan of ours; both of them had always wanted to work with us and both of them gave 100 per cent.

Looking back on it now, I'd say there's definitely less emphasis on technique, more emphasis on feel. There are quite a few mistakes on it, for instance, and things that are a little bit out-of-tune. It's not so much a case of making mistakes deliberately, it's just one or two things sounding right at the time, even though they're technically wrong. I don't think the mistakes are really all that important to the sound as a whole, because the rest of the band obscures most of them anyway, but to us as musicians they're important because it was really the first time we'd allowed ourselves to play that way.

Recording Techniques

There's a big contrast between the way we recorded *New Gold Dream* and the way we approached this one. Again I think a lot of the difference is due to Steve Lillywhite. For the last album, we did all sorts of things to make the band sound really live. We double-tracked everything, worked a lot on stereo panning, did all the things that normally suggest a huge sound. But in the end it didn't sound huge at all. It just sounded

contrived. I remember recording the bass-drum and snare-drum at a really high level, right out of context. The first time you listen to it, it strikes you as being really powerful, but then you realise it's only a false power; a false perspective.

For *New Gold Dream* we used a computer-assisted mix-down, and we played each track over about 39 times so that we could give the computer instructions about what to do with the faders, and it was all really laborious. But luckily the recording was a lot less technical this time. . . Steve believes mixing should be a sort of performance, with him moving all the faders manually. It never took him more than two or three attempts to get everything right. Just a couple of goes and there it was – the final mix.

Also Steve only double-tracked one vocal during the whole of the recording, whereas for the last album we recorded almost everything twice or three times over. His reasons for doing that were perfect because if you use too many effects, you cheapen the sound up; it always sounds as if you're trying to make things appear bigger than they really are.

In a way I suppose we were aiming for a more honest sound.

Visuals

We often speak metaphorically when we talk about our albums, rather than on a musical level, because our music is a bit like a sequence of pictures. I think video's a great medium. It could be used to bridge the gap between audio and film, but so far most promo videos have been desperate. Our early videos were desperate, though we should be doing one soon that'll be much better. I just don't think video's full potential has been realised, though I notice quite a few film directors are getting into making promos now, and that should be good because they'll bring their techniques and expertise into the field.

What would be a good idea would be if a film director came up with a three-minute film, and then got a band to put music to it, rather than the other way around. From our point of view, we'd much rather film abstract images than have shots of the band. It would be much easier to communicate that way; to say what we want to say."

Monkey

business MUSICAL EQUIPMENT

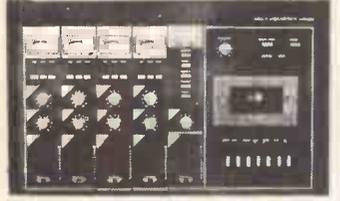
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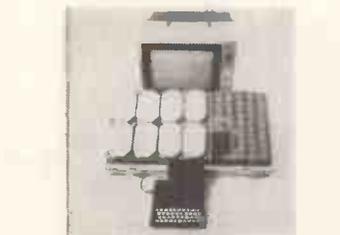
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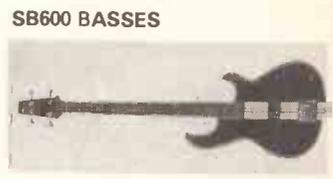
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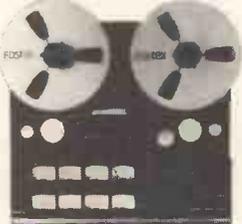
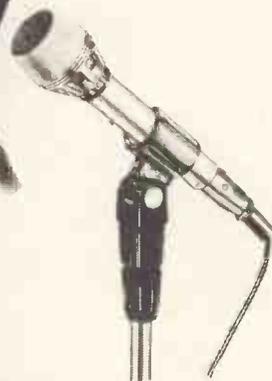
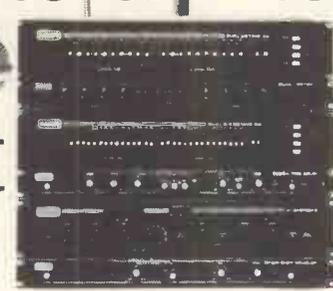
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Danse Electronique



Dan Goldstein talks to Dave Hewson, one of Britain's premier electronic composers and producers, about his career and his approach to working in his own studio in South London.

“My first experiments with sound began when I was still at school. I was just trying out things with tape-recorders – splicing, that sort of thing. Looking back on it I suppose it was a bit like musique concrète. All I had then was a Philips 2-track machine, a very, very old one.

The first time I heard a synthesiser was when I heard Walter Carlos' *Switched On Bach* on the radio in the sixties. At the time it was something completely new and I was just amazed at the sounds the instrument could make. Shortly afterwards I was very lucky because my parents bought me an AKS synth for Christmas one year, and that opened up all sorts of possibilities. I'd only really ever dreamed about owning one prior to that, because whereas today you can buy a good mono synth for very little, in those days an Instrument like that cost over £300, which seemed like a lot of money.

The problem was that once I'd got the AKS, I didn't really know how to work it, so I managed to twist the arm of my music teacher at school, and he got me on to a day-release course at the Royal College of Music, where I studied for a year with Tristram Carey in their electronic music studio, learning how to operate synthesisers.

At about the same time, I also got on to a course at Trinity College of Music, where I studied composition under a composer called Richard Arnell. He was very much into the electronic side of things, and had been ever since the early fifties. It was Richard that first got me interested in film work, because he was one of the Directors of the London Film School, and he suggested I look into working on soundtracks. So I suppose between the years 1970 and 1973, I'd written and recorded electronic music for 30 or 40 student films.

I then came to something of a crossroads in that I decided that rather than risk going

into music full-time, it would probably be easier to work during the day as a music teacher, so I went to a teacher-training college and got a degree there, and in fact I'm still teaching to this day. However, my own electronic music has taken off to such an extent that I now spend more time in the studio than I do in the classroom.

For one thing, the films that I've worked on recently have become somewhat more prestigious. I've done the music for two ITV documentaries: *Cold Chips*, which is about computers and their possible effects on society; and *The Moray Brothers*, which tells the story of the convicted criminals who became painters. Both those soundtracks have relied heavily on electronics.

Computer Animation

The other major film work I've done is the music for a movie called *Dilemma*, which is a computer-animated film. It came about quite a bit before *Tron*, so I don't know whether or not Disney copied the idea! On that particular project I wrote the music in conventional notation form, and then realised it electronically, using the Emulator for much of the work. Once the music had been recorded, the animators set to work making the film to go with the soundtrack, which is an unusual way of working (things are usually accomplished the other way round) and a very exciting way of working. It meant that the images fit the music very accurately which isn't always the case. The film's gone on general release as support to *Return Of The Jedi* all over the country, so I imagine it's reached quite a lot of people.

I've also just finished another piece called *Doctor In The Sky*, with the same group of people, though this time we worked slightly differently in that instead of composing the music from scratch, I worked from a set of rough drawings – impressions of what the animation was going to look like.

In addition to my film work, there's also the work I do here in my own studio primarily as writer and producer. I'm currently working with several artists in that capacity. The first of these is Sharon, who's a solo performer (though we tend to write together as a duo). We started off calling ourselves 'Poème Electronique', after the piece Varese wrote for the World Fair. Our music could be described as avant-garde pop, in the sense that it's an attempt to make the Depeche Mode and Yazoo sort of music a little bit more sophisticated.

However, we did have quite a few problems at first in that we found it difficult to get record companies to accept our music, because it was a bit off-the-wall in a way. Eventually we managed to get a deal with Carrere Records, who released a single called *The Echoes Fade*, which was I suppose the most commercial piece we had at the time.

My second project came about as a result of contact with a company called Silvia Music, who wanted me to make an album of instrumental versions of current electronic hits. We ended up calling the album *Danse Electronique*. There are some vocals on it, but most of them are done via the Emulator, with a lot of vocal sampling, as well as some conventional backing vocals. For that particular project I had to hire a lot of the equipment, because I don't own an Emulator or a Fairlight or a Simmons kit. On the other hand, I still used quite a lot of older equipment, particularly Yamaha CS80. I see the CS80 as being something of a Stradivarius of the synthesiser world because it's such a wonderfully responsive instrument, and I don't think I'd ever part with it, even if I was able to afford something like a Synclavier.

I was a bit lucky to get my CS80. I remember at the time I was in a seven-piece band called Stagestruck, which was a very visual sort of outfit – a bit like the Tubes in a way – and through them I met a man called Barry Dunning, who happened to be manager of Mud, of all people! It turned out they'd bought this instrument from Yamaha as one of the first of the production line, but the problem was that nobody really knew how to use it properly, and they'd been touring America using it as a sort of glorified organ. So what happened was that Barry Dunning was keen to get rid of it, and offered it to me at a very advantageous price. I've had it ever since.

Until recently I was also working with a band called the Techno Twins. I was at College with both of them, but we'd lost touch until I bumped into them again when Stagestruck were doing a gig at the Rock Garden. They asked me to play keyboards and co-produce a demo for them, which we recorded here and sent to Satril Records. They liked it straight away, so we re-recorded it in a 24-track studio and the single made the fringes of the charts. After that, I helped them make an album called *Techno-Nostalgia*, which was fifty per cent cover versions, fifty per cent original material, and that was all done with the CS80, MS80 and a hired Linn Mk.1.

I'm no longer associated with the Techno Twins – they seem to be moving more in a jazz-funk direction now, which I'm not so interested in – but I have recently become involved with some other pop artists.

'Exotica Maximus'

First there's a duo called Exotica Maximus, who produce very interesting electro-percussive pop, and they've recently got a version of the Stones' *Paint It Black* out on release as a single. That was recorded here, using some very strange percussion sounds, such as steel-drums and bits of wire

being tapped — all sorts of interesting sounds. They're signed at the moment to an independent label though I think they're looking for a deal with someone a bit bigger.

Then there's also a singer called Denton Crane. When I'm working with him I tend to use a lot of sampling, which means hiring Emulators and Fairlights. I suppose we're aiming for a sort of Trevor Horn sort of production, but although the music is quite commercial, the concept behind it is a very original one. The idea is that Denton Crane is just a newspaper boy who is also — in his spare-time — a rock singer. So we've put together quite a lot of material which is interesting lyrically. For instance there's one song called *The Lost Michaelangelo*, which is about the last art treasure on Earth being entrusted to Denton. Unfortunately, he's such a complete idiot that he drops the statue out of the window! But is an interesting concept, and we gave the first performance of Denton's work at the Camden Palace not long ago.

The biggest problem for me at the moment is one of finance. I'm not yet in a position where I can give up my teaching altogether and run the studio full-time, simply because I need the income my regular job gives me. I've done commercial work in order to try to keep the studio's facilities up-to-date. For instance Sharon and I recorded a single called *What A Wally*, which is easily the most commercial thing we've done. It got us quite a bit of attention — Sharon was on television two or three times — but it didn't really hit the charts in any big way.

Obviously that sort of thing is a compromise, but I see it as a necessary compromise because I have to fund my more serious projects continuously. I'm not really a pop person: I consider myself a serious electronic composer. But at the moment I'm doing a lot of pop work simply because I see it as the means to get into other areas of compositional work.

While I was at Trinity I built up quite a large catalogue of classical work using orchestra and conventional instruments, and what I'd really like to be able to do is use the best of electronics and combine that with live musicians, as well as carrying on with my film work.

Classical Composition

I've got two piano concertos that I've never heard, and five string quartets which, likewise, have never been performed, and unless I can find some musical society that's willing to put them on, or find some rich benefactor, I don't suppose I'll ever hear them played. During the classical era, things were a bit easier in that there were rich patrons who considered it fashionable to support serious composers. That situation doesn't really exist today, and most young composers break through by getting coverage on film and television, so that's the channel I'm pursuing at the moment. As far as I can see it's the only way my serious projects are going to be realised.

I don't really want stardom for its own sake, I simply want the means to be able to pursue other projects, and also to encourage other people... I know that when I bought my AKS, most other synthesisers were extremely expensive and I felt I was in a very privileged position in owning one, and in many ways the same sort of situation exists today: some people have got lots and lots of equipment while others have got access to very little. So what I've done is I've tried to encourage other people to work here and share in the facilities here. I have to charge them a commercial rate — usually £10 per hour — again out of economic nec-

essity, but in addition to the equipment in the studio I can also advise people on their composition and recording, as well as perhaps finding them work in the film area if they're interested.

'Mood And Mode'

One source of income that I can rely on to a certain extent is royalties from the BBC and ITV, because about ten years ago I made a library record called *Mood And Mode*, which was mainly just the AKS and an Electro-Harmonix phaser. I'd studied medieval music at college — and had played in a medieval ensemble — so, influenced by Walter Carlos' work with Bach and Scarlatti, I decided to dig up a few thirteenth and fourteenth century scores and orchestrate them using the AKS. Because at that time I only had a TEAC four-track and nothing to master on, I took the tape to a small studio in Wood Green called BTW, and it was the owner of that who commissioned *Mood And Mode* for his library label.

Just recently I've started work on another library record, this time for Chappell Music. It'll be a bit like *Danse Electronique*, except that this time the emphasis is more on the classical side of things, so it might end up in the Vangelis sort of area.

Keyboards

I've really accumulated synths bit by bit over the years. Once I'd got a job I was able to buy more less whatever took my fancy at a particular time, so I bought two Korg MS20s, an Elka Rhapsody, a guitar synth, a Kitten synth... instead of selling instruments in order to pay for new ones, I've tended to keep almost everything, so I've ended up with an enormous mass of different keyboards, though with the exception of the CS80, none of them are particularly sophisticated. I think in a way I prefer to have lots of little synths than one very sophisticated one, because I think it's more interesting to build up sounds using a variety of different instruments. Obviously if I think a piece needs a very difficult sound I'll hire a digital synth of some sort, but at the moment I can't afford to buy any of these.

One problem I have had is getting good vocal sounds from keyboards. I don't use vocoders on speech synthesis because I think it's just become too gimmicky now, but I do like the choral sound from the Roland Vocoder Plus. I can't think why they

ever stopped producing it, because nothing's come on the market to replace it, and the people who have got them are making a fortune now by hiring them out. I've tried various other newer keyboards to see if they can match it, but I haven't found none of them as satisfactory overall. The PPG does a reasonable approximation, but the Emulator sounds a bit weak unless you do a lot of sampling.

At one point my manager and I were thinking of buying a Fairlight. I've used it here on hire a couple of times — with an operator because I don't know the first thing about computer programming — and I went along to Syco to see a demonstration of it. Obviously it's an impressive keyboard, but what really surprised me was how slow it was. It takes ages to create even the most basic sounds on it, which is OK if you like a lot of fiddling about, but not so good if you're just interested in the music. So I decided there and then that the Fairlight wasn't for me. I've not had a chance to work with the Synclavier so I don't know whether things are any easier on that.

It seems to me that things are developing at such a rate anyway that it won't be long before you'll be able to perform a lot of the Fairlight's functions just with a home computer, so I'm not too worried about not being in the mega-synth league at the moment. In a sense it's the way things have got cheaper that's led to the big increase in the amount of electronic music being produced. Not so long ago something like the development of the Polymoog was seen as incredible, but nowadays that instrument is something of an antique, because it's now possible to buy a vastly better polysynth for about a quarter of the sum it originally cost.

Studio Development

A little while ago I decided that it would make sense if I had a proper studio of my own in which to work, and rather than get an eight-track I decided to go straight up to sixteen. For reasons of economy I chose the Tascam 1" system, and I must say that the results with dbx noise reduction have been very impressive. However I did have a problem in that I didn't really have anywhere to house the equipment, so I decided to build an extension on to the side of my house, and that took me about nine months to complete. Although there's very little in the way of conventional acoustic isolation, the separation between the control room and the main studio area is excellent, due



mainly to the fact that I made the wall between them two feet thick!

What I've got now is a control room full of keyboards — when I'm on my own I prefer to work there anyway — and a main studio area that's got very little in it. I'm thinking of swapping the two around, so that I've got a bigger area for the control room, but as yet I haven't got round to it.

I haven't had any formal training in recording, so everything I've learnt has come through experience. In a way I think it's a nice way to work — it makes a change from music in my case — and anyway I think something like that is very difficult to teach someone: there are so many different sorts of equipment available, and they all work in different ways.

I haven't got all that much in the way of outboard gear: I've got a Roland digital delay and some compressors and noise gates, but the more sophisticated products like Quantec Room Simulators are just out of my price range. If I've needed them for a particular project I've simply hired them.

I tend to overdub a lot when I'm working on projects for records. What I have done for a couple of film soundtracks is taken my keyboards into a larger studio and improvised to screen, which is quite an interesting way of working. I did *Cold Chips* that way, for example, I've never used sequencers or something like an MC4 here. I prefer to play everything live, which is probably due to my training as a recital pianist. I think in many cases where there's a difficult sequence of notes, people just use electronics to play them for them, but I'm in a position where I can play almost everything myself. In fact, I sometimes play Drumulator and LinnDrum live: tapping the buttons rather than programming patterns. On *Danse Electronique* there are some echoed Linn sounds that

were played live, and I did that mainly because I prefer to do things by feel than through programming.

On the other hand, I'm not actively against the idea of using sequencers. I'm getting more interested in computers — I've just bought a Spectrum — and I can foresee lots of instances where that sort of thing might be useful to take some of the tedium out of playing. For instance, if there's a repeated quaver pattern that I could program into a computer via the MIDI interface, that would make things a lot easier, though at the moment my knowledge of computers is very limited, so I might start off from an analogue viewpoint (with something like an MC4) and proceed into computers from there.

Clarity

On the keyboard front, I'll soon be getting a Roland Jupiter 8, which should augment the CS80 quite nicely. The thing that attracted me to it was the sheer clarity of the sound: it's capable of producing some very pure effects, which is in direct contrast to the CS80 really because that can sound very rough. Of course, the Yamaha's such a powerful instrument that I've often felt when I've recorded it that it's overshadowing all the other instruments, so I have to be very careful when I'm using it.

When I'm recording polysynths — particularly where string sounds are concerned, I might record the synth seven or eight times in stereo, de-tuning all the parameter very slightly each time to build up a big chorus effect. For me that's the best way to get close to a real-life string sound, because when you hear a string ensemble playing together, what makes the sound big is the fact that they're all playing slightly



differently.

I almost always record keyboards with any outboard effects already on them, partly for economy of tracks and partly because I think it's better to make decisions based on the sonic evidence: I prefer to take an hour or so working on a sound so that I can get that absolutely right before I got on to any of the other instruments. I suppose it's a bit like the way an artist mixes his colours to get a final tint that is just right for the picture.

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Oberheim OB-8

8-Voice Polyphonic Synthesiser

The heritage of previous polyphonics shows clearly in this latest synthesiser from the Oberheim stable. Not only has it retained the basic look of its predecessors (keeping a strong product identity with the blue 'executive' styling) but it has retained the fundamental voice format which has made the OB range so popular. Anyone familiar with the OB-X or OB-Xa will automatically feel at home with much of the OB-8 panel. Features have been added without taking away or rearranging any of the familiar 'basics'.

This means that each of the eight voices has 2 VCOs, 2 ADSRs, a selectable 12/24db Low Pass Filter and there are now 3 LFOs to play with. Clever use of button combinations increases the number of VCO and LFO waveforms available and the number of voicing programs (now 120) which the machine can hold at any one time.

Oscillators

The two VCOs still have their individual pitch determined by Frequency knobs which are stepped in semi-tones. Fine Detunes between the oscillators (for fuller sound textures) are still set up on a separate

Oscillators, Filter and Programmer.

knob, which is very handy for small adjustments. There are now three waveforms available on each oscillator. Besides Sawtooth and Pulse, there is now triangle wave (a purer thinner sound) which is selected by holding down the switches for the other two waveforms simultaneously. The pulse width of both oscillators is controlled from the one knob so different widths cannot be set up on each oscillator.

The other limiting feature of the Oberheim

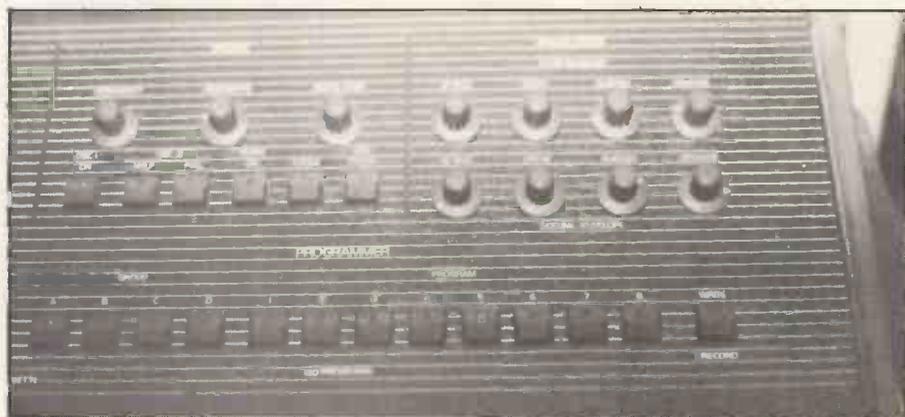
way of doing things is there is little or no ability to mix sound sources. VCO 1 is either on or off, as is the Noise Source and even VCO 2 is only available On, 1/2 volume or Off. However, in compensation there are the very useful features of Sync between the oscillators (for those Jan Hammer sounds) and filter envelope control of VCO 2 pitch (for syndrums, bends, etc).

Filter

The OB Filter configuration is very nice allowing switching between 2 and 4 pole filtering (give a 12 and 24db/octave filter cut-off response) and there is of course an independant ADSR for the filter, totally separate from the amplifier envelope. Whilst the filter can be made to track the keyboard (keeping the same harmonic content to each note), the effect cannot be adjusted unfortunately: again it is either on or off.

The LFO Modulation section has been expanded to allow modulation of the Volume as well as the Pulse Width of either oscillator (or both), with one Depth of modulation, whilst the Pitch and Filter can be modulated with a different mod amount. However, only one Rate and Waveform can be programmed at any one time. The choice of LFO waveforms has now been expanded from just Sine, Square and S/H (Sample and Hold ie. random) to include rising and falling Ramp and all these can now be retriggered from the keyboard.

The Master Control Section has changed very little. Master Volume is still there but the Balance knob (between split and doubled programs) has now become the means of programming individual volumes for each program and also balances between programs in the Split/Double memories. This means that a complete set up of the machine can be selected by pressing two switches and once split or double has been selected you can step through your twelve programs using a footswitch into the Program Advance socket on the back.



Envelope Controls.

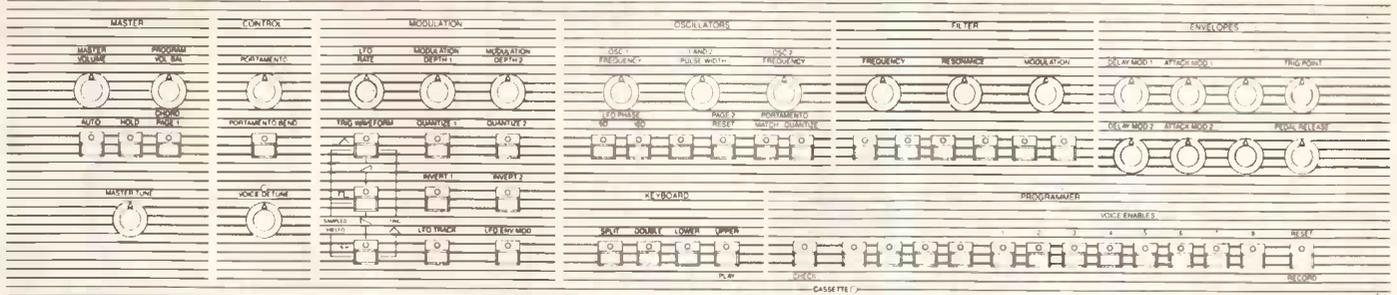


Auto-tune, Master Tune and Hold controls are unchanged but the Chord buffer switch (for memorising a chord to be played from a single note) now doubles as the switch for calling up Page 2 functions (by pressing it twice).

Page Two

This is a clever way of enabling an entire new set of parameters to be programmed without the extra expense of the knobs and switches to access them and is the biggest innovation on the OB-8. Over half of the front panel controls are assigned a new function in the Page Two mode.

The diagram below shows which of the control functions change when Page Two



Master, Control and Modulation Sections.

has been selected. Let us go through these functions and see just how they operate. Firstly when you select the Page Two 'mode', the programmer switches 1 to 8 light up, showing that all 8 of the synthesiser voice channels are enabled. Pressing any of these switches will cause that channel to be muted (ie. made unavailable for playing with). Programs will now be played with the remaining available voices. This feature is particularly useful if one of the voice channels ceases to operate properly as you can remove it completely until such time as you can have the machine overhauled. Nothing is more irritating than a poly synth with just one oscillator not working, because it usually means that the machine is unplayable as, after every 6 or 8 notes the cycling brings back that oscillator and a note is either missed or sounds wrong. With the OB-8 you can avoid this infuriating state of affairs. Of course this feature can also be used constructively if you want just one channel working - a sound used like this has a much more subtle quality than using the 'unison' switch which gets all sixteen oscillators working monophonically.

The Portamento, which appears as just an 'amount' control on Page One, becomes much more controllable using Page Two. Normally all the voices glide at slightly different rates. However, if you select Match, then all the voices are forced to glide at the same 'matched' speed. The Portamento is normally a smooth glide but by using Quantize you can change this into semi-tones ie. glissando, so only the musical pitch intervals are played in the course of a glide. Portamento Bend is a particularly interesting feature; this allows you to program an interval above or below a note, and each time the note is triggered the pitch is forced to glide from this interval either up or down to the 'played' note. This feature, more controllable than Portamento, is in fact true Gilde and allows precise effects to be programmed, irrespective of the notes played.

LFO Controls

The additional control that Page Two gives you over the LFO is nothing if not complete. Again, the effect can be quantized on either of the modulation routings and the depth of the steps set by the Mod Depth knobs. This allows you to get rhythmic effects in a similar way to Sample and Hold, but with a regular pattern to them. This is made all the more effective by the fact that you can set the point at which any of the waveforms is retriggered by the keyboard (using Trig Point, which replaces Filter in Page Two).

Page Two also provides two simple envelopes for the LFO, one for each modulation depth. This envelopes consist of a Delay time (which holds off the modulation) and an Attack time (which controls the introduction of the modulation). If either of these controls is used, then when a new note is played the modulation is instantly reduced to zero and re-introduced according to the settings of these controls. Of course this makes highly desirable musical effects such as delay vibrato programmable and automatic whereas on previous OB models they had to be introduced by the Mod lever. Even more complex effects can be introduced by using the Invert control on each Mod. Envelope. This means that the mod is there as soon as the note is played, continues for the programmed Delay time and then disappears at the rate set by the Attack Mod control.

LFO Track causes the LFO speed to be modified by the pitch of the note played, by adding the keyboard control voltage to the LFO rate control voltage. In practice this means that the higher up the keyboard you go the faster the modulation rate. The speed of the LFO can also be controlled by the second Mod envelope. This means that you can start with a slower mod and after the Delay Mod 2 time, increase the speed using the Attack Mod 2 control (useful for imitating Leslie speakers). Conversely the use

of Invert 2 allows the speed of the LFO to be decreased after a programmable time.

The final Page Two control adds an extra feature which I have always wanted to see on synths with a 'Unison' capability. Using the Osc 2 Detune control you can actually detune the voices (all 8 of them) against each other when 'Unison' has been selected. This has to be the ultimate 'fat' lead or bass sound, with unbelievable thickness and punch. In fact, nearly all the Page Two controls make the 'Unison' mode a much more versatile and exciting setting as the numerous modulations can still be accessed: all the voices do not have to be identically programmed.

Programmer

This has the capacity to memorise all of the main panel settings (Pages 1 & 2) in 120 locations, of which 108 are supplied with factory sounds in them. There are 15 banks of 8 programs on the programmer. The programs in each bank are selected by 8 individual switches, and it is these which change when Program Advance is activated by a footswitch. The 15 banks are slightly more complicated. Four switches labelled A, B, C and D are used in combination, to obtain the 15 possible permutations: A, B, C, D, AB, AC, AD, BC, BD, CD, ABC, ABD, ACD, BCD, ABDC. Each of these then become the name of a bank, so you refer to a program as BD5, ACD7 or B3. This means that whereas changes within a bank are quickly achieved (as with the first four banks), when you are trying to quickly change the later banks you can easily make a mistake and have to try several times. Still if this is a cheap way to access 120 programs (as opposed to 10 banks with a switch each of 12 programs - 22 switches instead of 12) then the greater good must be kept in mind.

The 12 switches also indicate which of the double or split programs have been selected (only one of the twelve switches, A-D or 1-8 is lit at any one time in Split or Double). These enable you to double any two programs (making the OB-8 4-voice poly with two sounds per voice) or split the keyboard at any point and have a different 4-voice program on either side. Twelve double set-ups and 12 split set-ups (including split point) can be stored and recalled. However, the Lower or Upper programs can be substituted at any time, and the 12 set-ups of either type can be stepped through with a footswitch.

Left-Hand Panel

Another area where the possibilities of the OB-8 have been enormously expanded is in the Real Time Performance controls to the left of the keyboard. The Bend lever is now programmable, ie. the interval which it operates over can be varied and memorised. And now it is possible to program the lever (which traditionally was pulled towards you for 'up') to operate either way.



Left-hand panel with levers and arpeggiator.

This panel now also houses a third LFO which is introduced by the Mod lever. It is quite common for such additional LFOs to be triangle or sine wave only but not this one. By a series of clever combinations of switches and lever positions (admittedly fairly complex) the mod lever can introduce triangle, square, S/H, rising and falling ramp wave and noise generated modulations. The lever can also be bypassed and the mod introduced from a depth knob (on this panel) or a pedal. The modulation thus derived can be routed to the pitch of either VCO or both, and this in turn can be used on either half of a split/double program (particularly useful in conjunction with the hold setting).

Arpeggiator

All the controls on this panel also double as the programming switches for the 'intelligent' arpeggiator when you change the mode from Modulation to Arpeggiator. This is far more than the standard arpeggiator which is included in most synth these days. Besides running up, down, or up and down, the order of notes can also be assigned by the order in which they are played on the keyboard, which starts to approach the flexibility of a sequencer. Add to this the fact that the sequence of notes played can be held and then put through a sequence of transpositions which can be programmed or transposed manually. Other possible assignments of the arpeggiator include random order (but with the emphasis on the lowest note), and arpeggiating chords (which, run slowly, gives you a chordal accompaniment). The arpeggiator can of course be triggered externally which increases the sequencing possibilities.

Panning Controls

Hidden in a recess on the right hand cheek are eight panning presets which govern the stereo position of each voice channel. By putting 1-4 over to one side and 5-8 to the other it is possible to have complete separation of Split/Double programs

Voice Panning Presets.

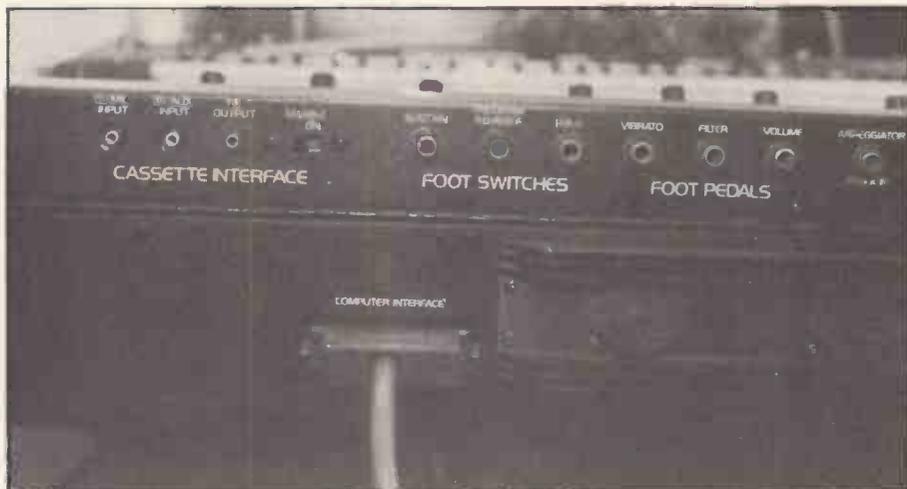


for individual processing of the signals, but a broad stereo picture can also be set-up by a gradual left to right panning from 1-8. This is a very handy feature, but it is a shame that these presets cannot be set up as part of the patch. As a Page Two function that would be a real boon!

Back Panel

At the far left there are the three audio outputs. Mono, Left and Right Stereo, which give the outputs set by the panning presets. Next along is the Memory Protect switch, which prevents your valuable sounds from being accidentally erased. Just behind this are the three mini-jack sockets for the

Back Panel Sockets with Computer Interface 16-pin connector.



The OB-8 opened up.



cassette interface along with the Enable switch. The Oberheim cassette interface system is very versatile with selective loading and saving if required, this means you don't have to go through 120 memories to save or load one particular sound; it can be done in banks of 8. Below this is the computer interface which allows the OB-8 to be connected into the 'system' via the DSX (see accompanying feature).

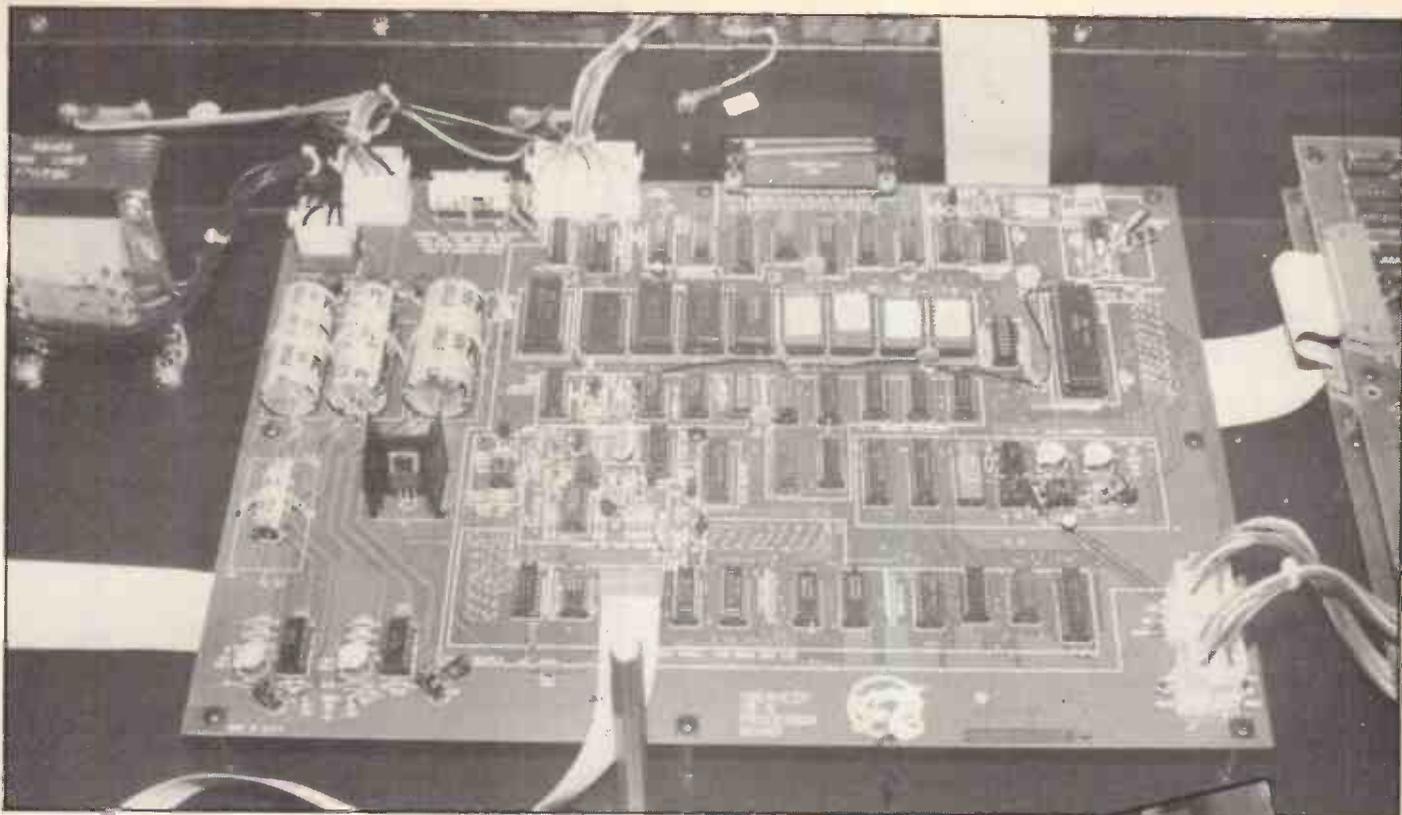
Foot Switches

A whole host of parameters can be accessed with foot controllers via the jack sockets on the back panel. Switches can be used to enable the sustain and hold features and to advance the sound programs. Pedals allow the introduction of the mod set up on the left-hand panel controlling pitch (Vibrato), and the Filter to be swept, with the Volume controlled by similar means.

The final jack on the back panel accepts the Arpeggiator Clock In to sync it with drum machines or a tape click track.

Internal Construction

Being firmly in the age of the microchip, it comes as no real surprise when the OB-8 is opened up (which is easily achieved by taking out a couple of screws and lifting back the hinged panel) that the internal design is very economical. Two connected boards receive the programming instructions from the front panel, which are passed on by ribbon cable to the master control board. This is based round a central Z80 processor which performs all the control func-



Master Control Board.

tions. The control instructions from the real time programming panel to the left of the keyboard arrive via a ribbon controller and then instructions are passed on by the same means to the two voice boards, the upper one containing voices 1-4, the lower one voices 5-8. The panning presets are cleverly mounted at the far end of the voice boards to protrude through the wooden side panel. The synthesiser chips used are principally Curtis and each voice is based around the 3340 oscillators. The filters are the CEM 3320 and the envelope generators are the CEM 3310.

Conclusion

Whilst retaining the basic Oberheim programming approach (with all its good points and its faults) so that any previous Oberheim user will feel instantly at home, the OB-8 adds a wealth of subtlety and versatility to the Oberheim arsenal. In particular the new-found all-encompassing flexibility of the LFOs, the 'intelligent' arpeggiator and portamento, and the performance controls make this a real step forward. Page Two adds a wealth of extra programming options without the additional cost of hardware (knobs, switches, etc) as does the left-hand panel. All this adds up to an instrument which is exceptional value for money and must be one of the most versatile synths on the market.

However, amongst all these features and options, it has been very easy to forget to talk about the sound of the instrument. Well, rest assured that the Oberheim sound is as good as ever and only benefits from the extra programming possibilities. The 108 factory presets which come with the OB-8 show its versatility without ever making themselves sound weak or unusable and an accompanying cassette allows you to reload them should you overwrite them with new sounds. All in all a great up-date of a classic range.

Paul Wiffen

E&MM

Thanks to the London Rock Shop for the loan of the OB-8 for review. The RRP of the OB-8 is £2,995 and it can be seen at the London Rock Shop and Chase Musicians.

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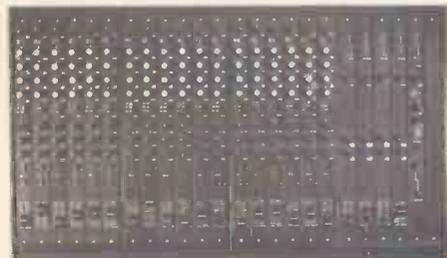
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An Introduction to the use of Sequencers

Some form of automatic playing facility has been available to the Electro-musician for many years now. As the Synthesizer has always worked on trigger, gate and pitch codes of an electronic nature, be they Control Voltages or Digital Information, it was always a logical step to try different methods of controlling the Synthesiser other than with a keyboard. The first generation of sequencers, those working on analogue triggers, were very limited. They had something between 8 and 32 notes (all of which had to be individually tuned using a different potentiometer for the Pitch Control Voltage of each note – which made them relatively expensive in terms of the necessary hardware). Note-length was usually determined by a single Gate knob or simply by how fast the sequencer was run. This meant all notes had the same time value and no rests were possible. This sort of sequencer gave the characteristic feel to the early music of Tangerine Dream, Kraftwerk, Faust and other early pioneers of electronic music. 'On the Run' from 'The Dark Side of the Moon' by Pink Floyd is a classic example of the sort of thing which could be done with such devices (an early EMS sequencer being used on this track). Perhaps the greatest exponent of the analogue sequencer is Giorgio Moroder, who in the late Seventies used the more expanded models to invent a new type of music 'Electronic Disco' as exemplified in his production of Donna Summer's 'I Feel Love' or his Soundtrack for the film 'Midnight Express'.

The new generation of sequencers which worked on Digital Technology arrived with the Eighties and offered a vastly increased number of notes with an ease of programming unheard of before. One of this new breed, a British product called the 'Spider' offered 256 notes (or spaces) and programming from the keyboard of its companion, the 'Wasp' at a price which even the Home Electro-musician could afford. Indeed, digital synthesizers like the 'Wasp', could even be run by home computers. These days, the wide range of sequencers on the market are programmable in the same way as computers, with full edit functions as well as being programmable from the musical keyboard. They also allow musical subtleties such as 'staccato' or 'legato' phrasing and tempo variation to enable 'authentic' musical performances.

Terminology

Trigger. A Pulse, either digital (an electronic code) or analogue (a voltage) which causes the synthesizers envelopes to open, allowing a note to begin sounding.

Gate. The continuance of the trigger pulse which holds open the envelopes in the sustain phase (i.e. after attack and interrupting decay and preventing release), simulating the amount of time the finger remains on the keyboard.

Real Time. A sequence which plays back exactly as it was recorded. Useful for fast programming and solo performers' accompaniment but can cause synchronisation

problems for group or multi-tracked performance.

Pulse Time. A slower but more controlled method of programming either from a musical or computer keyboard, allowing composition, edition and synchronisation (often referred to as 'Step-by-Step').

Clock Signal. An internal or external series of regular pulses which form the basis of all trigger pulses and allow synchronisation between sequencers drum machines, etc. Often referred to as 'tempo' or occasionally 'frequency'.

Space. The name of the facility on most sequencers of the digital type which allows you to insert rests into the sequences (occasionally this is actually labelled 'rests').

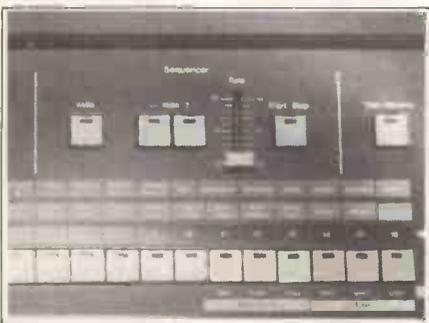
Delete. The name of the facility which allows you to erase wrong notes and spaces from sequences.

Insert. The name of the facility which allows you to add extra notes or spaces in the middle of an existing sequence.

Step (Forwards or Backwards). The facility which allows you to move about within a sequence without changing anything until you find the point where a change is required. Step number tells you the point at which you are on more sophisticated sequencers.

Loading Sequencers

The most immediately obvious way to do this if you have a real-time sequencer is to simply press record and play the music in.



Sequencer controls on the Roland JX-3P.

But there may be several reasons why this is not the best idea. Most obviously you may not trust your technique or timing. Don't forget that if you want to 'loop' (repeat) the sequence you will have to 'play' the stop button at the appropriate point as well. You may wish to synchronize the sequence to another or to a drum machine (very difficult with a real-time sequence and only possible if the internal clock which was used to analyse your playing can be synchronised fast enough or indeed, is externally accessible at all). Many real-time sequencers have no edit facilities available.

Sometimes it may be possible with polyphonic sequencers to put one of the parts (preferably the most difficult) down in pulse time and then add the rest in real time. Whether you do this or put everything in step by step, you will still need to take care with the clock/trigger value.

To decide this, look for the smallest note

or rest value in the music you wish to program. This will determine the value of one trigger in pulse time or the clock speed in real time. Even if this note-value occurs only once in the piece, if it is not allowed for, you will not be able to program either this note or the one that follows it properly.

If in real time, set the Clock ('Tempo' or 'Frequency') so that the fastest note(s) you are going to play are correctly recorded (you will have to experiment till you get this right). On some real-time sequences (the DSX for example), the clock is permanently set at a suitably fast tempo. If you find notes missed out or the wrong value, then you must set the clock faster, until this no longer happens. However, this will use up the memory faster, making your potential sequence shorter. If you cannot find a compromise, you will be forced to resort to pulse time loading (even this may not be possible, although it does tend to record evenly-noted sequences more efficiently – minims and demi-semiquavers together will probably be more efficiently recorded (i.e. longer sequences will be made possible) in real time). If there is a 'Ready' feature on your sequencer which will start recording as soon as you touch the keyboard this will help to save space and prevent timing problems at the beginning of the sequence (fatal if you want to 'loop' and/or synchronize your sequence).

If you are going to program in pulse time, each pulse (that is each potential trigger) has to have the value of the shortest note in the piece of music and everything must be worked out on this basis, (There is one exception to this rule – where the notes are not all multiples of the shortest note-value e.g. where you have triplets or fifth notes, etc., which we will come onto later).

Now you must program in everything in multiples of this time-value. For example, if your shortest note is a crotchet, you will have four pulses to the bar in common time (4/4) and a minim will last for two pulses and a breve for 4. Or if your shortest note is a quaver, there will now be 8 pulses to the bar, a crotchet 2 pulses, a minim 4, a breve 8, etc.

Similarly in different time signatures, you will have different number pulses per bar. In 6/8 with quavers 6 pulses, in 2/4 with hemi-demi-semi-quavers 16, 9/16 gives 18 demi-semiquaver pulses per bar. Hopefully you will not have to work with this memory-wasting hemi-demi-semi business too often, but I have tabled most of the possibilities below.

However 'hemi-demi' problems are easy compared to triplet and fifth-notes in terms of pulse assignment and sequencer space wastage problems. If you have triplets, fifth-notes, etc., and the notes they are divided down from (i.e. 3 or 5 times their value) carry on as above. The complications really set in when you have notes only slightly different in length from each other e.g. quaver (1/8note) and quaver triplet (1/12). To solve this we must go back to the fractions we did in school. What we need here is the lowest common denominator (LCD); a pulse length which allows us to program both the eighth note and the twelfth note. The LCD of 1/8 and 1/12 is 1/24.

So we need 24 pulses per bar to cope with quavers and quaver triplets. To program a quaver, we need three pulses ($3/24 = 1/8$) and for a quaver-triplet ($2/24 = 1/12$) we need two. Again all the ramifications of this are tabled below.

Now take the number of pulses per bar and divide the total memory space by this. Say we have 16 per bar (semi-quavers in 4/4) and memory is 1288 notes (memory is usually close to a power of two as digital memory is stored as binary or hexadecimal numbers - $128 = 2^7$; $256 = 16^2$, then we have room for 8 bars of music. With 24 per bar (quavers and quaver-triplets in 4/4 we only have room for 5 and a bit bars. You see now how triplets and 'hemi-demis' swallow up storage space!

This table shows even more clearly how the high resolution necessary for triplets and 'hemi-demis' uses up memory space rapidly; without them, 128 notes gives you more than 10 bars, with them to get five bars

dotted crotchet rest in semi-quavers and so on.

How we do this for notes is dependent on the comprehensiveness of our sequencer. On the ideal machine, we could simply press a key corresponding to the note value (indeed on the Elka Micropiano, this is how it is done, allowing maximum efficient use of the memory space). However, most sequencers don't have this feature and we have to program longer notes "long-hand". On some, this is done by playing the note - which takes up one pulse - and then pressing the "rests/space" button to fill in the remaining number of pulses (essentially legato-phrasing that note to a number of spaces, which, has precisely the required effect). On others we must press the "step forward" button the appropriate number of times (don't forget the playing of the note always takes up one pulse), while we hold down the note in question.

On sequencers which make no provision



The Elka Synthex sequencer panel.

Chart for EMT

Shortest note in music	Pulses in Bar					Breve value	Minim value	Crotchet value	Quaver value	Semi-Q value	Demi-SQ value	Triplet quaver	Triplet semi-q	Triplet demi-q
	4/4	3/4	5/4	7/8	9/8									
Breve (whole note)	1	—	—	—	—	1	—	—	—	—	—	—	—	—
Minim (½ note)	2	—	—	—	—	2	1	—	—	—	—	—	—	—
Crotchet (¼ note)	4	3	5	—	—	4	2	—	—	—	—	—	—	—
Quaver (⅛ note)	8	6	10	7	9	8	4	2	1	—	—	—	—	—
Semi-Q (1/16 note)	16	12	20	14	18	16	8	4	2	1	—	—	—	—
Demi-SQ (1/32 note)	32	24	40	28	36	32	16	8	4	2	1	—	—	—
Hemi-D-S-Q (1/64 note)	64	48	80	56	72	64	32	16	8	4	2	—	—	—
Triplet quaver (1/12 note)	24	18	30	21	27	24	12	6	3	—	—	2	1	—
Triplet semi-q (1/24 note)	48	36	60	42	54	48	24	12	6	3	—	4	2	1
Triplet demi-s-q (1/48 note)	96	72	120	84	108	96	48	24	12	6	3	8	4	2

is doing well. So we must be careful what music we choose to load into our sequencer; in pulse time, music with lots of notes of the same time value tends to be much more efficient. But beware the piece which is entirely crotchets except for a couple of quavers! You will still have to program the entire piece in quavers pulses.

Now we have sorted out the mathematics, with our pulse assigned a time value and we know how many bars we can store, how do we program in the music? For time value notes equal to our pulse-length (i.e. the shortest) nothing could be simpler. Simply play the notes on the keyboard in your own good time and the sequencer will play them back in perfect time. If your sequencer has a legato facility, don't forget to make the most of this by holding down the last note while you play the next one for notes which are phrased in the music. To program a space simply press the key marked 'rests' or 'space'.

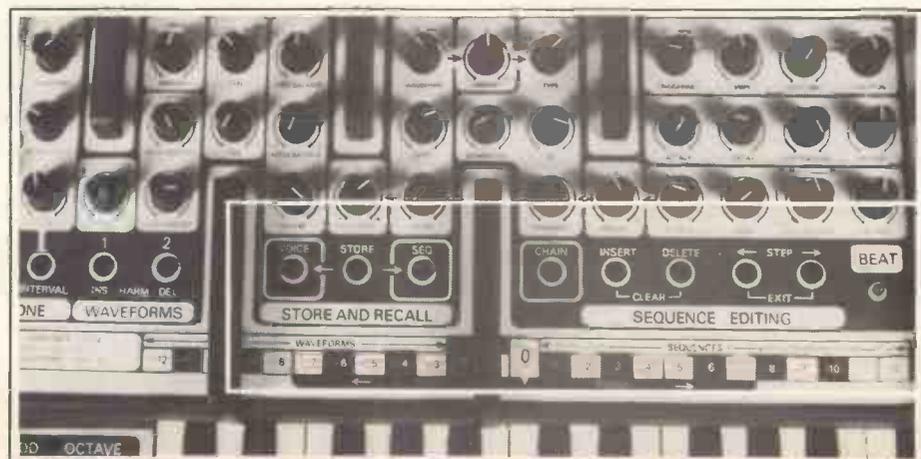
To enter notes of longer length, we must first know how many pulses they will take up, i.e. how many times bigger are they than our shortest time-value. For instance a breve is worth 4 crotchets, a minim 16 hemi-demi-semi-quavers, a dotted crotchet three quavers and so on. Now we must make sure that this many pulses are taken up in our sequence. If we are inserting a longer space, there is no problem. We simply press the space/rests button the appropriate number of times, 4 for a minim in quaver pulses, 6 for a

for longer length notes than the pulse, it is still possible to get this effect by sacrificing either repeated notes, or spaces. To do this however we need to make changes to the envelope on the synthesizer. If we are going to manage without spaces, we must turn up the release on both filter and amplifier envelopes so that it lasts as long as the note-length required. Then we simply fill in the remaining necessary pulses for our note-length with spaces. The release controls will then hold the envelopes open after the trigger has been and gone, making the note the required length, i.e. until a new note is triggered.

If it is repeated notes we are going to sacrifice, then we must turn release up a bit and sustain to full on both envelopes. This will prevent retriggers of the same note sounding. Now we simply fill the number of pulses required with the same note repeated the appropriate number of times. Of course, both these methods entail some loss of musical freedom, as changing the envelopes always modifies the sound somewhat, but this still gives us greater flexibility in accurate programming of notelength.

Let us now look at some music to see how we would go about putting it in a sequencer.

OSCar's sequencer programming buttons.



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Let us begin with a typical synth pattern which is mainly in semi-quavers (1/16th notes) in 4/4. For those of you who don't read music I am putting a programming notation below the music lines. A retriggered note is shown by its name, whereas a note tied over more than one pulse is represented by t (don't forget you can use a space if you have no facility for tying notes) and means a legato tie (if available). There are 16 pulses to the bars in this example, although the pattern repeats itself within the bar.

Bass Line 8 times 4 times 4 times D.C.

D#E Et E E E E D#E Et E E E E rpt8x G G#G#t G#G#G#G#GG#G#t G#G#G#G#rpt4xF F#F#t F#F#F#F# F#F#t F#F#F#F#rpt4x

You will notice that the second phrase is merely the first one transposed up a major 3rd and that the third one is the same up a tone from the original. This means that if your sequencer allows transposition, you can loop a single bar (or even half-bar) and transpose up 2 tones after 8 bars (16 half-bars) and up 1 tone after another 4 bars (8 half-bars).

Now here is a drum pattern to accompany the bass-line. This is written out in our usual format – bass drum on the bottom line, then snare, with hi-hat crosses on the top line with o and c indicating when it is to be opened and closed. We also include our usual block chart for ease of programming onto drum machines.

Drum Pattern

STEP NUMBER
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

OH															
CH															
SD															
BD															
AC															

If you are synchronising your bass pattern with a drum machine, you will need to program a trigger on every 16th note. This can be done using the toms on the Korg KPR-77 or the Roland TR-606. However, if you cannot put 'spaces' in your trigger, try programming the rhythm below on the Lo Tom to trigger the sequence and only load 14 notes per bar (missing out the two t beats). This trigger pattern will then play the notes in the correct rhythm.

Bass Trigger (Lo-Tom)

STEP NUMBER
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

HT															
LT															
SD															
BD															
AC															

Now let us move on to add chordal accompaniment to the rhythm section. Here is the music part with the three lines written out as they should be programmed in (r means a rest should be programmed):

Polysequence

rr F#tt F#tt F#ttt F#G#F# t rpt rr E tt E tt E tt E#F#E t rpt
rr C#tt C#tt C#ttt t t t t rpt rr B tt B tt B tt t t tt rpt
rr G#tt G#tt G#ttt t t t t rpt rr F#tt F#tt F#ttt t t tt rpt } then repeat whole line

D.C.

rr G#tt G#tt G#ttt G#AG#t rr D#tt D#tt D#ttt D#E D#t rr F#tt F#tt F#ttt F#G F#t rr C#tt C#tt C#ttt C#D C#t rpt
rr D#tt D#tt D#ttt t t t t rr C tt C tt C tt t t t rptrr C#tt C#tt C#ttt t t t t rr A#tt A#tt A#ttt t t t t rpt
rr C tt C tt C tt t t t t rr G#tt G#tt G#ttt t t t t rr A#tt A#tt A#ttt t t t t rr F#tt F#tt F#ttt t t t t rpt

Again a 16-pulses-to-the-bar trigger will run this sequence in time with the rhythm parts. However, if your sequencer doesn't have a 'space' facility or enough memory, then the same effect can be obtained by loading these notes;

Polysequence Trigger (Hi-Tom)

STEP NUMBER
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

HT															
LT															
SD															
BD															
AC															

and using this triggering pattern from the Hi-Toms on your drum machine:
Now we have the accompaniment, we can add the melody line, either manually or on the sequencer, if you have a fifth line. By looping the lines sequenced so far, you can play the melody and then improvise over a eight bars E6 (+ 2), four bars G = (Double Harmonic) and four bars F = (Pentatonic Major) cycle. Anyway here is the tune:

Lead Line



As for the choice of synth sound to play each of these lines, this is to some extent dictated by the nature of the different roles they play within the piece and the length and speed of the notes. Try a full sound (PWM or sawtooth) with a fast filter envelope on the bass-line. The chords of the polysequence sound good with sharp attack and a fairly quick decay, whereas the lead line needs a good 'sustain' sound to carry it over the long notes. A woodwind-type sound, perhaps with some delay vibrato, adds a nice lyrical feel to the piece, which is, incidentally, called 'The Pulse'. Anyway, have fun experimenting with different sounds once you have loaded your sequence notes. This is of course the joy of using sequencers: you can program your music and then make the 'producer's' decision of how it should sound.

Paul Wiffen

E&MM

The first of the new series of E&MM demo cassettes features this piece on the Oberheim system (reviewed elsewhere in this issue) and on more modestly-priced equipment from Roland.

'The Pulse' Copyright 1983 Paul Wiffen.



Moog Music, Inc. have just announced the **Memorymoog Plus**, a new model Memorymoog six-voice polyphonic programmable synthesiser with MIDI interface and a powerful polyphonic/monophonic sequencer system built in, now available at authorised Moog dealers at a surprisingly affordable price. Also available as a retrofit kit, MIDI/Sequencer capability can be installed in all Memorymoog models.

The polyphonic sequencer provides 6 individual sequence memories; independent tempo, time signature, program changes (different sounds for each chord/note in the sequence), and number of voices used may be programmed for each sequence location. The

performer can play the keyboard live in conjunction with the sequencer, and transposition of the sequence from the keyboard is possible. Memory overhead is approximately 4200 data-compacted "events" in real time mode and 5250 events in a "step" mode which allows data-entry of sequences, rather than real time performances.

The monophonic sequencer drives any external synthesiser with standard 1 volt/octave pitch control. The system can play back any given poly sequence along with any given mono sequences simultaneously.

Like a drum machine, the Memorymoog Plus sequencer can merge individual sequences, repeat them, and put them into a desired order to create a song.

This "merge" can call up a program chain that the performer prearranges. On playback, the chain will advance as instructed to provide program (tone color) changes for the sequences, as well as pitch/timing changes.

The system provides clock input/output for compatibility with a variety of rhythm/drum machines (3 user-selectable clock speeds).

In addition to the MIDI/sequencer capabilities, the Memorymoog Plus has enhanced pitch stabilising/editing circuitry and software. Also available will be 100 new factory programs.

For more information, please contact Roy Goudie, 11 Forth Wynd, Port Seton, East Lothian, Scotland. Tel. (0875) 812033.

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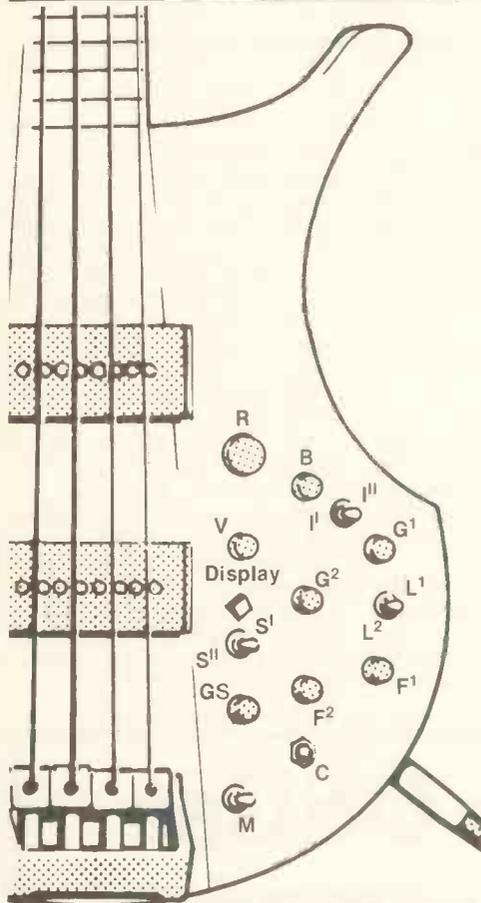
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Vigier Nautilus Digital



Bass Guitar



maple sandwich construction continuing through the body, and 'splaying out' to form the central section of the body. The neck is not only sandwiched laterally, the fingerboard itself (laminated sheet with a poly covering), meets a metal sheet that runs the entire length of the neck. This Vigier call S.T.M. or 'metal under fingerboard'. This plate in turn meets the truss rod along the centre, and the maple and walnut slices that form the back of the neck. This construction, the makers claim, combines all the advantages of all wood and all metallic necks while removing the disadvantages. For a test on this, we have to allow time to take its course, but the neck is extremely well finished, and the contour running both across the neck, and from headstock to body, is logical. Those used to a more 'standard' feel, where the neck thickness remains more constant, may take time to get used to this Vigier, but once there, conventional necks feel rather cumbersome. The frets are wide – almost $\frac{1}{8}$ " in fact, which gives a fast feeling without losing intonation accuracy over the entire length.

The neck sandwich opens as we have said as it reaches the body, and makes a beautiful contrast to the chestnut burburst walnut from which the body is hand carved. The upper arm of the cutaway looks 'top heavy', a sort of caricatured Rickenbacker, but the balance, due to the contours, is aided by it and allows the bass to be held very lightly when playing, since it remains very stable.

The Body

The twin pickups, (manufactured by Vigier by one M. Benedetti), contain eight pole pieces each, these being made from alnico 8. These are set in an ABS surround, that has no side covers, forming a table like structure, with the coil windings supporting the top.

The bridge on the Nautilus is massive. Heavy chromed steel, four shafts emerge from the base of the bridge to take the four individual string supports. These can be raised or lowered for string height, and moved bridge or neckwards for intonation. The four ball ends on the strings, emerge from the back of the body.



The Electronics

The basic idea of the Nautilus is to allow the musician to find the right sounds from the instrument in rehearsal (up to 19 can be stored) which can then be brought up at the touch of a button (or in this case the choice of a dial, or the footswitch). There are twelve controls on the body, and a schematic description of them appears below. So let's take the largest and most important first. This is 'R' on the drawing and is the memory search. Running through 1-19 continuously gives easy access to all the numbers. The chosen memory number is displayed on a small prism, which is illuminated with LED digital numbers, easily visible to the player (except in very bright lights).



Programming

We have printed below the manufacturers explanation of how to program – using the references to the drawing – and as you can see they are simple to operate, and there is enough safety margin to ensure that treasured sounds can't be easily erased.

What none of this can tell you, is that the basic sound from the Nautilus is excellent. Playing from a straight 'Precision' sound, through the Rickenbacker 'jagged edge' to a smooth Wal like sound – in fact, it can produce almost all the bass sounds currently in use in modern music, and a few of its own invention.

The volume of each sound is not programmable, however, and for this you have to utilise the master gain and the volume control to achieve the best from the bass. The degree of control afforded by the parameters takes away the slight 'toppiness' of the sound, while the depth of the bass sound is powerful – all the way down! Obviously, on stage, the wealth of controls is no problem since everything is pre-programmed, and as long as you do your homework in the programming stages, the use of the Nautilus in the studio should be a dream. "Jazz funk sound? That's number 5 ... heavy metal, that's at 14 ...". Using the controls manually will obviously come into use at some time, and here the Vigier really scores since, as long as you are aware of the capabilities of the instrument, the basic parameters of the 19 programmed sounds become much wider since you can work on those memories manually – and you won't have to reset any of the memories at the time, or afterwards – they remain as before.

The inclusion of a standard jack socket on the front panel was puzzling at first, but it seems that this taps the sound direct from the treble pickup for tuning purposes – a boon for stage and studio musicians alike – just hook up a tuner, and leave it there.

True innovations are rare. And when they arrive, there tends to be no end of comment, discussion, and a general rush in the direction of the music shops stocking the chosen item. However, this sort of activity seems to have bypassed a quite exquisite new bass and guitar system, recently introduced by Vigier, the French guitar makers.

There are several models in the Vigier range, including a fretless 6 string guitar, and while the quality of all the Vigier instruments themselves is extremely good, the fact that sets two of the models apart from the rest of the market is that they are fitted with a 19 sound digital memory system. (We hope to cover the digital guitar in a future issue).

The Vigier Nautilus Bass System comprises the instrument itself, plus a foot-switch controller which can switch the bass on and off – allowing the volume to be set and left – and also changes the number of the memory that is being used, even as you play.

But first, the instrument itself. The distinctive shape of the body is well balanced and comfortable, this is comparable to many other bass guitars on the market, but, unlike the Nautilus, few remain comfortable for long periods of playing. The body is sculptured at the back and features a staggered cutaway giving easy access to upper frets.

The neck joins the body at an (almost) heel less contour, with the walnut and

**Parametric Functions**

Frequency	Allows you to choose from Bass – Medium – Treble in relation to the position of your frequency pot (F1) and (F2)
Gain	Allows you to boost the frequency 0 to 15 DB or to attenuate this frequency (0 to – 15 DB)
Bandwidth	Allows you to amplify or attenuate the chosen frequency with precise selection
GS	Master Gain
S	Two position switch (three functions)
S' LED OFF	Manual Mode This position is used for creating different tones. Before deciding whether or not to store these sounds into the memory. (See memory feeding).
S'' LED ON	Memory comes into action. Sound previously been stored and selected ready to be used and changed by (R). 1 to 19 reading on A.
S''' LED ON	(Hard edition ready) Memory ready
"FLASHING"	for editing facilities.

Memory System

- 1) Switch S to S' (LED OFF) to obtain manual mode.
- 2) Create sounds with (B, I, G1, L, F1, G2, F2, GG) using tone, frequency volume, polarity switches etc.
- 3) When a suitable sound is found, select a memory available for storage, for example No.5 (with R)
- 4) Pull M (safety switch) down M' and back to its' original position (M)
- 5) The sound is now stored into memory No.5 and LED is now displaying at S confirming that sound has entered memory No.5

The above operation can be repeated using different sounds and memory numbers to create your own pre-selections.

The Controls**Refer to drawing**

V	Volume (not programmable – see GG)
R	Rotary Switch – memory search. Digital display 1-19 reading display on perspex prisms A.
B	Balance between pick ups (Bass and treble)
I	Two position switch (LED Display) I LED OFF Normal Phase I' LED ON Reverse Phase
LED	LED overload
C	Direct output of TREBLE PICK UP (for tuning facilities)
G1	Gain + or – 15 DB Parametric 1
F1	Frequency Parametric 1
G2	Gain + or – 15 DB Parametric 2
F2	Frequency Parametric 2
L	Switch two positions (band width selections)
L' LED OFF	Wide Band Parametric 1
L' LED ON	Thin Band Parametric 1
L'' LED OFF	Wide Band Parametric 2
L'' LED ON	Thin Band Parametric 2
L' L'' LED ON	Thin Band or Parametric 1 and 2
D	Switch on/off power 220 volt

Pedalboard

But the real delight is the simplicity of the instrument – once the programming is complete. The fluidity of the neck, coupled to the removal of any need to fumble away at the controls leaves you to simply play. Out from the bass comes a six pole (male) din connector, this can be linked to the female cannon which is wired direct to the pedalboard. This pedal is connected direct to the mains, and the cable to the guitar carries both the current required, and also the signals. An output jack is then led from the pedal to the amp or PA or mixer as required. There are two footswitches on the pedal – one for standby, with system working but no

output/switch on, and a stopping control for the memory. This, however, only goes up in single. So, to get from 1 to 19 you have to tap 18 times. Whereas the rotary on the body will reverse or advance as required. Perhaps the addition of a reverse stepper would help here.

Conclusion

An exceptional instrument, with the capability to faithfully reproduce almost every bass sound available – and remember them! But what is more important is that the basic sound from the Vigier Nautilus System is so excellent.

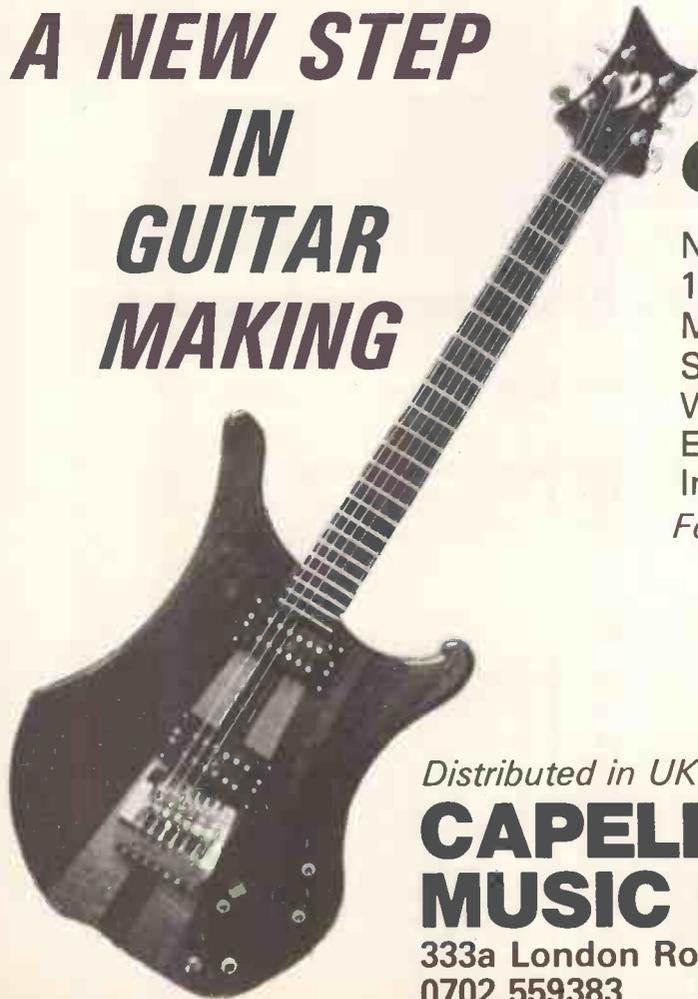
At the price, there will be only a handful of serious bass players interested in the Nautilus – a strange fact considering the expense that keyboard players (for instance) expend on their working instruments. The Vigier certainly deserves a much wider recognition – it is as versatile as it is beautiful as it is innovative.

Tim Oakes

E&MM

The Vigier Nautilus Bass System retails for around £1,300. Information is available from British distributors Capelle Music Industries, 333A London Road, Hadleigh, Essex. Tel: (0702) 559383.

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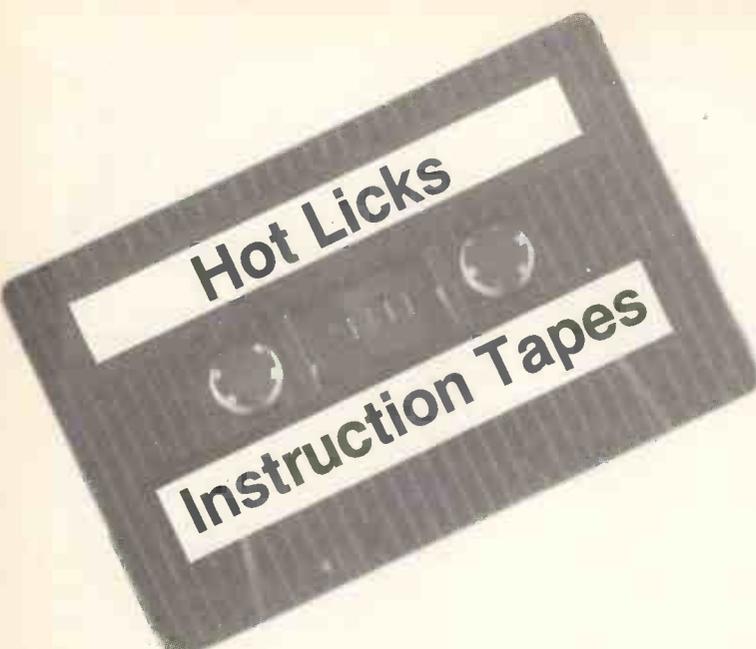
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The Hot Licks Instruction Tapes are one of several cassette based instruction series, designed to take a non musician through to playing at a (fairly) high level of dexterity. With around five such systems on the market, the question of which to choose from immediately rears itself, but a rapid examination of the rivals to the Hot Licks series produced some interesting conclusions. So

much so that the review that follows of the *Hot Licks* really has to be seen in the light of its competitors. In the main these are produced at home, by amateur players. They are usually in the form of one single cassette, and of the ones I have heard the quality leaves a lot to be desired.

The tuition sheets on the majority of the HL rivals are photocopies, and on two of the

specimens, the sides of the photocopy were so obscured that absolutely no sense could be made of the tuition whatsoever.

And so to *Hot Licks*. There are a whole series of different tuition courses to choose from, including Rock, Lead Guitar, Advanced Guitar, Nashville Guitar, Blues Guitar, Bass Guitar, Jazz Rock, and a beginners tape and study course called *How To Play Guitar*.

There are six tapes to each set, each one lasting an hour, and they are accompanied by a book of instructions, with the musical notation taken down in tablature. This means that non musicians, and non musical readers, can quickly get an idea of the tapes and how to use them. The general impression after a good month with the Rock Guitar course is that they are an excellent way to learn confident and constructive guitar, with the added bonus that the tapes themselves are interesting to listen to.

The form is, sit (or stand) with the book at reading distance and guitar in hand, get a cassette player (the higher the quality the better) within range and go. It really is as simple as that.

The tapes were compiled and recorded by Arlen Roth, whose patient manner takes the listener gently through the various techniques of playing manner takes the listener gently

through the various techniques of playing rock guitar. Tape One covers chord work, rhythm exercises, suspended 4th licks, barre chords, I, IV and V progressions and finishes with a selection of techniques to copy. 'Parrot Fashion' learning is one that a lot of people avoid like the plague, but the Hot Licks tapes take you on a course that says, basically, 'here's something new - experiment with it...'

The rest of the cassettes and tuition press on over the basis of the original two. Speed is slowly increased, and it is worth recording your playing at tape One and comparing this with the playing standard reached by tape Six. This sort of 'before and after' approach could be a marketable ad campaign for Hot Licks since the advancement is quite dramatic - and the non musician who went through this course was astounded at the result (and terminally embarrassed at the early efforts...).

Going through the various tapes would be pointless, there are six, and their flow is extremely good, adding up to a comprehensive and effective course. At the price (£7.95 per tape) it makes for an investment.

Tim Oakes

E&MM

Hot Licks Instruction Tapes are available from Labtek International Ltd., 257 Middlewich Road, Northwich, Cheshire CW9 7DX. Tel: (0606) 48684 (catalogue available).

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Siel Cruise Synthesiser

Like several other members of the Siel range, the Cruise has been available on the Continent for some two years or so, but is only receiving proper distribution in the UK. Broadly speaking, it's a preset synth with both mono and eight-note poly sections, a splitting facility that allows the keyboard to be divided equally between the two, and a mild degree of control over some of the sound-generating parameters.

In some respects, the design of the Cruise shows its age. It possesses few of the innovations displayed by some of its newer rivals, an arpeggiator or MIDI interfacing, for instance. The importance of these innovations will vary from user to user, of course, but in view of the fact that the Cruise is to a large degree designed as a 'performance' instrument, sequencing and the like are hardly likely to be uppermost in the minds of many prospective purchasers.

The Cruise is a deceptively light instrument, due mainly to its construction which employs a good deal of plastic; only the control panel is metal. The keyboard is four-

octave C-to-C (when will the manufacturers start giving budget poly buyers a decent-sized keyboard?) and has an excellent feel that is both light and positive. The controls can be divided into four sections: mono, poly, master, and performance.

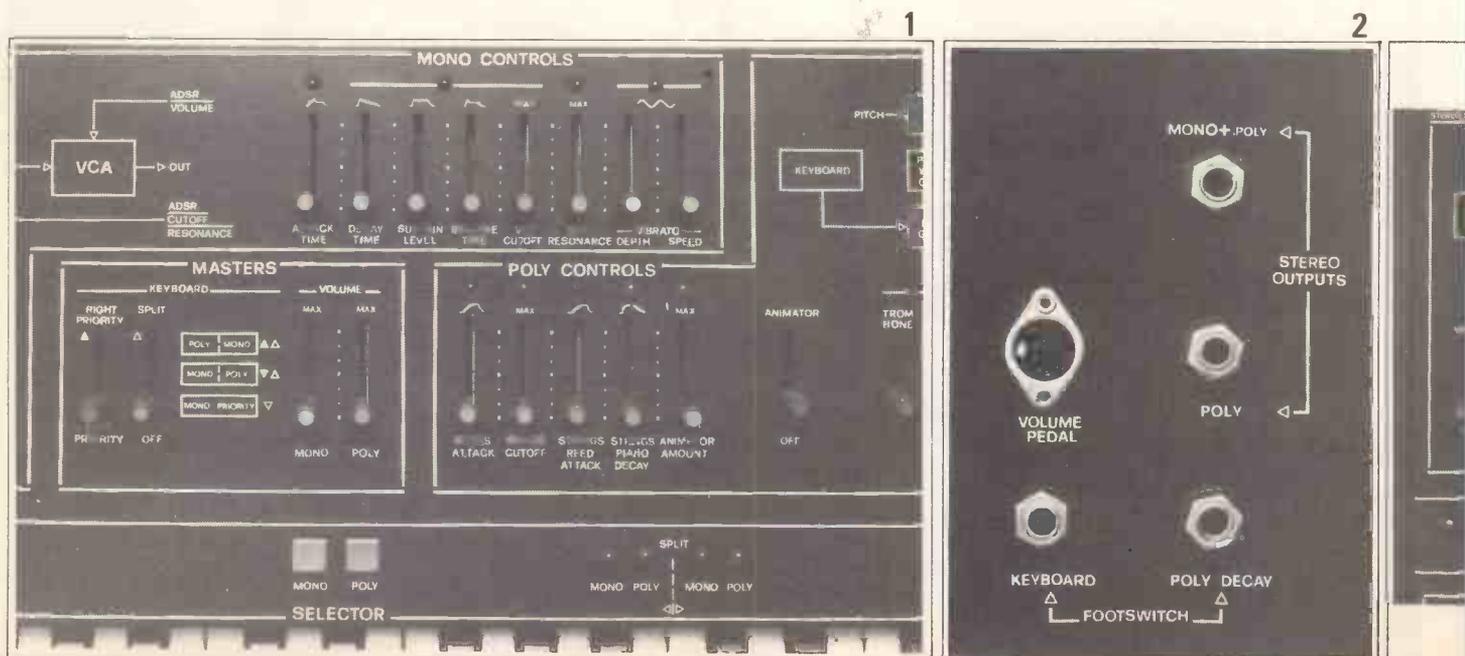
Taking the mono section first, this comprises ten toggle-switches to select the desired setting, with an eleventh to choose between PRESET and FREE modes, more of which anon. There's also a vibrato on/off switch and a series of eight slider pots vary some mono parameters, notably ADSR, VCF cutoff and resonance, and depth and speed of the aforementioned vibrato.

All the presets have been given names (piccolo, sax, etc.) by the manufacturers, none of them terribly accurate, though I suppose they serve a purpose. Contrary to initial appearances, control of some parameters is still possible even when in PRESET mode, though precisely which parameters depends on the voice selected. So that you can see these at-a-glance, however, red LEDs above each parameter slider glow instructively as each voice is chosen, a

feature repeated in several other areas of the Cruise's design. Moving on to the FREE mode, this is something of a misnomer in that the only additional control it affords the user is the opportunity to vary VCF resonance.

Unfortunately, there are no memories in to which the user can program his favourite settings in FREE mode, although with so few parameters capable of adjustment, it's a limitation that can be tolerated in most circumstances. Generally speaking, the most impressive sounds in the mono sections are those that combine a slow attack with, say, a footage of 8' or 16' (footages are indicated above each preset's red LED; they vary from 4' to 32', giving the Cruise quite a reasonable octave-range for a machine in its price category).

The fact that the mono voices are not mixable does impose certain limitations when this section is used in isolation, but a further problem that might be significant is the lack of keyboard tracking. This omission is presumably a cost consideration, but it does mean that, with the sawtooth-based



sounds in particular, high notes can be an awful lot louder than low ones. One redeeming feature however is the mono section's vibrato, which has an excellent range of adjustment and suits most of the preset voices well. Whatever you may think of vibrato as an effect, there's little denying it adds to the realism of the Cruise's mono sounds, so long as a little care is exercised when using it.

But if the mono section disappoints slightly (and I don't want to appear too harsh; some of the voices are excellent, it's simply the *variety* of voicing that's lacking) the poly section more than compensates. It's split into four sub-sections: brass, strings, reed, and piano, and this time the nomenclature is a little more instructive.

The reed section is next, and this incorporates three voices: accordion, which sounds a little bit too much like a car-horn for my liking; musette, which is an octave up and has built-in rapid vibrato; and the extremely effective church organ, a splendidly deep, resonant voice capable of passable imitations of some of the great French cathedral diapasens.

Lastly, the piano section comprises a further three presets, of which clavichord and honky-tonk are a little thin and metallic and need additional delay to make them sound convincing, while piano itself is an excellent, mellow 'upright' version of a Yamaha electric grand.

Unlike the mono section, the poly voices are wholly mixable, not only within their respective sub-sections but also with each other, making a combination of as many as ten different polyphonic sounds possible. Actually, this latter isn't nearly as bad as it sounds, and it's the poly section's mixability which is really the key to the Cruise's success.

The chorus unit (I just can't get used to calling it an animator), standard on the strings as already mentioned but optional for the remaining three, is a little noisy in operation, but this is only really noticeable if you're using the piano section in isolation. Like the mono section's vibrato, it's a well-conceived device that's variable over a usefully large range. Of the various combinations available with the poly section, reed/strings are particularly effective, or alternatively, why not try all four sections together?

Brass has two voices – trombone and trumpet – but the one is simply an octave-lower version of the other. Brass sound is also governed by 'resonance' and 'cres-

cendo' switches and by two slider controls varying attack-time and cutoff. 'Resonance' adds a rather unpleasant 'wah' to the attack, while 'crescendo' is simply a slow-attack preset that obviates the need to adjust that parameter manually. The attack control has a limited but nonetheless realistic range, while increasing the cutoff frequency makes both brass sounds more synthetic, à la The Human League *circa* 'Marianne'.

The strings section is permanently and irrevocably linked to what Siel rather quaintly term an 'animator' or what you and I would normally call a chorus unit. Again, the section is divided into two voices – violin and cello – one octave apart, while a third toggle-switch marked 'percuss', brings in a none-too-impressive sharp attack: after all, how many stringed instruments can you name that have an attack time of less than 0.25 seconds? Fortunately, two sliders vary both attack and decay times (assuming you're not using the 'percuss' switch) and this gives the string section a pretty useful range.

The master section controls the relative volume-levels of the mono and poly sections, while two separate toggle-switches determine which half of the keyboard is assigned to each section if the user has selected split-keyboard mode, the latter being accomplished with the same switches. Either section can be assigned to either half of the keyboard, increasing considerably the Cruise's versatility. With judicious use of the level controls, some glorious atmospherics can be achieved with, as just one example, piccolo at the upper half of the keyboard and strings and piano at the lower. The only limitation is that such splitting only gives you two octaves to play with for each voice, but such is the price you must expect to pay if you want a keyboard that can perform the functions of two or three machines in one compact package.

To emphasise the Cruise's performance versatility, Siel have incorporated a performance section at the left-hand side of the keyboard, though the two most significant controls – a portamento slider and pitch-bend knob – work only on the mono section. I found they worked well enough, though in practice the Cruise is such an expressive instrument that for much of the time they were superfluous.

Of considerably more value are the foot-switches that come as standard and plug in to quarter-inch jack sockets (DIN for the volume pedal) at the rear of the instrument.

The decay pedal works extremely well in emphasising short piano passages, for example, without the need to free one hand from the keyboard in order to adjust the relevant slider. The 'keyboard' pedal switches the poly side to mono when the unit is in split-keyboard mode. Also useful.

Clearly the Siel is an instrument of some subtlety. Its sounds are clear and delicate, due in no small measure to the employment of DCOs for sound-generation, while the keyboard action encourages fast playing. The Cruise seems to have been developed in something of a technological vacuum and is therefore not directly comparable to any other keyboard on the market I can name. Yet despite its place on the fringe of synthesiser development, it's an impressive piece of work that few who play it for any length of time find easy to ignore.

It has its idiosyncracies: no voices selected at switch-on, lack of an overall level control, string sounds that don't quite decay for long enough, but these are far outweighed by its good points – its LED indication, the action of its switches, the versatility of its split-keyboard function, its stereo outputs, and above all, the sheer *panache* of some of its sounds.

Unusually for a preset synth, many of its finest points only become apparent after several days' fiddling, as the Cruise is not an instrument that's all that easy on the unwary beginner, due largely to the eccentricities outlined above. However, the clock diagrams above the mono and poly sections assist to some degree, and I assume reasonably helpful users' manual exists – there was none supplied with the review sample.

If you do get a chance to play the Cruise, don't let first impressions put you off; it's a much more complex and rewarding instrument than it appears.

Dan Goldstein **E&MM**
The Siel Cruise has an RRP of £469 including VAT and is distributed in the UK by SIEL (UK) Ltd, Suffolk House, Massetts Road, Horley, Surrey RH6 7DT. Tel: (02934) 76153.

Pic 1.

Mono, Poly and Master controls.

Pic 2.

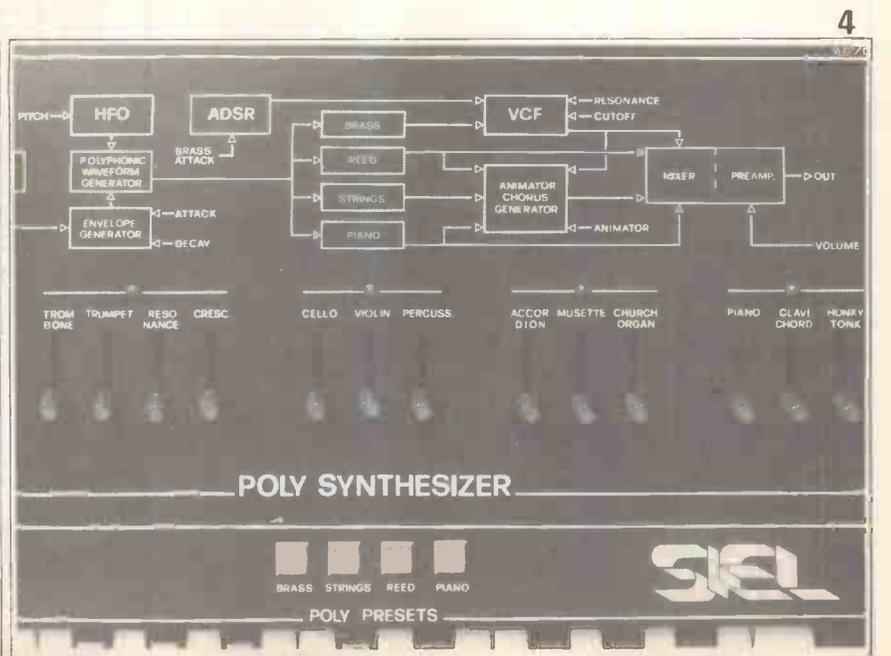
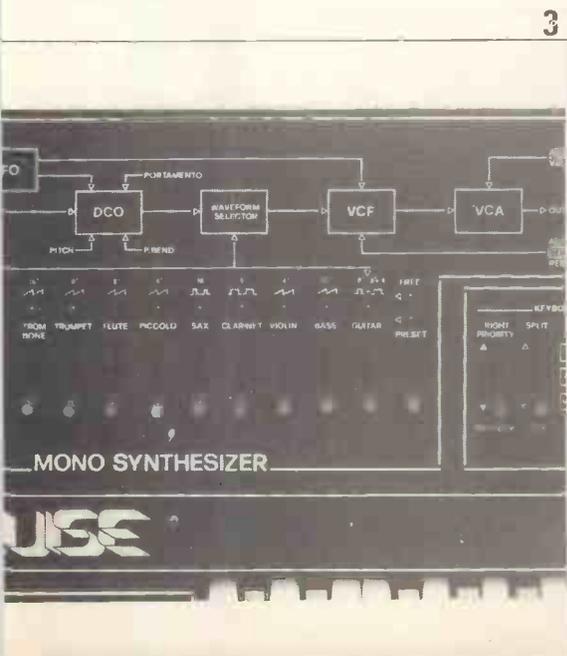
The connector panel (showing Mono + Poly out).

Pic 3.

Detail of the Mono presets.

Pic 4.

The wide selection of Poly Presets and activity diagram.





The team, John Hill with the 'Hot Duo', Alan Murphy and Felix Krish holding their respective instruments.

Fender 'Hot Duo' Tour

Throughout November, Alan Murphy (of Kate Bush fame) and Felix Krish (currently with Bucks Fizz) undertook a string of dates throughout the UK to promote the new range of Fender guitars and amps. With John Hill of CBS Fender providing the 'rap' (product information), Felix the 'slap' (bass) and Alan on 'whammy bar' (guitar with tremelo arm for the uninitiated), local halls such as the Kimberly-Clark Social Club, Maidstone (where we caught the show) saw an evening of 'musical excess' organised in conjunction with a local shop.

Opening with an interesting little number called 'Day of the Doughnuts', the presentation dealt first with history of the Telecaster (backed up by a country piece), and then the story of the Strat (with 'Purple Haze' as illustration). After the precision Bass, back to the music with 'Burn from Baghdad' featuring the new Elite Strat with Alan using the active electronics to good effect. The Elite Tele fuelled the exciting 'Warp Factor 6'. Perhaps we should mention at this stage that Alan and Felix were playing over some excellent backing tracks which they had recorded themselves using a TR808 drum machine augmented by the suitcase Simmons, to which various synth parts had been added. After 'Summer Night in Wandsworth', Felix did his solo bit taking us through the sounds on the new Elite Precision II. 'With Reference To Archimedes' led into the section on the new amps designed by Paul Revere, which gave a phenomenal range of sounds: the 'Super Champ' and the Princeton being particularly impressive for their size. 'Six-eight' and 'Heavy Bongo' were followed by a competition with prizes of sweatshirts and strings for those who had been paying attention. A whirlwind 'Bridge over the Falls Road' rounded up the evening.

It was refreshing to see a major company like CBS Fender using their influence to enable people to see great players like Alan and Felix in a relaxed informal atmosphere. John Hill spiced the product information with his inimitable sense of humour and the evening proved to be as entertaining as it was informative.

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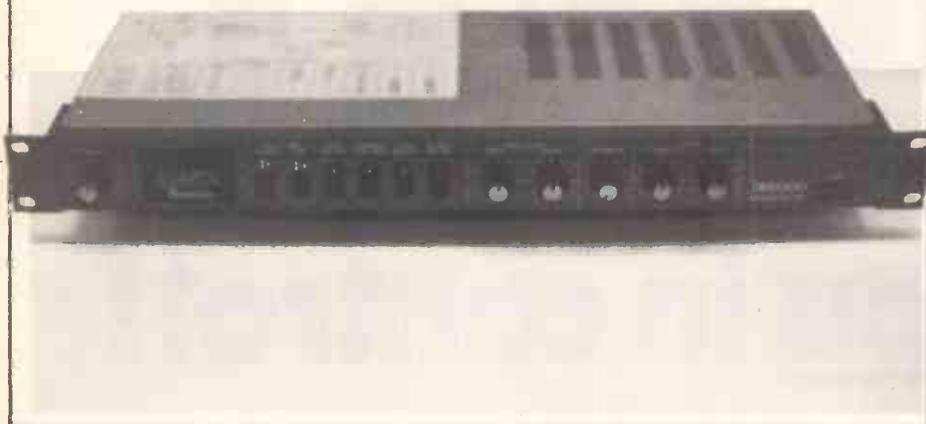
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Ibanez DM2000



Digital Delay

The DM2000 Digital Delay is not simply an update of the DM1000. Many improvements have been made on general operation and the inclusion of a 12 bit microprocessor has allowed a 10Hz to 16kHz bandwidth with delay characteristics inconceivable with the 8 bit processor previously used.

The DM2000, in common with other equipment in the range, is designed to be rack-mounted and compact, measuring just 44mm (1U) high. The outer metal casework has a hardwearing grey and bronze metallic finish.

Controls

An LED configuration on the left hand side of the front panel displays delay time from 0 to 1023ms, and two spot LED's flash on and off in sync with the duty cycle of the internal modulator. A headroom indicator, situated above the delay time readout, displays the input level of the delay signal (including signal through the feedback circuit) from -20dB to +6dB.

Two dual action switches reduce or increase delay time. As a matter of interest, it takes approximately 7½ seconds to change delay time from 0 to 102ms, and in general the layout of the other front panel controls make for a swift and accurate effects changes. Four switches with LED inserts, are used to turn on the internal modulation, reverse feedback phase, switch delay mode to hold (for infinite repeat) and finally to bypass the lot leaving dry (unmodified) signal only. The bandwidth of the internal modulator and its duty cycle can be altered by two potentiometers, and feedback is continuously variable between a single repeat to run away oscillation. Dry and Delay outputs are controlled by two further pots on the left-hand side of the front panel.

Modulation, Hold and Bypass can also be controlled by foot-switches to the back panel, particularly handy in live performance, and pseudo stereo output is available under the guise of mix (dry and delayed signals) and inverse/mix (dry and delayed signal in inverted phase). A dry only signal out is also included in case you want to check that you are still playing and that the instrument isn't in complete control. An interesting feature is the external feedback loop. The send jack from the unit (input to

external loop) comes after the first regeneration of the delay circuit and returns via the receive jack to the pre-mix stage. This offers as many possibilities as you have cyclic treatments but more about this later. Lastly, (or should I say firstly), the input is via a single high impedance jack which is switcheable between -20dBm for line (PA and recording) and +4dBm for use with instruments.

Construction

The internal design matches the neat and efficient layout of the external. A sturdy steel framework holds all components rigidly in place and allows easy access to both sides of the two main PCBs once the two piece metal outer shell is removed.

In all there are 45 separate ICs in the main delay circuit board including an AM 2504 which performs the ADC/DAC work, and a D8048 12 bit microprocessor which duly carries out the three x's with the aid of 12 1K RAM chips. The unit is powered by a somewhat massive JK08h transformer and tends to get quite warm after a period of use. However adequate ventilation is provided, and a plastic screen which is there basically to protect internal wires crossing over the steel frame also gives some protection to the delicate ICs nearby. This might however be a consideration if this unit was sandwiched between two similar pieces of equipment in the rack.

The Modulation is derived from an internal LFO in the 8048 which should make for accurate sweeping of the delay time while flanging, chorusing and doubling.

After preamp stage the signal is pre-emphasised, low pass, filtered and compressed to prevent aliasing and quantisation noise at ADC. When the signal has been converted back in analogue form, it is expanded, put through a second LPF and de-emphasised. Before being sent to output amps or feedback loop. This companding process combined with the added resolution of a 12 bit CPU offers a very good S/N ratio which is rated as -95dBm by the manufacturer.

Effects

Various effects are available with equipment of this type and six sample settings of the popular ones are set out in a chart, thoughtfully stuck to the top of the rack mountable unit.

Flanging is produced by a series of notch pass harmonically related filters. This is induced in the DM2000 by sweeping the delay time by a ratio of up to 4:1 with the LFO (M.G), creating the phase distortion necessary to diminish cancellation.

You would expect that the LFO in this system would be of high quality and capable of giving full bandwidth sweep. The wave does give a very good symmetrical output and adopts delay characteristics very precisely. Unfortunately the excursion of the wave does not seem to be great enough to create an efficient flanging ratio (enough teeth in the comb) at high delay rate. Recommended delay is between 2ms-8ms which should give a bottom notch of about 62Hz but instead the effect is weak and barely noticeable even when presented with a fairly bright signal straight from a Quad 303 amp (which was the only time I lit the +6dB headroom indicator, with normal studio use its difficult to present enough power to reach 0dB).

Chorus: This produced a better effect than the flanging, with higher delay time and no feedback. The sound had a definite fullness of tone but was still basically too weak in harmonics.

Doubling or Automatic Double Tracking is selected at 30-80ms delay, lower rate of modulation than chorusing, with a small amount of feedback. It creates an interesting, rich sound but despite its name it is not quite perceivable as a distinct echo: Once again the modulation let the DM2000 down, but things were improving.

Hard Reverb: take out the modulator, add extra feedback and the DM2000 starts to come alive. Although it lacks some of the presence of a good spring operated system, much greater control is available if sudden changes of reverb type, related to tempo or mood, are desired. With careful adjustments of feedback gain and dry/delay mix interesting subtle effects are available.

Slap Back: when delay is increased to 100-300ms a 'slap back' or 'bathroom' effect is produced. This is very effective at long delay rates but tends to be slightly abrupt at short regeneration cycles. However with careful adjustments of feedback rate clear and natural sounding effects are available.

Long Echo: the DM2000 offers delay times of up to 1023ms and regeneration can be set precisely. It is now that 16kHz bandwidth regeneration is particularly advantageous as regeneration does not detract from tone quality, and fascinating ostinati are available through switching feedback mode to hold.

Comments

Generally I found the DM2000 easy to use as it gave a great deal of flexibility over its various functions. Probably about the smallest, yet most annoying problem I found with the equipment was clicks made by the operation of the six switches on the front panel. Noise of the two dual action switches used to alter delay time unfortunately cut back its ease of use decisively. Feedback has to be reduced virtually to minimum when changing delay time or else audible clicks build up in the feedback in the same way that any other signal does. This can completely destroy continuity changing between, for example, echo and flanging.

The four other switches can also effect audio signal to a lesser degree if simple sounds such as sine-waves are input. The byproduct of being able to produce a delicate raindrop effect with these clicks is of small consequence when overall performance is otherwise impaired.

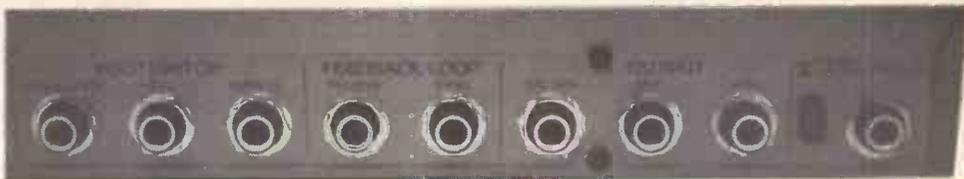
Sound breakup tends to occur after about

30 seconds of reverb when feedback is set to maximum, and just becomes noticeable in the last few regenerations at lower levels as clipped attack.

The hold function allows easy access to infinite repeat with excellent reproduction of sound quality. The delay time needs to be set at 1023ms to effectively use hold mode as it automatically assumes 1023ms sequence time when switched in. Creating and adding to the sequence is straight-forward; simply by switching in and out as each voice is added very complex ostinati can be produced (I had over 20 different timbres all reproduced with extremely clear accuracy).

Once you have your sequence it can be treated to pitch-shift using the modulator. However, as the shape of the LFO wave at this delay rate is very distorted there can be little practical use in this. Even so, very interesting effects, particularly when using speech from a microphone input, can be created. The maximum duty cycle of the LFO last about 23 seconds being 11½ seconds in each positive and negative phase.

The external loop adds extra creativity to the instrument. For example, sending the signal to a 2x frequency divider, inverting the output and high-pass filtering the result, gives a strange broadening effect at high delay rate, and interesting interaction of signal tones if delay is slow. Using it as one input of a ring modulator filtering the result and losing dry output can give very thick textures, and if you have a synth with ESP (external signal processor), the sent signal can be used to trigger other equipment or for envelope following. These are a few uses which I found interesting, but there are many more, and the loop is definitely a good feature for studio use.



Conclusion

I can't help feeling that the design of the DM2000 has been hampered slightly by trying to appeal to a wide range of users. Problems I experienced while flanging etc. using outputs directly from synths (with input selected to -20dBm) are reduced considerably when the unit is fed with a power amp and switched to +4dBm. I found it impossible to attain the required reading on the headroom indicator with either synth or guitar, and yet when powered by a Quad 303, headroom could be made to peak at the suggested +6dB, and effects were better, but still not good.

For live performance foot switches can control on/off function of modulator hold and bypass (good quality switches are a must, especially on hold, to prevent noise). However, the external loop facility is badly thought out for live use, when a plug is presented to send output at the back, the front panel control is switched out of the circuit (except that if turned fully anti-clockwise, feed-back is still reduced to a single repeat). This means that in live performance, if you want to change from external to internal feedback loop, the jack plug needs to be removed from the back panel. This should be switchable from the front to realise the full potential versatility in live performance.



The positioning of the -20dBm/+4dBm switch at the back next to the input jack could be better, but you can't have everything at the front and you are very unlikely to need to use it live.

The DM2000 is designed to be a digital delay unit, and as such, it does an excellent job with a S/N ratio that allows for a great diversity of signals to be treated with a crystal clear reproduction of timbre, I would definitely like to see the delay time limits extended at both ends but even as it stands, this equipment offers extremely good value for use either live or in a studio environment.

Glenn L. Hughes **E&MM**

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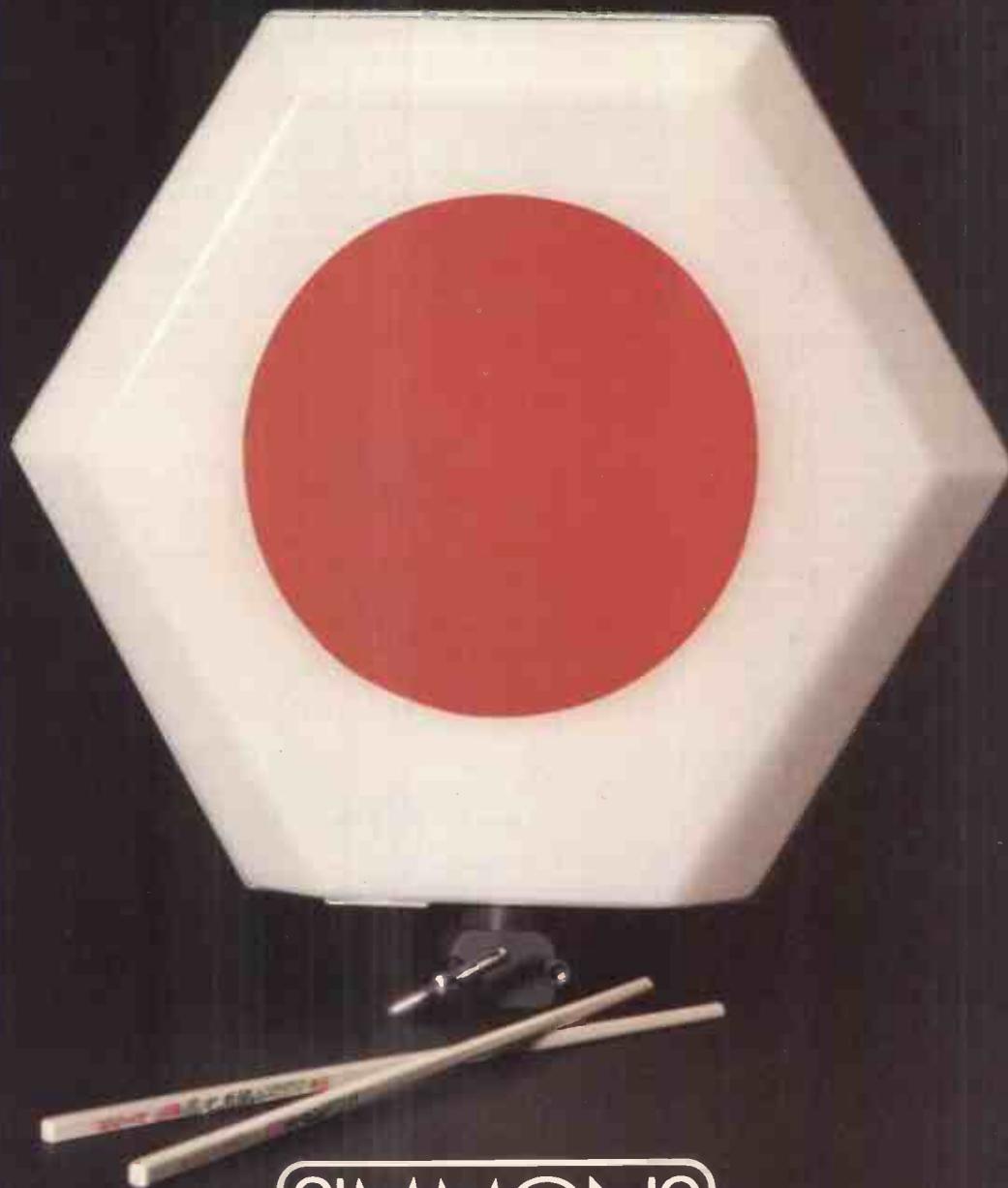
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Modular Synthesis Producing String Sounds

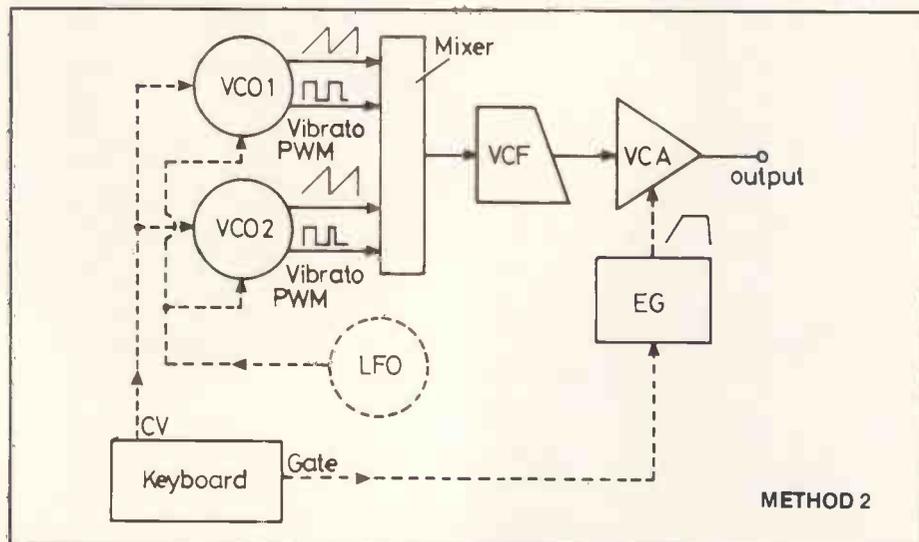
Over the last year or so In Advanced Music Synthesis, we have been looking at the various individual modules that can be found on a synthesiser and seeing the sort of things they are capable of and I've been giving you simple exercises to illustrate each modules facilities. Over the next few months we'll be putting all these modules together and seeing how they interact with each other and instead of trying out fairly nebulous ideas we'll be covering specific sounds such as orchestral, percussive and synthesizer sounds. But before all you Musicians Union members go wild about us showing how to imitate acoustic instruments let us explain our reasons for doing this.

Acoustic instruments are often quite complex sounds that have a good deal of harmonic and amplitude variation within the course of each note and across their musical range. Synthesisers, on the other hand, have a habit of being quite static and 'even' which is why a lot of people think that synthesisers are cold and clinical. It's not so much the fault of the instrument as of the players. With a bit of thought and application, however, it is almost possible to reproduce these 'acoustic' nuances on a synthesiser which will enable you to create more 'animated' sounds and hence dispel these unfounded criticisms of electronic music. By trying to reproduce as closely as possible an acoustic instrument it will give you an idea of how familiar sounds are made up so when you set up an electronic synthesiser sound, the principles you learnt when imitating an acoustic instrument can be applied to create more interesting synthesiser effects. This principle of 'learning through copying' is not new, however. Painters when embarking on their studies, are usually told to copy famous paintings by various artists so that the techniques the artist acquires when copying these paintings can be applied to his or her own original work. It is interesting to note that the best synthesiser players usually have their roots in classical music or Instrumentation. Their awareness of orchestral techniques plays an important part in the creation of their own music which usually sounds more dynamic than many synthesisers whose music and sounds tend to drone on and on, sometimes for the entire side of an album, without variation.

Anyway, to business. This month we are going to look at 'Strings'. This is a good all-purpose sound that can be used as a melody line or as chordal backing but with some thought it can be made far more interesting than the standard string-synth sound that has been flogged to death over the last couple of years. But before we see how to set up a string sound, let's take a quick look at how 'real' strings achieve their unique sound.

First of all, a stringed instrument such as the violin has a high harmonic content and because of the bowing action, the envelope has a slowish attack, usually a full sustain level (when played legato) and little or no release. A string section has a number of players, all of them scraping away at their instruments and because of human inaccuracy, none of these instruments will be simultaneous sawtooth and pulse waveforms, 1 voltage controlled filter (VCF), 1

voltage controlled amplifier (VCA) and envelope generator (EG) combination, 1 low frequency oscillator (LFO) and a chorus unit. These will need to be patched up as in Fig. 1. The control settings aren't that critical: but the VCO should be set to give both the sawtooth and pulse waveforms simultaneously, the cut-off frequency and keyboard follow on the VCF should be set at about two-thirds or three-quarters, depending on the tone of strings you require. The LFO should be set to give a medium-slow output (around 5Hz) and patched to give vibrato and pulse-width-modulation (PWM). I find it best to keep the vibrato on all the time and not delayed in any way, incidentally. The EG is connected only to the VCA and is set to give a slowish attack (the exact setting depends on the type of string sound you're after), full sustain and a fairly short release (long release times tend to transform your string sound into a 'theatre organ' and will blur melody lines). Messing around with ADSR controls will yield quite a large variety of string effects, however, and I advise you to experiment for the best effect - as long as the attack time is fairly slow you should get a passable string sound. Finally, all these are shoved through a chorus unit to further augment the ensemble effect provided by the vibrato and PWM.

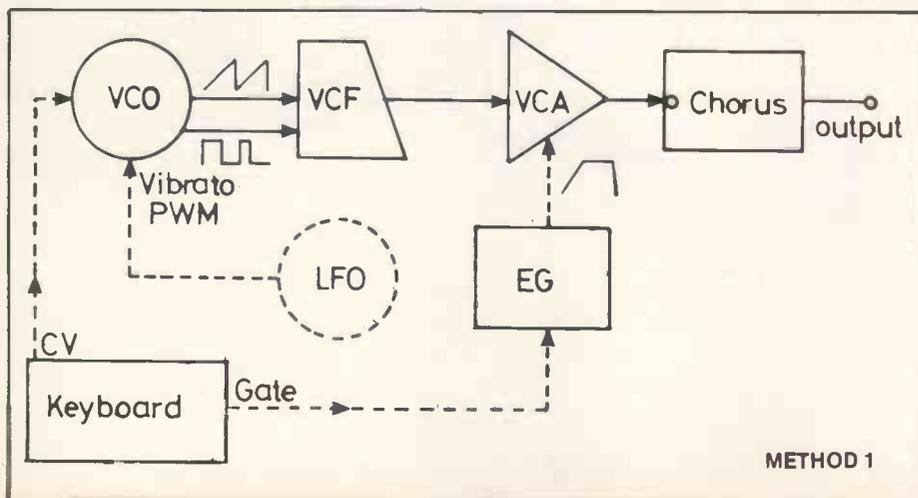


METHOD 2

exactly in tune with each other and also, each musician will have a slightly different style and vibrato technique so that the end result will be a rich, thick, ensemble sound. Synthesising this, however, can be done in a variety of ways.

METHOD 1

The ingredients you need for this 'recipe' are 1 voltage controlled oscillator (VCO) giving



METHOD 1

METHOD 2

This utilises the same sort of control settings as Method 1 except that we are using 2 VCOs to provide the ensemble effect. This method is preferable to the above as chorus units can sound somewhat electronic and can have an unnerving 'beat' to them which shows up on long sustained notes, while the effect of two detuned VCOs can sound more natural. Again we use the sawtooth and pulse waves simultaneously but if your particular synthesizer doesn't allow you to do this then select sawtooth on both VCOs or sawtooth on one and pulse on the other - two pulse waves will not sound so good as two sawtooth waves. The setting of detune depends on the thickness of the ensemble effect you require but I don't recommend tuning the VCOs an octave apart (or using a sub-octave) as this will sound more 'synthesiserish' and less authentic. To further augment the ensemble effect, you could use a chorus unit in this method as well but this can sometimes blur the sound if you are not careful.

METHOD 3

This requires more hardware than either of the two methods outlined above. You will need a modular synthesiser that has 3 (or more) VCOs, 2 VCFs, 2 EG/VCA, 2 (or more) LFOs and probably a small mixer of some

form. Set all the controls as above but make small variations to each 'channel' so that the cutoff freq of one VCF is slightly different to the other and likewise with the attack, LFO rate, etc. This will allow you to create a more authentic string sound as it enables you to recreate the small differences that exist between two instruments and two players. For the more adventurous amongst you, if you have the hardware, you can also recreate the striking of the bow against the strings by feeding a sinewave into the control voltage inputs of one or both VCOs. The amount of modulation from this sinewave is fairly critical but you should be able to tell when the effect is right. The

allows you to vary the envelopes times over the range of the keyboard. Another point to bear in mind is that in a string section there are fewer 'cellos and contrabasses than there are violins and violas so the ensemble effect will need to be decreased in the lower registers by decreasing the amount of detune, chorus or PWM. To overcome these problems, I advise you to record each line separately - but more of that later.

Keyboard Technique

One of the key points in obtaining a realistic string sound is not only the sound but the way that sound is played. In other words, don't expect to get authentic string

a soft, fairly quiet sound as the attack is not being allowed to reach to full sustain level. Keeping your fingers on the keyboard for just a fraction longer will allow more of the attack portion to be heard and the sound will be a bit louder so that varying the time you keep your fingers on the keyboard can give you notes of varying levels. To hear this demonstrated to good effect, I suggest you take a listen to 'Village Ghetto Land' by Stevie Wonder off the 'Songs in the Key of Life' album set. Although done on the huge Yamaha GX1, the same sort of effect is possible on even the smallest of synthesizers.

Recording Tips

Finally, there are some things to bear in mind when recording string parts on a synthesizer. For a start, a 'real' string section does not play in mono, but is spread across the stereo image and so, once again, it is a good idea to record each string part individually. Not only will you be able to articulate each instrument separately and make allowances for the differences between the different pitch ranges, but you will be able to pan them to give a wider string sound. If tracks are limited on your tape machine then I suggest you record the violins and violas on one track and the 'cellos and contrabasses on another and during mixdown, send the violins/violas through a chorus unit (via the effects send on the mixer) and pan the straight and chorused signals left and right respectively leaving the cello/bass lines in the centre. This will help to spread the string sound quite considerably. If you have access to a harmoniser then that would be better than a chorus unit. If you have quite a few tracks to play with, try double or triple-tracking string parts in unison using detuned or varispeed effects.

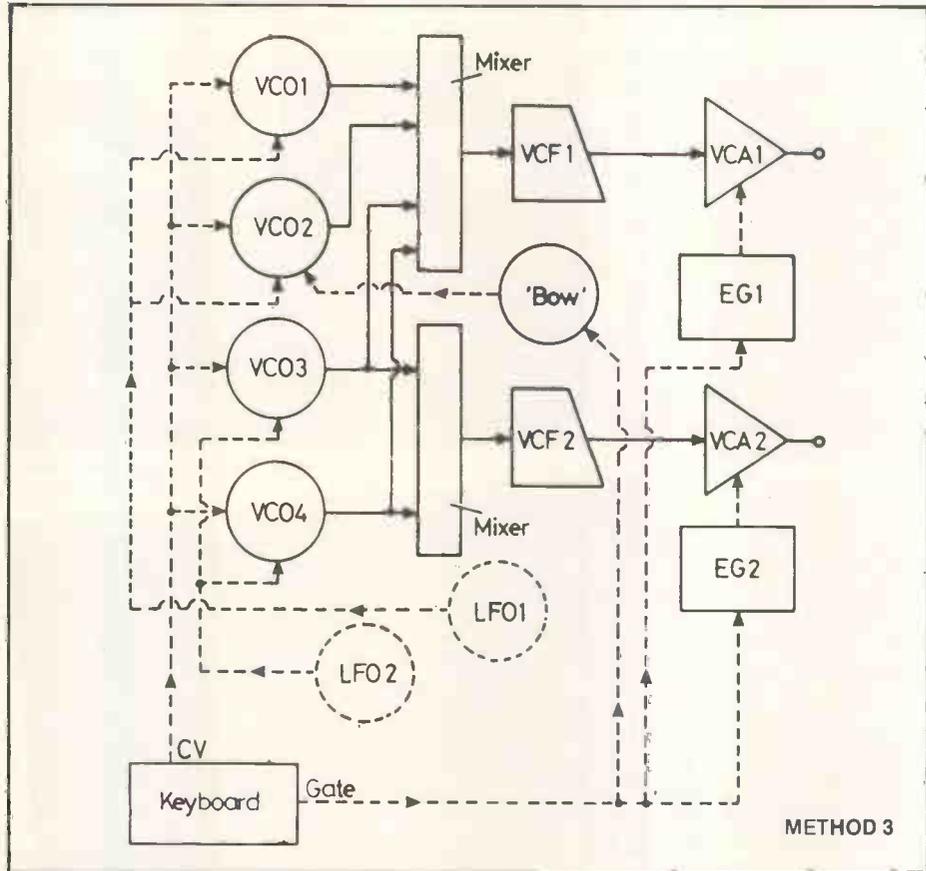
Reverberation (NOT echo) will give you the correct acoustic environment for the strings to work in (Echo will give 'bouncing' repeats, especially on more staccato lines - this can be a good special effect, however). I also recommend that you tweak the EQ in the mid-range a bit in order to give that woody resonance of strings. A simple EQ section on a mixer will probably suffice but a graphic equaliser will give you more control. You can use one or more chorus units on your string sound and I find it best to route it via the effects send and bring the chorus back through another channel where it can be EQ'd and treated separately.

That just about concludes this month's look at strings. As I said earlier, any of these techniques can be usefully employed for any sort of ensemble sound, be it an imitation of an acoustic instrument or a unique electronic sound. I have not covered pizzicato strings as this can be a bit involved and will require another 4 pages! I will, however, be looking at them later.

Next month, we'll have a look at brass sounds so until then, happy orchestrating.

STEVE HOWELL

E&MM



frequency of the sine wave should be around 80-100 Hz (experiment for the best effect) and it must be shaped via another EG/VCA giving a fairly fast attack decay with no sustain. This will add a 'crunchy' transient to the front end of string sound and is particularly effective on faster melodic lines. Routing the VCA via a foot-pedal to control the level of the sinewave will allow you to bring in the 'scrape' as and when you want it. It takes a bit of time to set up but the results can be very good indeed, especially if the synthesiser is then put under the control of a sequencer or Micro-Composer.

Those then are the three ways of obtaining good string sounds that will sound quite authentic. There are a few things one has to consider, however, in order to get a totally realistic string section effect. Firstly, violins, violas, 'cellos and contrabass are not simply the same sound spaced an octave or so apart. The heavier strings of the lower pitched instruments require more energy to get a sound. As a result, the attack and vibrato speed will be slower than on a higher pitched stringed instrument such as the violin. To more accurately reproduce this effect will necessitate you altering the respective controls on your synthesizer accordingly. On a polysynth, this can be difficult, especially if you intend performing the whole string part in one go unless you have a key-follow control on the EGs that

sounds by playing large, keyboard type chords on the keyboard - you will have to play the parts very much as a string section would play them. Fig. 4 illustrates this. The block chording given in Fig. 4a will not sound as good as the arrangement in Fig. 4b. Block chords can sound quite good but for the most part I recommend you orchestrate your string parts as if it were a 'real' string section. Again, this will require you to record each part separately as the intervals can be quite large but the results can be well worth the effort, believe me.

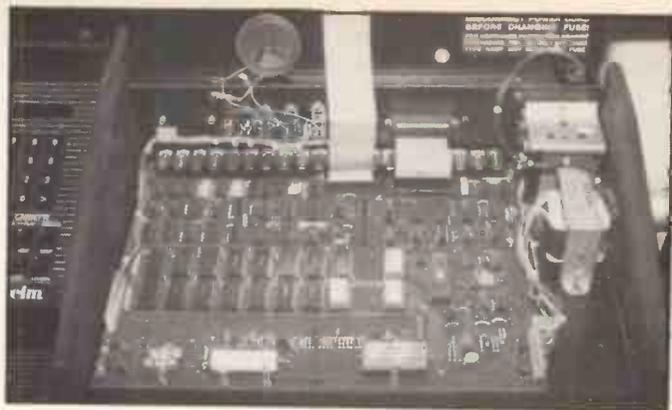
Your playing technique can also play an important part in the final string sound as well. The slow attack on the EG enables you to obtain a touch-sensitive effect whereby playing in a more staccato manner will give

Fig 4.





The top-of-the-range 'system', DSX, DMX and OB-8.



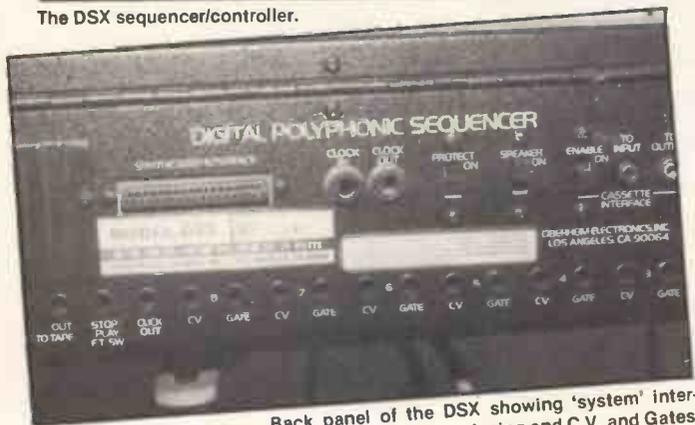
Internal view of DSX showing metronome speaker.



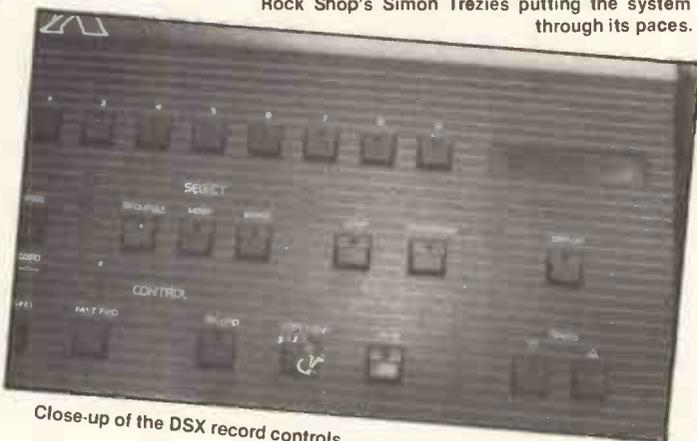
The DSX sequencer/controller.



Rock Shop's Simon Trezies putting the system through its paces.



Back panel of the DSX showing 'system' interfacing and C.V. and Gates.



Close-up of the DSX record controls.

Oberheim Performance System

Synthesiser, Sequencer and Drum Machine Interface

With all the current talk about MIDI, it is easy to forget that some companies have been developing their own interfacing for some years. Of course, the Roland system has received a lot of exposure with the DCB (Digital Communication Bus) allowing the MC range of sequencers to be connected to their polysynths, and also the DIN connectors which sync the TR drum machines and bass-line.

However, there is another system which has been quietly developing and expanding over the years, one which has received less publicity because of the limited numbers of dealers importing it. But now that several new people are bringing over the Oberheim system from the States, let us hope that this system attracts the interest it deserves.

The heart of this system is the DSX sequencer which can control the whole family of Oberheim polyphonics — the OB-X, the OB-Xa and the latest model, the OB-8 via a computer interface. It also has 8 separate CV and gate outputs to control up to 8 analogue synths of the 1 volt per octave variety. It has a capacity of 6,000 notes and

is capable of 16-voice polyphony. It can store up to 10 sequences at any one time and there is cassette storage for building up a repertoire of sequences. Each individual sequence can be independently recorded over 10 tracks and there are two recording modes: *Real Time* (with a 1/192 note resolution) or *Quantize* which will auto-correct your playing to 1/2 note (minimum) maximum or 1/32 note (demi-semiquaver) minimum. There is also a programmable metronome with an internal speaker.

The Merge feature gives the DSX a particularly useful flexibility. It allows sequence looping with the ability to listen to different tracks each time round, chaining different sequences and inserting transpositions and sound program changes. This gives virtually unlimited variation within the total memory capacity of the sequencer.

The DSX is also designed to work side by side with the DMX or the more recent DX digitally-sampled drum machines (see DX review in E&MM Sept '83). The DMX works on replaceable voice cards while the DX's sounds can be changed using new

EPROMs. Both machines can store 100 drum patterns (up to 99 bars) each and combine these into fifty songs. Of course the syncing facilities on both the drum machines and the sequencer allow them to be used with compatible equipment from other manufacturers.

Full marks to Oberheim, who have been producing this totally internally compatible system since 1979. Each new piece of the equipment has upgraded the potential of the system (the OB-8 improving on the spec. of the OB-Xa for example) or made similar facilities available at a lower price (the DX coming in at just over half the price of the DMX with most of the features) but ensuring that the original does not become obsolete.

Paul Wiffen **E&MM**
Thanks to the London Rock Shop for letting us play around with their 'system'. Current prices are DSX £1,395; DMX £1,995; DX £995; and OB-8 £2,995. An extract from 'the Sound of the System' — an Oberheim demonstration single — will be included on the first of the new series of E&MM demo cassettes available in the New Year.

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RECORD REVIEWS



Saga Heads Or Tales PRT 25740

'The Flyer' opens this latest offering from Saga with one of their classic guitar riffs set over a backdrop of full keyboards. The vocals enter and lead from the front, pushing straight through the verse to the chorus. The middle eight leads into a full frontal guitar solo bursting with rapid runs and squealing harmonies.

'Cat Walk' starts from a PPG sequence which builds to the main riff heavily punctuated by guitar and brass-type chords. The verse lines are set over this and it is only interrupted by the descending chords of the chorus set over the root bass line. The next time this chorus reappears the rhythmic complexity is increased by guitar chords and the keyboard textures are piled over the concluding guitar solo.

'The Sound of Strangers' features some nice harmony vocals in the chorus and an interesting keyboard section built up over a dampened guitar rhythm. After the final chorus a nice instrumental develops with jagged guitar lines over a sequenced keyboard part. In 'The Writing' the basic accompaniment on the piano is built upon by more electronic keyboard sounds. The guitar enters to give the chorus a heavier feel. The instrumental passage that follows each chorus features funky brass-type parts from the Memory-Moogs and a double-speed guitar adds tension to the longer break.

'Intermission' is the first track at a more relaxed tempo, a synth bass underscoring flowing keyboard lines. The lyrical lines of the verse lead towards the chorus which is over a sequenced

PPG riff. Orchestral type bowing follows and the concluding guitar solo of a fairly aggressive nature contrasts nicely with the languid tempo.

Side Two opens with 'Social Orphan' returning to a more up-tempo feel. Once again Jim Gilmour provides a brassy arrangement on MemoryMoog and there are some nice bits of clavinet-type chording underneath. 'The Vendetta (Still Helpless)' is another piano-based piece giving an almost circus music feel to the vocal sections. The instrumental features gliding synth chords and some fiery guitar and lead synth phrases. The fade features the piano phrase on a musical box type sound.

Jim Gilmour's lead vocal on his song 'Scratching the Surface' has a different feel with rhythmic synth and Simmons kit fills in the verse. The chorus changes the pattern, hand-claps punctuating a repeated piano riff with changing chords. The instrumental section adds a lead guitar which duels with a solo synth.

The concluding track 'Pitchman' features some of the most interesting synth sounds and complex phrasing on the album. The PPG provides some nice tuned percussion sounds and the chorus is broken up by some syncopated unison phrases between guitar and synth. Gilmour takes a synth solo using a plucked sound which leads into section of descending unison phrases which stop and start building up to form the backing for a final all-stops-out guitar solo.

A particularly interesting album for synth enthusiasts contrasting as it does the analogue sounds of the Moogs with the digitally generated ones from the PPG. Some fine playing is

contributed by Ian Crichton on guitar and Jim Gilmour on keyboards, and Michael Sadler's voice delivers with confidence and power. An added bonus if you buy now is the free live single which features two Saga classics 'Careful Where You Step' and 'Don't Be Late' with the added excitement of a stage performance. The tightness of the playing is impressive and the sound and recording quality is excellent. Another good reason to pick up a copy of this excellent record.

Paul Wiffen

E&MM



Ian Anderson Walk Into Light Chrysalis CDL 1443

After 15 years at the helm of one of the longest surviving British bands Jethro Tull, Ian Anderson has finally found the time to produce his first solo album. Whilst still clearly bearing Anderson's highly individual stamp, the input of his fellow Tull member (albeit a fairly recent recruit - being eight years old when Tull was originally formed), Peter-John Vettese on keyboards gives the album a much more keyboard orientated electronic feel. Between the two of them, they played or programmed all the instruments on the album. The drums are courtesy of the Linn and an MC202 and an Emulator also play their part in the arrangements. Peter's principle keyboard is of course still the Rhodes Chroma (about which he talked extensively in our September issue).

From the opening bars of 'Fly By Night' it is clear that this is not just a Tull album by a different name. A high sequence is overlaid by piano bass and high speed 'violin' bowing from the Emulator and this pre-dominance of keyboards continues throughout the song.

An atmospheric build up from the synth leads into the opening lead guitar melody of 'Made in England'. The tempo picks up as the flute begins the riff. Both lyrically and melodically this is perhaps the track most reminiscent of Anderson's previous work. An extended middle section juxtaposes lyric keyboard

lines with flurries on flute and the odd power chord breathes a faint hint of the guitar rock origins of Tull.

The title track comes next and features a steady rhythmic beat over which Anderson stretches his vocal lines in a more languid fashion. The lyric is perhaps the album's strongest, dealing with that instant when the artist is about to step on-stage.

'Trains' shows Anderson's growing use of sequenced synths as a rhythmic base, continuing in a direction first taken in 'Watching Me, Watching You' off the last Tull album 'Beastie'. 'End Game' which follows it opens with a delicate texture of electronic sounds and features a punchy lead synth in the middle section and some nippy fills. 'Black and White Television' has an almost Human League bass-line in the quiet sections, although the overlaid keyboard textures have a greater depth than most electro-pop, and the chorus has the tricky rhythms we have come to expect from Anderson. 'Toad In The Hole' is a timeless number which could have come at any point in his career and is delivered in that narrative half-speaking half-singing style which is one of his trademarks.

The single 'Looking For Eden' takes the same basic verse format through a variety of tempos and accompaniments, from syncopated rhythms to orchestral textures. The lyric moves cleverly from the questioning to the disillusioned. 'User Friendly' makes a witty light-hearted love song of modern computer jargon. Peter adds suitable fills and quick chords of an electronic nature. The instrumental after each chorus features a duet between flute and keyboard based around a pentatonic riff very characteristic of Anderson's writing. The track finishes with a rapid sequencer repeating as it fades suggesting electronic equipment overloading.

The final track 'Different Germany' is perhaps the album's best. Introduced by a high tinkling sequencer, a pulsating synth bass pushes the languid verse lines to the more complex chorus both harmonically and rhythmically. The middle section is built around a repeated organ riff over which Peter Vettese plays a rapidly accelerating synth solo. A brief section features Emulated vocals and then a cascading piano run brings the basic beat crashing back in for the final verse and chorus.

On this album Anderson with Peter Vettese has really exploited all that technology has to offer the musician with sequen-

RECORD REVIEWS

cing, sampling and synth programming all playing an important role, but avoiding the trap of anonymity which can so often result. The album still bears his individual stamp on the songwriting and instrumentation, but has a freshness which is the result of a different arranging and recording format.

Paul Wiffen

E&MM

and Bones' settles into a more familiar acoustic feel, with some fine playing from Steve Gadd with that gentle yet busy style at which he excels. Anthony Jackson also stands out on Contrabass guitar which he contributes on most of the tracks on the album (the Contrabass guitar is an acoustic version of the standard bass guitar). The song itself

weave around the main riff providing a hypnotic contrast between repetition and change. This must be one of Simon's most fascinating blends of poetic lyrics and musical techniques and stands besides his other great achievements over the years.

The last track on this side 'Song About The Moon' seems like light relief after its predecessor but even this has its philosophical content. Opening with a joyous gospel-type choir (a la 'Loves Me Like a Rock') it moves through a reflective middle eight, to a heavyish final verse, fading on those gospel vocals once more.

Side Two opens with the up-tempo version of 'Think Too Much', which features Nile Rodgers and Bernard Edwards of Chic fame. Overall this is much more light-hearted than the conclusion on the first side (interesting logic!) and is based around some great rhythmic patterns. Verse 2 begins with some interestingly aggressive samples on the Synclavier behind the main vocal.

'Train In The Distance' is another acoustic narrative song, with the title illustrating the 'grass is greener' motif in the story of a marriage. As he sings in the conclusion, 'The thought that life could be better, is woven indelibly into our hearts and our brains'. The instrumental finale sees Dean Parks imitating the sound of the train on an electric guitar which comes to a significantly abrupt halt, along with the solid beat of Jeff Porcaro (of Toto fame). 'Rene and Georgette Magritte With Their Dog After The War', based on a famous photograph, is laced with a sad nostalgia. Simon plays that delicate picked electric guitar we first heard on 'Night Game' and barbershop vocals and a lilting orchestral arrangement complete the air of reminiscence tinged with regret.

'Cars Are Cars' finds Nile Rodgers on jangling rhythm guitar, vying with a Linn Drum pattern, punctuated by a spiky horn arrangement by Dave Matthews. The near banalities of the verses are contrasted with the philosophical comments in the middle eight sections which are underscored by a more lyrical accompaniment from Rob Sabino on synth.

The final track 'The Late Great Johnny Ace' (co-produced by Larry Waronker as was 'Song About The Moon') is Simon's tribute (characteristically later than most) to John Lennon. Actually the song has surfaced before, in the Simon & Garfunkel concerts last year and is on the Concert in Central Park video, if

not on the Soundtrack LP. Ironically it is during the course of this solo performance that someone from the audience rushes onstage to menace Simon, underlining how the famous will always be at the mercy of the unstable elements in society.

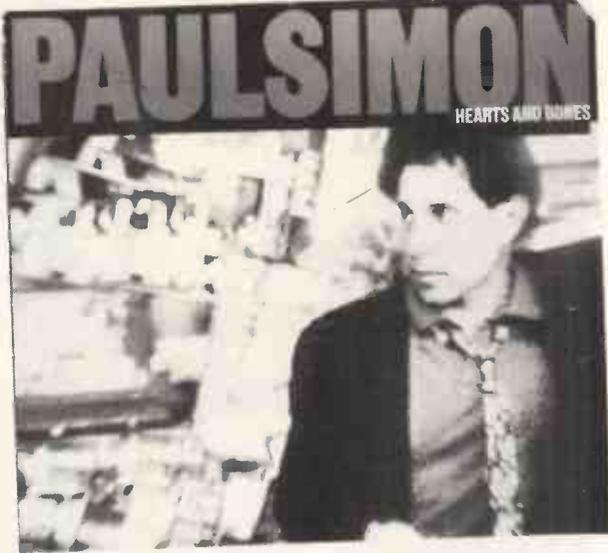
However, the song itself deals more with the tragedy in terms of its musical impact. Indeed neither the killer or the shooting are mentioned. The lyric instead has three distinct sections. The first of these deals with the death of Johnny Ace in 1954, in which Simon was hardly involved 'but I felt bad just the same'. The middle section deals with the time when Lennon's music had the greatest impact on Simon, in the early days of 1964. The final section, sung over the same music as the first, is the one that tells of the effect of Lennon's death. The contrast between the quiet sections, just acoustic guitar and a spine chilling synth bass growl from Michael Boddiker, and the up-tempo middle with joyously distorted guitar (a la Sixties) from Sid McGinnis (he of Peter Gabriel fame) highlight the changes of mood within the lyrics. But the most poignant part by far is the closing instrumental by Philip Glass. Based around two simple chords, with repetitive violin and cello lines, it has the melancholy mood of an elegy. The sudden ending seems significant as well.

This is without doubt the most moving tribute to Lennon to date. The marriage of two leading musical geniuses from different fields is so perfect that one does not notice the join and the refreshing lack of commercialisation (unlike some of the other tributes - why else release it in 1983 when the song was written in early 1981 unlike the other more recent songs on the album?) makes the emotion all the more heartfelt.

Once more then, the three year wait between Paul Simon albums has not been in vain. Another finely crafted album in both songwriting, performance and production. All the musicians play superbly without ever trying to step outside their supporting role, allowing the songs to shine through. Perhaps more than any of his fellow veterans (Dylan, McCartney et al), Simon has always managed to sound contemporary and yet timeless. On this latest offering he does so once more with consummate ease and the introduction of electronic instruments makes a mockery of those who claim they have no place in captivating emotional music.

Paul Wiffen

E&MM



Paul Simon Hearts & Bones WEA 923942-4

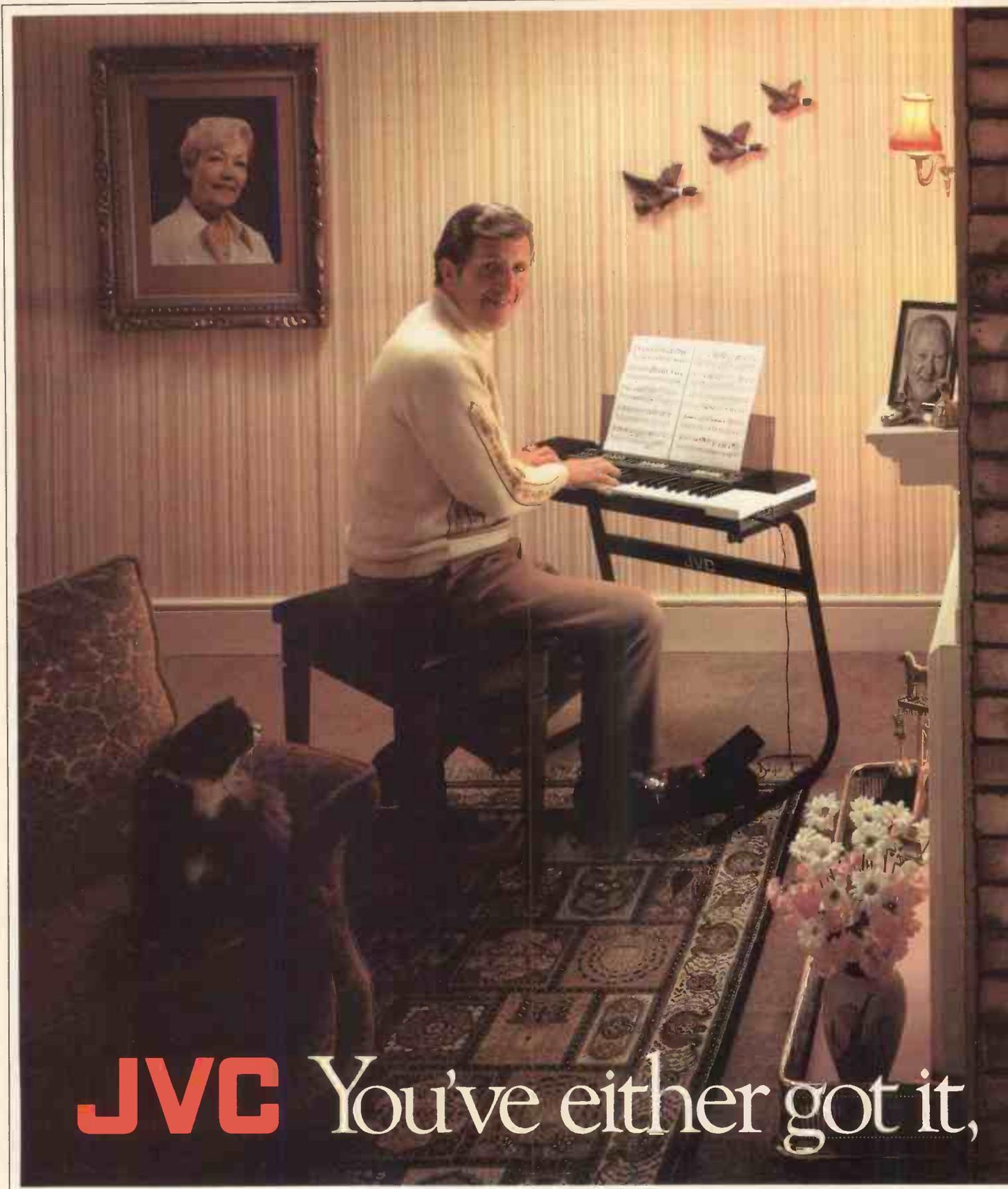
This is the first album by the seminal American singer/songwriter, now celebrating 25 years in the business, to feature electronic instruments to any great extent. Whilst previously Simon has opted for session musicians who excelled on more traditional instruments, he obviously feels that their electronic counterparts have now matured to the point where they can complement the emotional subtlety and melodic grace of his work. Indeed, the first track 'Allergies' is almost a statement of intent. Opening with a heavily-modulated polysynth played by Rob Sabino, the first word of the lyric, 'Melodies' is performed through a Vocoder by Rob Mounsey (the synth player on the recent Simon and Garfunkel World Tour). Simon's plaintive vocal joins in. As the track builds, Steve Ferrone adds cascading rolls on Simmons drums over the top of Steve Gadd's Latinesque rhythm patterns on an acoustic kit. The Spanish feel is heightened by a blistering solo from guitar virtuoso Al Di Meola. The lyric cleverly combines amusing observations on the treatment of physical allergies with emotion problems ('My heart is allergic to the women I love And it's changing the shape of my face').

After this fiery opener, the second and title track 'Hearts

is another of Simon's narrative tales, in the same vein as 'America' and 'Duncan', recounting the changes in a relationship in the course of a journey through Mexico. Such is the strength of the images created that one would almost swear that the story line is taken from a film one has already seen. Perhaps more than any of his contemporaries, Simon has turned the folk song-based narrative into an art form.

'When Numbers Get Serious' is a much less intense, tongue-in-cheek piece, jibing at the importance of numbers in modern society. Driven along by Jackson's fine slapped bass and Eric Gale's reggae influenced guitar, and also by off-beat chords from Tom Coppola on the Synclavier, that state-of-the-art electronic music system from New England Digital. Coppola has a hand in many of the tracks and is greatly instrumental in giving the album its Eighties feel. A surprise slow ending gives a vaguely mystical conclusion to the track.

'Think Too Much (B)' (Part A opens Side Two) is based around Mike Mainieri's repeated Marimba phrases, which are given interest and depth by the rest of the players. A distant vocal echoes the fatalism of the main lyric which has all the power and futility of 'Slip Slidin' Away'. Piano (from old faithful Richard Tee), Synclavier and Electric Guitar (Dean Parks, another long-term associate)



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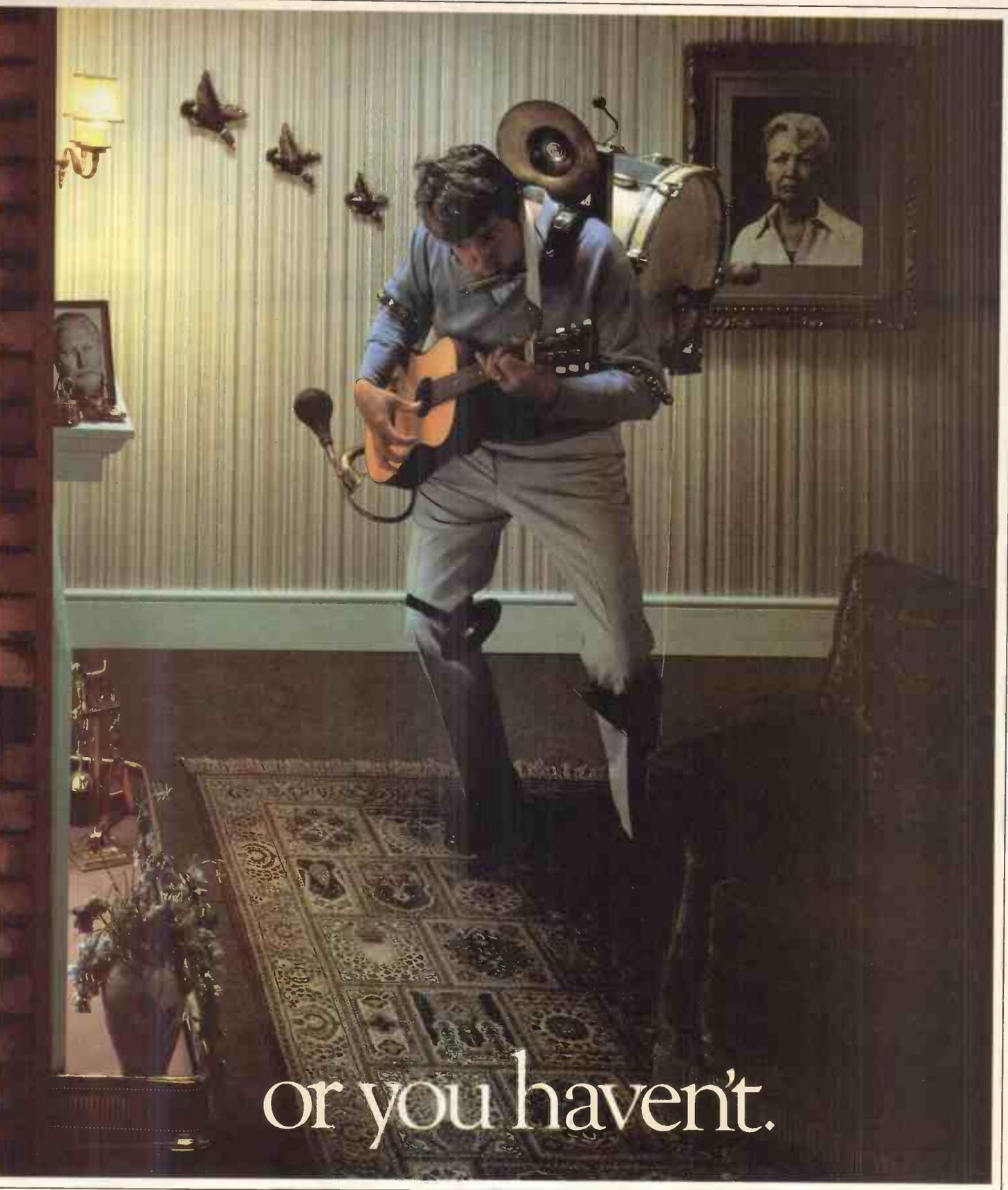
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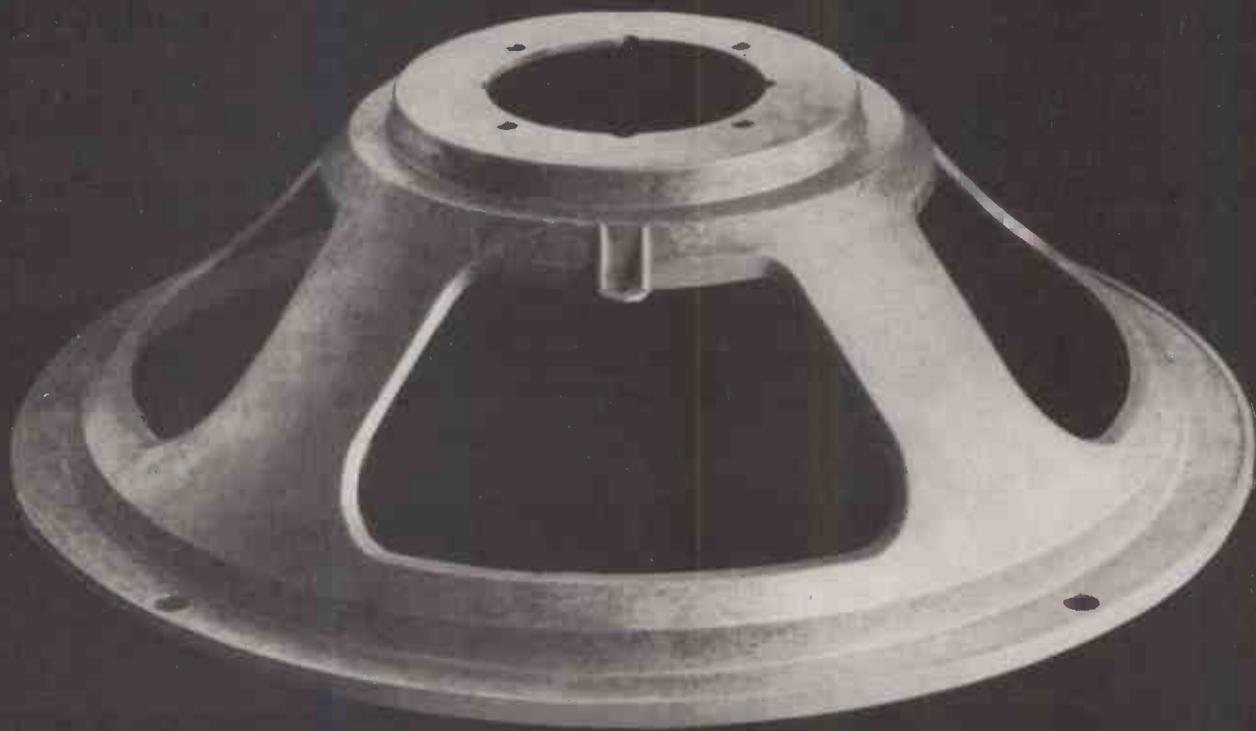
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RECORD REVIEWS

SINGLES



Simple Minds Waterfront Virgin VS636

In yet another sudden and drastic about-face, Jim Kerr and Company launch into an inspiring and evocative song that really ought to be in the Top Ten by the time you read this. New producer Steve Lillywhite has obviously played an important

role, allowing the band considerably more freedom than did his predecessors, while drummer Mel Gaynor (himself a relative newcomer) gives the track tremendous weight with some splendidly powerful percussion runs.

The rest of the band play with their customary zest and originality, while Kerr's lyrics spark off all manner of colourful and optimistic images.

The B-side is a live version of 'Hunter And The Hunted' (from *New Gold Dream*), but even this superbly played and recorded piece is overshadowed by the sheer glory of 'Waterfront'. The consistency of Simple Minds' recent recorded output has led their followers to expect a miracle with each new release, and this latest record doesn't disappoint.

'Waterfront' is only a taster for the new Minds album, due for release sometime early in the new year. On the evidence of this, it should be quite a record.

SPK Metal Dance Desire WANTX1

Much-touted in recent weeks by a music-press anxious for something genuinely new to write about, SPK in their present mood are light-years away from the band that made a truly cacophonous noise on a John Peel session not so long ago. 'Metal Dance' is easily their most commercial release to date, fusing 'Blue Monday' with 'I Feel Love' and adding a fair sprinkling of junkyard-percussion (the band's trademark) just for good measure.



It's certainly a powerful release, due just as much to some dynamic production work and a convincing vocal display by singer Sinan than anything else. The twelve-inch version I had for review was something of a disappointment, first because it lacks the disciplined arrangement of the shorter record, and second because the band's remaining members — Graeme Revell and Derek Thompson — have used the extra quality of vinyl to let their industrial car-door bashing run error so slightly into excess.

It's an important release — it may even make the lower reaches of the charts — but it still leaves SPK with some work to do if they're to fulfil the potential their followers claim they possess.

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Keyboards in Saga

Saga, Canada's premier progressive-rock band, recently concluded a long European tour at the Hammersmith Odeon. We spoke to Jim Gilmour, the main keyboard player (of three) in the band, about their recent album 'Heads or Tales', which was recorded over here and the keyboards they use. Jim was actually one of the first keyboard players to use the PPG and is something of a veteran with the system now. Interview by Paul Wiffen, Photography by Sally Newman

"The PPG is one of the fundamental items of my set-up, both live and in the studio. I am actually the importer in Canada. I was very disappointed actually because Wolfgang (Duren of PPG) didn't manage to send me a Waveterm in time for the recording of the album, which I needed badly. This meant I wasn't able to do any sound sampling in the album recording sessions. So instead I had to use the AMS DMX-15-S digital delay (which can freeze a sound up to 3.2 seconds with a 18 Hz bandwidth and then be externally triggered), but this means that there are sounds on the album which I couldn't store and use live, because they were sampled by the AMS. So I got my partner Jim Burgess to come over from Canada and help me out, because I haven't had any time to play with the Waveterm what with touring, writing and rehearsing. Anyway, he came over and dumped a whole load of things from tapes, samples and the like and then my Waveterm didn't arrive in time for the tour. So I have had to mess around with my current programs and generally 'play it by ear' as far as live performance is concerned. Still it's good practice for programming.

The problem is, of course, that PPG is really taking off world-wide now. Suddenly everybody wants them, which is good for them but no so good for me as I have to join the queue of people waiting for the instruments.

I have used both the Wave 2 and the Wave 2.2 on stage for some time now and I just love them. The real beauty is that anyone who has a PPG, whatever kind of feel you want, you can get your own personal sound, which is different from anybody else."

(For those of you who are unfamiliar with

the PPG system here is a brief look at what it does. The original instrument, the 360 Wave Computer, stored 30 banks of 64 digitally-created waveforms (nearly 2,000). These could then be manipulated and ordered to produce timbre changes. This made really complex sounds available but was a little difficult to use live, so the Wave 2 was introduced. This used the same basis for digital sound creation, but the resultant waveform could also be processed through an analogue-type section with eight VCFs, triggered from a keyboard or an eight-note polyphonic digital sequencer. The next product was the Wave 2.2 which not only had all the features of its predecessor but was also compatible with future products, the Waveterm and the Expansion Voice Unit. The first of these allows natural sounds to be sampled (and manipulated in an analogue manner via the Wave 2.2) as well as pure additive synthesis (building sounds out of individual harmonics). The EVU allows the system to be extended to 16-voice polyphony and has a 12-bit Sampling Memory. For more extended information on the PPG system, see E&MM, Feb 83).

Moogs

"My other main instrument is the MemoryMoog. I use two of them on stage, to do the strings and brass-type parts. They're great but they do break down quite a bit. Tuning can also be a problem, but we have to have them really, because our sound is a Moog sound, we've always had Moog oscillators in our sound.

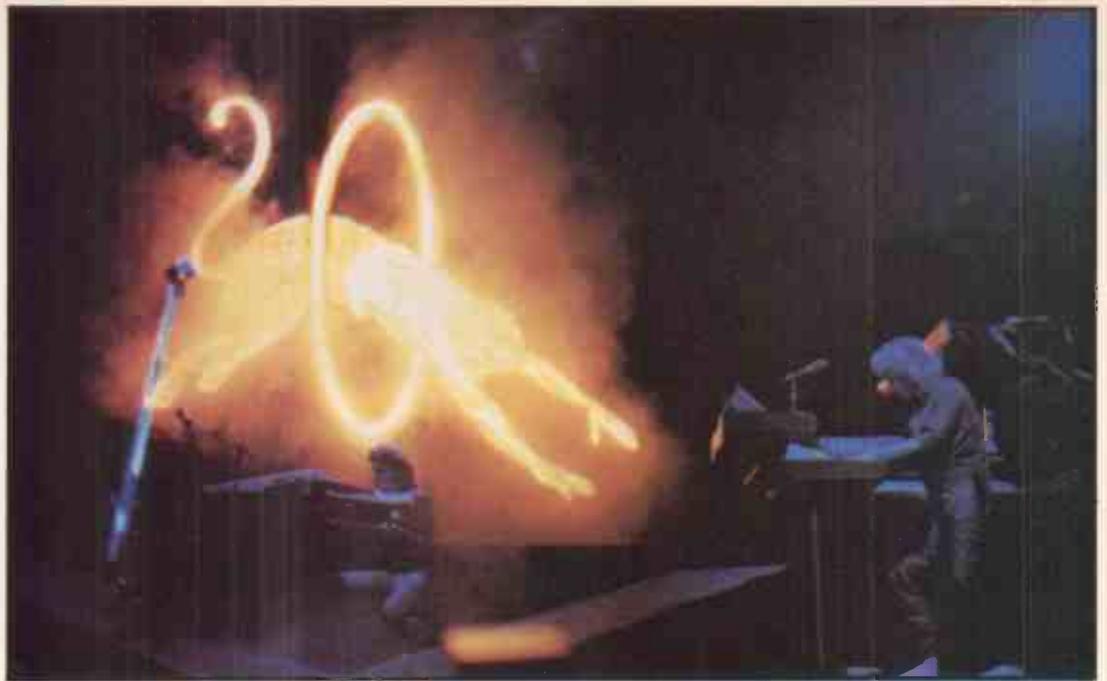
We have three of them on stage. Mike (Sadler - lead vocals and keyboards) re-

placed his Mini-Moog with one, and I have two, although I still use a Mini-Moog on stage. At one point we went out and bought a whole bunch of Sources, with the hope of replacing all the Mini-Moogs which didn't give us program storage. But we weren't happy with them at all. You couldn't solo on them, because you just get up to the top and the keyboard runs out, and I just didn't like the sound of them, they don't sound like a Moog at all. The sequencer is unusable, with the glitch every time the thing loops.

Jim Crichton, who plays all the bass parts (guitar and synth) uses a Jupiter 8 and Multi-Moog. Mike's set-up, which I use from time to time in the set (on 'Scratching the Surface' for example which is my lead vocal), is a Yamaha Electric Grand with a Memory Moog on top. I also use a Liberation for the posing and showing off. I don't like the sound of it that much but it allows me to get out stage front. It has one nice feature, the performance control of oscillator sync, but what I would really love is if I could hook up the Liberation keyboard to the Mini-Moog. I've tried to devise various ways of doing it but it's impossible. I can't even do it with the Memory Moog. There are some really neat sounds I have found on the Memory Moog which I'd love to solo with out front using the Liberation. They really got the sound right on the Memory (unlike the Liberation) and now they've got a retro-fit sequencer (a proper one this time) and MIDI interface coming out.

MIDI

Hopefully next year, I'm going to get all the keyboards linked in to MIDI. Instead of everyone rushing around from one set-up to



another, if they could just press a button and get the sound they want triggered from the keyboard in front of them, it would make life a lot easier. And if we could get all the keyboard sounds loaded in and set up for the beginning of each song. At the moment we use Walkman's to cassette-load sounds but a controlling MIDI system could make that all automatic. Into the song we could make our own setting changes but just to know that everything is ready waiting to go would be so good. It would make things go so much smoother on stage. You'll see me on stage at the moment with my flashlight in the dark scurrying around thinking to myself, 'What number am I supposed to push?'. I do have all the numbers written down but seeing on a darkened stage is sometimes a real problem. Actually during songs I make a lot of setting changes, so I wouldn't like that to be done automatically. I like to keep control of the editing slide of the sounds, but to have the starting point sorted out would be such a relief.

The MemoryMoogs help a lot here because they have chains of programs. I use them particularly on a couple of songs where I have to make a lot of program changes and haven't any hands free. I just press 'advance' each time and also the 'backwards' step. You can do this with the new PPG as well, but I don't use the feature so much as when I'm playing a good PPG sound, I like to stick with it.

Of course, the electronic instruments in the band don't stop with the keyboard. Steve (Negus) uses the Simmons SDS5 on a fair number of songs, as it gives a more modern feel to some of the material, particularly on my song 'Scratching the Surface'. Steve is actually the Canadian importer of Simmons kits.

It might seem like Saga has got the Canadian musical instrument market sewn up, but we don't do that much business. We don't sell that many PPGs as it is a fairly expensive system, but a lot of the bands want to have them, it's a sort of status symbol. I really wanted the distributorship so I could control when and how I use it. If I wasn't doing it, someone else would be and then I would be restricted by when they could allocate me the equipment. There's not really all that much money to be made, but it's fun and it keeps my partner Jim Burgess occupied full time. He spends all his time on that. Stevie Wonder flies him down all the time to help him program the two full systems he has just bought. I am

also looking at the new British synth, the Oscar. They tell me it can sound just like a MiniMoog, a real full sound, so I'm getting one over soon. I might even use it to replace the MiniMoog on stage so I don't have to change sounds manually.

Guitar Sounds

Ian, our guitar player, uses a Roland Jazz Chorus amp for the nice mellow sounds and Mesa-Boogie for the lead lines. He uses a footswitch to move back and forth between them. His main guitar is a Les Paul and he uses a digital delay to control his own echo. His set-up is really simple. He never really got into guitar synthesis as we have enough synth sounds at our control. Ian is the one in the band that brings us out of zzz... sleepy keyboards and really rocks. He's a great soloist and gives the band a lot of bite.

The only person I've ever heard get a good sound out of that Roland guitar synth live is Pat Metheny. I couldn't believe it, it was just beautiful. But it's not really right for our music. I couldn't believe it when I heard that Eddie Jobson had joined Yes (*— he has now left again — Ed*). I just loved his solo album 'Zinc', he's such a great player. But he shouldn't have sung — it sounds like he's trying to imitate Jon Anderson. It's strange because we may be opening for Yes in the States when they tour there next year. It

really freaked me out to see he only used a MiniMoog and a CS80 on that solo album. I talked to him when we toured the States with Tull last year, he came backstage to watch. He didn't even know what a PPG was. I told him he ought to try and keep up with new developments, but if he can make those sounds with a CS80, then perhaps he doesn't need to.

I loved the CS80 but it broke down all the time. I had to try and find something that was close to the CS80, big sound, touch sensitive and versatile, and so I settled for the PPG and MemoryMoog combination. But to see Jobson on stage with a CS80 is a real education, because he's changing those fiddly little manual presets all the time.

We all live in the Bahamas now. I live two doors down from Robert Palmer. I sold him a PPG system too, so I can work on his while I'm out there. Keith Emerson lives on the island too, but I'm still trying to find out his address. It seems to be a closely guarded secret. There's a good musical community down there, it's great! I haven't met any of them yet, as we moved down there in August when everyone else was on tour.

Recording

As far as recording goes, we are settled into working in England, ironically enough as our records sell less here than in the





States or Europe. But this is the second album we have done with Rupert Hine at Farmyard Studios in Little Chalfont. He's really great to work with, particularly for the keyboard player. He helps you find the right sounds and really makes you think about why you are using a certain sound. I introduced him to the PPG two years ago when we were doing 'World's Apart' (in the same studio). He'd never heard of it. I think I was one of the first people to record with it, because after 'World's Apart' everyone was asking where I was getting these sounds from. And that's no great boast on my part, for most of them were the factory presets and they're just so good. I still like to work from them, adding a bit, changing a parameter here and there, rather than starting from scratch which takes so damn long. Editing sounds is much more immediate and it gives you a jumping off point, something something to work with.

When we hit the studio we have most of the music worked out and rehearsed. In the studio I spend most of my time at the board, at the AMS and programming the synths. Solos are improvised and stuck down as they are, once the sound is right. Everything is worked out arrangement wise. However, lyrics are never written before we go in — they are always last. Sometimes we have to rush around writing lyrics to finish a piece, so we can get the vocals down.

When we're writing and arranging the song, I know the sort of sound that's wanted, but the studio is where we (Rupert and I) narrow it down. Rupert's particularly helpful if I don't know what sound I want. He'll get his tape of sounds, load them in to the PPG and see if there's something suitable from which I can work. Again I like a base to start from. I'll hear something and say 'I like that but I'm going to change this' and so on.

We all play the basic tracks together to get a tight feel. In fact, there's a lot of keyboard parts I kept when I could have redone them, just because they felt good. Obviously I often went back and worked on the synth sounds that weren't suitable but we kept a lot of the original parts. We concentrate mainly on the drums. If they feel good, then we go for it. Actually, Steve Taylor (the Farmyard's house engineer) knows exactly where the mikes should go and it takes him no more than an hour to get a good drum sound. Sometimes even a house engineer can spend two or three days just working on a snare sound, which is stupid. but drums are still the essential. By playing with them you get a live feel, and you've got to make the album sound as live as possible even if there's a few mistakes (which probably won't get noticed). The big problem with a lot of the Seventies bands,

and a trap we often fell into until we got together with Rupert, was that the drums went down first on their own. None of us would even play along. Steve would have to memorize everything with no musical clues. Then we'd be going in at different times, putting layer upon layer of keyboards, which is not really effective, because you miss out on the subtle interactions in a live situation. You can end up with so many layers of string sounds nobody can tell what's going on. It's better to have one good sound with lots of space.

Video

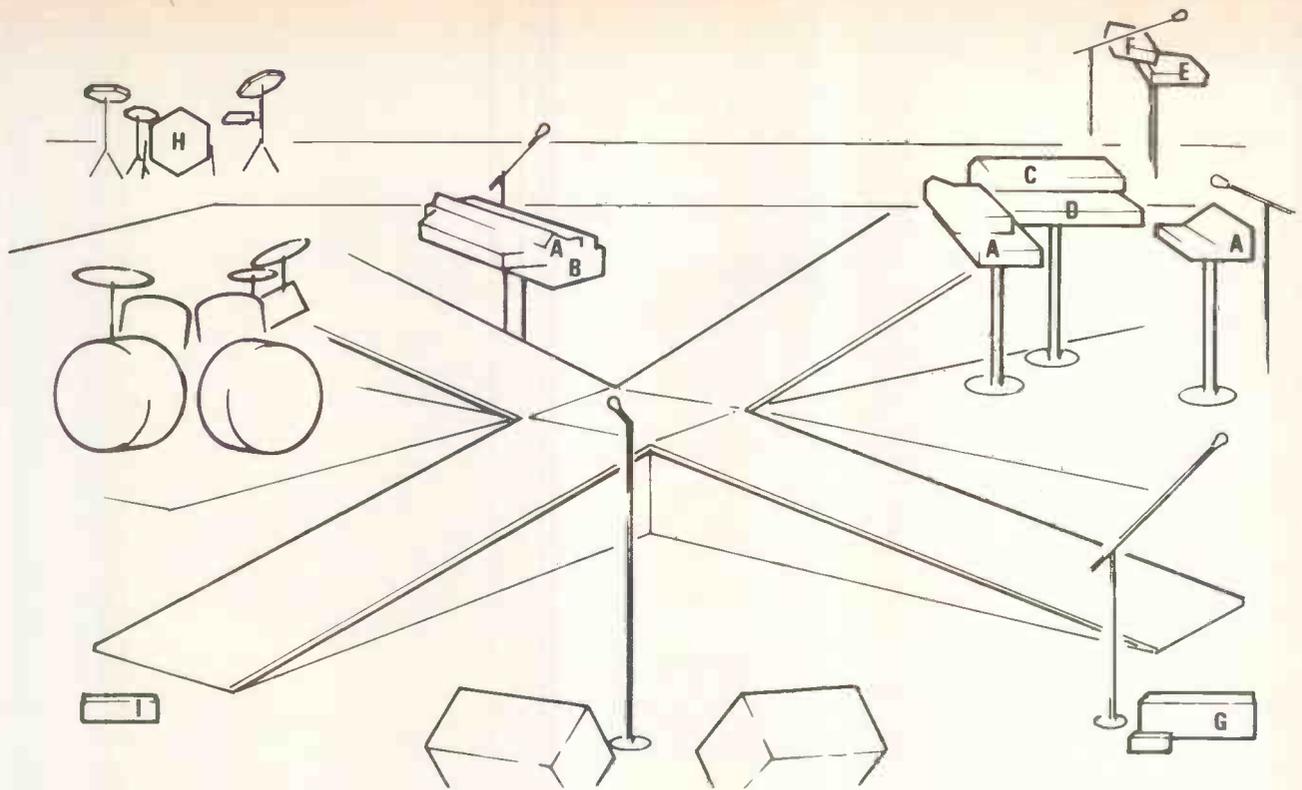
People have been telling me while I've been over here that a real old video of the band was shown on a late-night spot not so long ago. It must have been really old as it was from long before I joined the band. I wish they hadn't sold off that old thing, why did they do that? We've just spent a small fortune making really good quality promo videos, why didn't they use those? We've done a video for 'Flyer' and 'Catwalk' and we're just about to do one of my song 'Scratching the Surface'. We actually use videos to promote the album, not just the 'flash-in-the-pan single' mentality. We're still very much an album band, but you've gotta have a single. Record companies won't touch you unless you've got a single. In England the problem is really bad. If you haven't got a single, no-one hears you, because you have no FM stations playing albums. That's why the big English bands seem to have so much trouble. Jobson weaving around trying to find a stable unit and now John Wetton got fired from Asia. I couldn't believe that.

I hope John comes to see us tonight, he's quite a big fan of ours. In one of the Canadian interviews he did he was talking about us. Be interesting to get his reaction to the new material and the show.

The Concert

We have just done seven weeks in Europe (sold out) as part of our World Tour. Tonight is our first headlining show at Hammer-smith. We haven't really done much in England, I'm a bit ashamed of our previous record companies. Hopefully the concert will change things and now Maze (UK) seem to be fully behind us.

I hope the British audience are going to like the show tonight. We've had great reactions elsewhere in Europe, particularly to the new light show. We've got this great screen with polarizing filters to change the colours in computer controlled patterns (see photos). We bought it from the Yellow Magic Orchestra. We've also introduced radio mikes and transmitters for guitar and Liberation signals which makes us a lot more mobile. We still do the old favourites like 'Careful Where You Step' and 'Take It or Leave It' for those faithful few who've followed the band from the start, but we're hoping the new material will really take off over here. We love coming here and we find



recording here produces great results. We'd really like to go down well tonight."

The concert was in fact a triumph, a surprise perhaps for some of the media, but not for the hard core of Saga fans who had travelled from all corners of the British Isles to see the band. They were certainly a lot more exciting visually with the introduction of the radio leads and musically they sparkled. The duets between Ian Crichton on guitar and Jim on Liberation raised

sparks. The sheer versatility of all the musicians in the band was impressive with everyone constantly shifting between different instrument set-ups. They came back for three encores afterwards and even then there were calls for more. Listen to the album (reviewed on page 46) if you missed the gig and try to pick-up one of the first batch with the free live single to give you some idea of their on-stage performance.

Paul Wiffen

E&MM

Key to Stage Layout

- A MemoryMoogs
- B Yamaha CP80
- C PPG Wave 2
- D PPG Wave 2.2
- E Roland Jupiter 8
- F MultiMoog
- G Moog Taurus Pedals
- H Simmons SDS5
- I Guitar Effects Controllers

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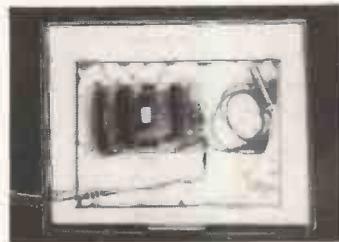
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OZZY OSBOURNE Hammersmith Odeon

After the Dio review of last month, could we really leave out a review of the Ozzy Osbourne tour? Whether the two vocalists actually consider themselves as rivals is doubtful, but certainly their careers and followers do

overlap, so it was interesting to see how the two ex-frontman of Black Sabbath compared.

As soon as the stage lights came on it was quite evident that there were similarities, the backdrop at both Dio and Ozzy were of evil and strange scenes, characters with eyes that lit up red, though Dio's devil looked like a streamlined, space-age one, whilst Ozzy's looked like a bemused goat. One of the more obvious differences between the two performers is that where Dio's stage set was by far the more exciting, Ozzy had the better lighting system, with operators from Tasco who knew its full potential. In fact Ozzy did not appear on stage straight away, instead classical music was played while the lights were used to give an exciting and fascinating display, a nice way of boasting really. The psychology of this move certainly worked and that and the band's skill and enthusiasm carried them through the first couple of numbers from 'Bark at the Moon' before the drummer (yes you've guessed right) did a solo.

But Garlin Appice is a showman drummer, who is sensible enough not to be self-indulgent or entertaining only to other members of the percussive species in the audience, but instead entertained us all, again with the help of the lights.

"Bark at the Moon" proved the

first real highlight of the gig, the backdrop changed to Ozzy made up a werewolf, perched, howling at a pulsing moon, and all the power and interest which the band had generated for the first two numbers but which had proved all too short lived, returned with a vengeance as they smashed into their Magnum opus. On a vast bank of keyboards Don Airey showed that he was extremely noticable musically even if the placement of the keyboards on the stage prevented him being visibly entertaining, but then again, few keyboard players are, (are they shy?).

Jake E. Lee however made up for Airey's hideway, in his solos there were all the great rock and roll excesses. He seemed to use every single one of the classic guitar poses, the usual guitar held vertically, the perennial dropping to knees etc. This isn't a knock, he is very entertaining, in fact amusingly so, and while his guitar playing live isn't all that memorable, he certainly proved a competent foil for the Moinman. Bass player, Bob Baisley, provided a solid grounding in which the rest of the band could flourish, confident in his reliability.

And now onto the frontman, vocalist and man who has the title role, Ozzy. Ozzy has always been an instantly recognisable vocalist, if not always a constant one. His singing tends to be occasionally out of

tune, but even when this happens, he is always effective. During the tour four dates were cancelled (imagine a werewolf with a sore throat!) because of bronchitis, and some dates on this tour have been a near run thing. I couldn't have guessed it. If he was having problems he hid them very successfully, singing better than some recording he's done. The track that he excelled on, and indeed that applies to the rest of the band too, was "Paranoid", the old Black Sabbath hit and their final encore and it was here the Tasco crew really showed their style.

The sound was absolutely earsplitting - but every note was heard. The kings of the Mega PA keep their crown once again.

But an essentially classic set from a polished performer. Ozzy Osborne is very likely to make a great success of the new LP, single and World Tour, but on that cold night in Hammersmith he proved that he's a lone wolf, in every sense, and it was his right to howl...

Dot Willig

E&MM

The Equipment

Sound rig supplied and built by Tasco, 14 stack Harwell rig adding up to around 25KW. (Sound Engineer Morrey McMillan). Lighting rig also built by Tasco, comprising over 300 Parcans, 4 telescan lights and 6 servo controlled lights (among many others). (Light engineer Ian Peacock).

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HAWKWIND

A ny retrospective of the past 15 years unearths a strange confusion, a maze of changes, bewilderingly rapid. Tastes have come and gone, ideas have been tried and failed, tried and succeeded, and over all is the flowing transience that makes the whole thing so damn interesting.

But in one corner of the flow, in a strange little eddy in the musical current, Hawkwind remain just the same as they were 15 years ago. The 'family' of friends, relations, and hangers on still clutch at their coat tails, they still tour with massively overblown stage shows, and they still play Silver Machine. And all this has to be seen in the (red) light of their bank balance. Hawkwind are broke, and have seldom managed to lift themselves out of penury. But, they were the first (and some would say the only) space rock band to break out of thrashing chords around the college circuit, and to take the whole idea of their personal mayhem out into a public that accepted it as just another fashion. Predictions of their imminent failure began almost the day they started, but apart from brief interludes in the flow, they are still as strong as ever.

The nucleus of the band, Dave Brock, Huw Lloyd-Langton, and Nick Turner remain, and, with some surprise, they have recently begun work with erstwhile front-man and strange poet Bob Calvert, and have also reforged their links with sci fi aficionado, Michael Moorcock.

We met up with Dave Brock and Huw Lloyd Langton just after the release of their new LP 'Zones' – though they were also in the planning stages of recording a new album to coincide with the tour.

So who are Hawkwind now? The puzzling personnel changes that have chronicled the band's career remain as baffling as ever.

D.B. "Well, we seem to be back to the old nucleus through trial and error, a lot of people have come and gone, but we feel that the basic members that count are still here and that we have one of the best lineups now that we ever have had. The tour in February is going to be very exciting for us – we have Bob back with us, and Mike



Moorcock, and even Lemmy has shown an interest. It's going to be under the title of *Earth Ritual* . . . and it follows on from the early roadshows that we did, like the *Space Ritual* one. We have very specific lighting ideas that we'd like to use for *Earth Ritual* basically to get away from the overhead lighting that we've always had, and to light the stage from below, while above we will have a laser – a sort of earth and sky idea. The lighting is a very important part of the set, and we like to get that sort of staging sorted out before the rest of the planning."

Well known for their extravagant stage sets (the last tour featured the band playing inside a huge spaceship, complete with a bank of video screens on each side) *Earth Ritual* promises to be one of their most expensive to date, not least in the sound and backline equipment they will be taking as well.

D.B. "We have tried this time to get the sheer weight of gear down, it became ridiculous at one point when there were something like ten or twelve keyboards on my side of the stage, as well as the guitar equipment. I took a Jupiter 8 and a Korg 800DV duophonic, a few analogue sequencers all wired up, and a few extra gadgets like the guitar equipment. Harvey Bainbridge also

took some keyboard with him – he had a Moog Source and another Jupiter I think. We were basically a four piece band, and to try and look after all the keyboard equipment at the same time as playing the guitar, and singing became just too much. It can be done of course, but you will spend a lot of money to get there."

H.L.L. "We seemed to spend more time rushing around the stage keeping tracks on everything than actually playing! But, yes, it has been done – Rush for example where Geddy Lee triggers the keyboards from the bass guitar. There were also the problems with space on the stage – with Martin playing the drums, he was so loud and had his monitors up so loud that I only had to walk out of range of mine and all I could hear was these drums pounding away . . ."

Well known for their synthesiser sounds, they have gone through legions of different keyboards over the years, though the changes have not really been audibly noticeable.

D.B. "I used to have a whole battery of Korg equipment including the Lambda, and I also used to have a beautiful VCS3. Sadly, that one got so damaged on the *Sonic Attack* tour I vowed never to take it on the road again. I even managed to break the



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Jupiter 8 at one stage – I really don't think people have an idea of what the equipment goes through on the road, and they really aren't built for it.

"Nick Turner recently took us along to see the Alpha Syntauri and I liked that a lot, but again we could only use it for studio.

"I really am very bad with equipment though, I tend to throw the manual out of the window and start to work on the instrument from my point of view – which is push it and see. But I'm convinced that if you do follow the manual through you will end up sounding like everyone else – by not following it through to the letter you get a whole new perspective on the instrument and how to use – or abuse it!"

The unique sounds that Hawkwind produce on their records is the product of years of experimentation. Originally they started with an extended live set in the studio, which was then cut down and edited to form the basic tracks. Nowadays they take a more scientific view.

D.B. "With *Sonic Attack* and to a certain extent *Choose Your Masques* we did the recording back to front. We didn't have a drummer at the time." H.L.L. "Yes, we used drum machines and the sequencers for them, and the drummer came in afterwards to put the overdubs in."

D.B. "The drum machine was the little Roland TR606 which is great. I use it at home now, just turning up the bass drum and the snare to get a rhythm and then play on and on over it."

One of the main problems that has dogged the band has been their financial plight, the extremes of the stage show, makes even meeting up difficult – the cost of transporting their various loads of equipment across to Dave Brock's farm becomes ridiculous. Instead, they now work on their

material at home, and meet up for rehearsals either while recording takes place or just before the tour is about to start.

D.B. "It's all down to portability. I'm there with 'X' tons of gear, and Huw wanders in with his little combo and his guitar..."

In actual fact, things are not quite that simple. Huw explained:

H.L.L. "Basically I use three guitars, a Gibson Les Paul 20th anniversary, a Gibson Howard Roberts Fusion, and the Roland Guitar Synthesiser. The synth is great, and it means that I don't have to take many effects units with me – I can just use a Roland Space Echo and leave it at that. The amps are the Roland Bolt 60 combo which I'm pleased with because I like valve amps, and I like them loud!"

Huw is also working with his own band at the times when Hawkwind are off the road, his single *Wind Of Change* (released under the name of the *Lloyd Langton Group* charting, as did a single from Dave Brock as a solo project, called *Social Alliance* which also appears on the 'Zones' LP. Collectors take note). In fact their vinyl output is a shady area of official releases, 'semi official' releases and straight bootlegs that would make any sort of authoritative discography nonsense.

D.B. "Keeping tracks on what is out got very hard after about 1973. Then the cassettes started coming out, and we hardly seem to do a gig these days without it coming out on 'special edition' tapes a few days later. Some have even got to the pressing stages and look like real albums. It gets jolly distressing! But I can't see how you could ever stop them. Of our own 'real' albums there's also a few strange ones like *The Text Of Festival*. I did the cover, and we knew it was coming out – but we never heard any of the tracks before it was

released. Then these are the compilations... loads of 'em!"

The talk of the various compilations led us to talk about the way that the bands stage show contains those 'obligatory' numbers.

D.B. "We don't really play that many 'old' numbers, simply because they are always changing and we think of them as just another track – timeless sort of thing. I know they run a poll in *Hawkfan* (the Hawkwind fan club newspaper) to find out what peoples favourite tracks are, and then we take the list for the shows from that! That's what the people want. It would be sad to go and see a band and all they played was either the new album or really obscure things – something we used to do I know, we got to the point where we would actually refuse to play 'Silver Machine'. That bothered a lot of people, so we just had to go back to playing it – and the others. I suppose all we are trying to do is write new classics!"

Our talk ranged over the long and interesting escapades they have all been through over the years, and the members past and present who made the Hawkwind legend what it is today. Like the Bob Calvert era...

D.B. "Times with Bob were strange – but a lot of fun. He's changed a lot now, put on a lot of weight and he's incredibly out of practice. We found that out the other week when we had a play together. He'll get it right in time, as long as we use him for a few poems or something, just as long as he doesn't get over excited!"

And so, as we enter 1984, it seems that a few more people are going to get over excited over a band that has seen an awful lot of bad luck – but an awful lot of fun as well.

E&MM

Tim Oakes



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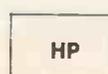
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Sharply Digital

An almost too-good-to-be-true digital tape recorder has recently been demonstrated in prototype form by Sharp at an AES exhibition in the States. This CX-3 Digital Audio Processor uses a standard compact cassette format, with the normal speed and playing time of conventional analogue recording. However, Sharp claimed to have squashed the mind-boggling number of 18 tracks onto the 1/8" tape, including 16 for digital audio, one for control purposes, and one that's doing nothing in particular. Audio input is digitised at the compact disc standard rate of 44.1kHz, and then apportioned to a cassette track at the rate of 70.6 Kbits per inch. This means that the CX-3 stores 1.4 gigabytes of data on a single C-90 cassette! Quite how Sharp get around the horrendous problem of drop-outs on such narrow tape is beyond me, but you can bet your bottom dollar that there's some hard-working error correction circuitry involved somewhere. So far, there's no indication when the CX-3 is to be launched on the unsuspecting world, but we're keeping our ears glued to the grapevine.

Kurzweil Keyboard

Readers will have seen the Kurzweil 250 digital keyboard mentioned in the NAMM show report in the August '83 issue of E&MM, and the tag attached to it was 'the most exciting new keyboard'. From what I've heard since, I don't think that's any exaggeration. The point about the 250 is that it takes a really significant leap forward in terms of current sound sampling techniques. Any fool can design a system that'll sample away for all it's worth into a chunk of memory, but anyone who's been following the speech synthesis story will know that digitisation techniques don't fit that happily into a world where only limited amounts of RAM are available for sound storage. What's commonly used, then, is some form of data compression technique. The current favourite is linear-predictive coding (LPC), a process whereby the formant bands of speech are coded, speech event by speech event, so as to provide instructions to a digital filter that then reconstructs those formants when the stored speech data is decoded.

So, why not do the same with the harmonic (or otherwise) components of musical sounds? Well, the main problem is speed — both as regards the wider bandwidth of sound in a musical context, and the complexity of timbral changes encountered over the range of the average acoustic or electronic instrument. What Kurzweil have done is to use principles of Artificial Intelligence, incorporated in the earlier Kurzweil Reading Machine, to capture the changing timbre of an instrument for the entire duration of a note, in all registers, and at all loudness. According to their publicity info, the 'sound complexity' captured by the 250 is 'at least 200 times greater than that of most other digital keyboard instruments'. That's what they call 'Contoured Sound Modelling', and I reckon that they must have some sort of musical equivalent of LPC working for their greater glory if those claims are actually borne out in practice.

One of the most boasted about features of the 250 is that it's able to 'perfectly recreate the sound of any acoustic instrument', including the duplication of the feel and response of a piano keyboard. Well, be that as it may (and until units are available for hands-on experience, that's a rather large 'may'!), Kurzweil do seem to have made an effort to extend their rigorous approach to other areas, particularly when it comes to the usability of the thing. Rather than adding on something like an MCL as an afterthought, Kurzweil have developed a special language called 'KMS Language' which they claim allows the creation, storing, editing, and use of the most complex sequences; the creation, modification, and combination of even hundreds of waveforms, amplitude, and filter envelopes; the use of the 250 to sample and analyse sounds, and the real-time transcription of keyboard performances onto a VDU screen.

One welcome aspect of the 250 is that it uses a host personal micro for most of the display side of things as well as some of the input and output of sequencing. The micro that's receiving most attention from Kurzweil is the Apple 11e (surprise, surprise), but no doubt the Commodore 64 and IBM PC will also figure somewhere in the story. The likely price of the 250 is something of a floating voter, but 'under \$10,000 and delivery in early 1984' is what Kurzweil are hoping for. So far, a UK dealer hasn't been decided upon, but, for more info, Kurzweil Music Systems can be reached at 57 Wells Avenue, Newton Centre, MA 02159. USA (Tel. 617-244-2121).

Simply Syntauri

Syntauri have never been a firm to hide their light under a bushel, and, on the front cover of their latest brochure, they serve up a generous dollop of hype ('alphaSyntauri — A new age in music/Infinitely simple to use/Simply infinite in capability/Limitless as the future'). Heavy stuff! I wonder whether they've ever heard of the Trade Descriptions Act over in the sunny climes of California?

Still, Syntauri do seem to have something interesting to offer as regards their recently released 'Simply Music' software. Twee title apart, the idea seems to be to provide the user with a visually interactive way of learning to play a keyboard. Aside from the usual thing of being able to record and play back pieces with different instrumentation, two methods of display are also offered: one with a display of a keyboard and the other with more-or-less conventional musical notation. So as to make the best use of these options, a variety of learning methods are available, including what Syntauri call 'Quick Play', 'Traditional Piano', and 'Improvisation'. Sounds a good idea, really. We'll take a look at this when we get around to reviewing their multitracking Metatrak software.

On a rather more bizarre front, Syntauri are also plugging their 'Dolphin Dialogue', a curious piece of software for the Apple 11 and Mountain Music. System cards that 'lets you experiment with sounds very much like those dolphins use to communicate with each other (and someday, we hope, with humans!)'. If I were a dolphin, I think I'd forget about leaping in the air for fish and tell Syntauri where to get off.

For more information, contact Syntauri Co., 4962 El Camino Real, Suite 112, Los Altos, CA 94022, USA (Tel. 415-966-1273), or their UK agent, Computer Music Studios, at 62 Blenheim Crescent, London W11 (Tel. 01-221 0192).

Time

Technology in Music Education is a group that has been set up by Joe Telford and Alan Smith with a view to 'the collation and dissemination of software, schemes, and hardware relating to music education'. TIME stems from a conference that was held in Southampton in April 1983 when various speakers discussed software and hardware developments that might form the basis of a future and more systematic use of micros in music education. One idea that's being voiced is the circulation of 'recommended' software amongst schools and colleges, and TIME is actively seeking suitable CAMI programs. So, anyone interested in any aspect of TIME is invited to contact either Alan Smith, at 7 Francis Close, Lee-on-Solent, Gosport, Hants, PO13 8HB, or Joe Telford, at Cleveland Education Computer Centre, Pressick Base, Marton Road, Middlesbrough, Cleveland.

More MIDI

Yet another MIDI program of Germanic origin (we haf vays of making you sequence . . .) has arrived on this Computer Musician's doorstep. This goes by the name of ARTEC, runs on the 48K Spectrum, and comes from a firm called Heart based in Dusseldorf. Good name for a firm with a program that beats away relentlessly . . . Basically, ARTEC is a 16-channel sequencer program aimed at both the non-real-time and real-time side of musical life. It's encouraging to see that the software seems to be well-designed as far as idiot-proofness is concerned. For instance, it provides instant feedback of entered notes, enters and calculates bars automatically, signals the input of incorrect note values, and generally (to quote from an information sheet full of wonderful mis-translations à la Japanese) 'esteemes faultless scores'. Don't we all . . . ARTEC also displays these scores in conventional notation and will print them out singly or en masse if that's what takes your fancy.

Various interface options are available for ARTEC. Firstly, there's the MIDI version, which provides up to 16 channels, 1 analogue I/O, 1 sync-to-tape, and 2 trigger channels. Next, there's the A interface, which gives 8 analogue (CV) channels, 4 trigger channels, and a sync-to-tape. Lastly, there's the option of the P interface, a 2 channel 8-bit parallel interface for those synths (the Chroma Polaris with the Triad interface, for instance) that let you get to the heart of the matter.

ARTEC is being imported by Ultra Design at 408 Richmond Road, Kingston-upon-Thames, Surrey KT2 5PU (Tel. 01-549 9310), though don't expect instant deliveries, as Heart are still gearing-up their production line. Also, no UK price has been decided upon as yet. Heart themselves can be reached at D-4000 Dusseldorf, Chemnitz Str. 47, West Germany (Tel. 0211-27-36-05), and the retail price (in Germany) that's being quoted for the system is 1,680 DM (around £420). If that seems a mite expensive for a MIDI interface and software, bear in mind that the hardware comes in a stage-proof, artist-designed plexiglass box, and includes such extras to the basic MIDI interface as a Z80A, RAM (for sequence storage away from the Spectrum), EPROMs loaded with software (meaning that ARTEC is always ready and waiting to do its owner's bidding), some timers, and space for future expansion and addition of other interfaces. Not surprisingly, we're itching to get our hands on one for review purposes.

David Ellis

CM



Soundchaser Digital Computer Music System

Passport Designs' Soundchaser Digital is another entrant in the 'turn your apple into a personal recording studio!' stakes. Whilst such claims make good advertising copy, it's not always clear that 'they' and 'us' have the same expectations of what a digital recording studio should be capable of. So, basically, tread carefully through the hyperbole... I mention all that for the simple reason that some of Passport's advertising (that on the inside cover of *Computer Music Journal*, Vol.6 No.3, for instance) goes a bit over the top (visually, anyway), and that's unlikely to have helped their reputation as purveyors of a 'serious' computer music system.

Bits & Pieces

To get your Soundchaser studio up and running, you'll need an Apple (II or IIfx) — preferably with a 16K RAM card (for increased note storage), a disk drive, the Mountain Computer MusicSystem digital synthesiser boards, the Soundchaser 4-octave keyboards and Passport's 'Turbo-Traks' software. Ere we go deeper, some pricings might help to put things in perspective. Firstly, as far as basic performance is concerned, there's nothing (I think) to be gained from going for the over-priced Apple IIfx. That doesn't stop some people from thinking there is, so there's now a surplus of Apple IIs that people have traded in for the IIfx. Because of that, it's relatively easy to find an Apple II for around £400 and

disk drives for around £200, which adds up to a pretty fair deal when compared with BBC Micros and the like. Mind you, it helps to have a tame Apple engineer to check that such bargains aren't rotten to the core!

Moving to the MusicSystem boards, here one is helped by the price cut that occurred about a year ago. When I plumped for this product in 1981 (after reviewing it for the May '81 issue of *E&MM*, in fact), the MusicSystem cost the princely sum of £425. Now, it's easy enough to pick them up for just over the £200 mark, which, for 16 digital oscillators that are separately programmable for frequency, amplitude, and waveform, and then summed into stereo outputs, is pretty good value.

On to Passport's own products. The basic, ground level system is the keyboard plus '4-track performance software', which sells for £649 in the UK (\$795 in the USA). This provides 4-track recording and offers an excellent introduction to many aspects of digital synthesis (this was the version demonstrated in the studio on 'Making the Most of the Micro'). However, in this review, we'll be considering the next stage up in the form of a software addition called 'Turbo Traks', which sells for £220 (\$295). That's expensive by home computer standards (though of average cost when viewed alongside professional or business software), and one has every right to expect a good deal for that amount of investment.

The other thing to bear in mind is that the software upgrade effectively puts the

4-track version you got with the keyboard, into the bottom drawer! As all the keyboard consists of is a standard synth-type keyboard, wooden case, and an interface card with 3 chips on it, one's forced to the reluctant conclusion that buying the upgrade has turned an expensive keyboard into a very expensive keyboard. In fact, a £649 keyboard. It seems a bit rough that one can't buy the keyboard alone and then add on whichever software package you choose.

Booting Up

The first thing you should do on getting the system is read the manual, as this tells you in which slots to put the keyboard interface card and MusicSystem boards. In fact, as the software stands, it's configured for the interface card to go in slot 7. That's OK for the States, but, for us owners of 'Euro-plus' Apples, it's a somewhat thick requirement, as that slot is designed to be the recipient of the colour card that's necessary for converting Apple colour to something that 625 line TVs and monitors can appreciate. With a bit of detective work, it's easy enough to find the memory location that holds the slot address for the keyboard, and then change this to a more convenient slot. But having to do that before you've even got a squeak out of the system isn't exactly conducive to customer satisfaction, and Passport deserve a rap on the knuckles for being so unthinking towards European users of their system.

Initial cursings apart, booting-up is gratifyingly quick and efficient because of the fast version of DOS (Diversi-DOS) that's on the system disk. The advantages of speeded-up DOS also rub off on the load-

input stages cope with the fast and furious transients that the MusicSystem boards seem to churn out with wild abandon. All that's of more than academic importance because of that troublesome little thing called noise. The fact of the matter is that those MusicSystem boards, clever as they might be, aren't too hot in the S/N ratio department, nor are they that reticent about producing quantization noise (a general level of grunge throughout the audio spectrum). None of this is Passport's fault (in fact, they probably make the boards perform as well as anyone could), but it does mean that one's working at a disadvantage, noise-wise, if the output level is set to anything less than maximum.

On the pitch bend front, the Soundchaser uses the keypress 'P' to select an upwards or downwards pitch bend and a games paddle (or a joystick) to actually implement it. Fine, you might think — but you'd be wrong! Apart from the limitation of not being able to bend up and down in one fluid movement (where pitch bending meets Jane Fonda, one might say), polyphonic bending is definitely out — unless you're after excruciating harmonies to give the avant garde a taste of their own medicine.

The problem is that the frequency offset read from the paddle is applied to all pitches in an identical manner. That'd be fine if there were the same number of Hertz between notes at the bottom of the keyboard as at the top, but, of course, there ain't. So, if you're playing a C at the bottom of the keyboard at the same time as middle C, and you then plunge in with an upwards pitch bend, the end result is hideously out-of-tune. In fact, the pitch bend is an excellent way of undoing centuries of equal temperament tradition, turning a well-tempered clavier into a bad-tempered clavier, not to mention achieving a similar effect on the part of the performer.

To get around this, the software should be scaling the frequency offset read from the paddle according to whatever pitches are being received from the keyboard. However, that takes a fair slice of the processor's action in such a time conscious situation as real-time digital synthesis, so one can understand why Passport have gone for a more simplistic approach to pitch bending. That doesn't make it any easier to live with, though, and the lack of scaling also applies to the modulation side of things. This means that a pleasant sine wave vibrato at the top of the keyboard becomes so gut-lurching at the bottom that a pack of Qwells becomes a handy addition to one's keyboard accoutrements.

Logical Oscillators

Switching our attention to the centre of the preset display (Figure 2 again), we're greeted with an array of crosses that's reminiscent of a plan of action for some military campaign. These crosses represent the assignment of the MusicSystem's 16 digital oscillators as 'logical oscillators', each with their own separate waveforms, to the 16 presets that we've already had a brief play with. In fact, any of the oscillators can be assigned to any of the presets by keying in 'P', the number of the preset, and then the required oscillator. This is actually a 'toggling' command, so doing exactly the same again will toggle that oscillator off the display.

Since oscillators 0-7 go to the left output of the MusicSystem boards, and 8-F to the right output, presets 0-7 (the left column, so to speak) are split across the stereo field. So, if you add some suitable ADSR envelopes to those oscillators, you'll then have some stereophonically-animated, dual-

oscillator voices providing eight-note polyphony.

The part of the display immediately above the preset battlefield sets out the ADSR parameters, octave setting, and modulation options for the indicated oscillator. This is where Turbo-Traks shows its flexibilities to good effect. Keying in 'E' (for 'edit') and a value from 0-F displays the parameters for each of the 16 oscillators. Entering 'C', followed by the first letter of the function you want to change, allows you to scroll through the hex values using the right and left arrow keys. What's more, you can even do this when you're playing the keyboard (tricky with only two hands) or when the sequencer's playing back (useful in theory, but needing a lot of self-organisation in practice).

The modulation options on the right are particularly interesting. 'WAVE FM' allows for the waveforms entered into presets to be modulated by one of four user-definable waveforms, either in a continuous or one-shot mode. The latter option means that one's at liberty to put sweeping pitch offsets within the body of a sound without being forced to have it repeat over and over again. Not only that, but, by setting different values of 'FM RATE' and 'MOD AMT' for the same or different modulation waveform(s) applied to the different logical oscillators in a preset, one can end up with some glorious delayed vibrato and mixed modulation effects. As the thoroughly ingratiating manual says with undisguised glee: 'Try that on your Prophet!'. Rather silly saying that, really, considering that modulation on the Prophet is properly scaled whereas the Soundchaser's isn't!

One thing I would disagree with is Passport's use of the term 'FM'. To most people, FM implies the use of modulation frequencies at least an order of magnitude faster than what Passport are using. In fact, proper Chowning-type FM is totally impractical with the limited processing power of the Apple's 6502. Strictly speaking, then, the Turbo-Traks FM is a LFO, so don't be conned into thinking you'll get DX7-type sounds from this system!

The ADSR parameters are self-explanatory, but the couple of values to the left need a few words of introduction. 'LIN/LOG' sets the ADSR envelope to either a linear (organ- or string-like) or logarithmic (percussion-like) type. 'TIME' sets the time lag before the start of the envelope. That may seem a curious feature in the context of dual-oscillator voices, but it makes a good deal of sense when one moves into the right side of the preset arena. Here, the majority of presets have been set up with more than two logical oscillators. Because each of the oscillators can be fed with a different waveform, this 'multiple oscillator' facility can be used to produce time-changing timbres of the sort (though not the quality) common to the Synclavier and PPG Wave 2.2.

However luscious such multiple-oscillator presets might be, they're not that usable as everyday musical fodder, for the simple reason that they chew up the MusicSystem's digital oscillators like there was no tomorrow. For instance, if you insist on treating your shell-likes to the delights of preset F, you'll be down to just monophonic capability. Now, other digital keyboards like the Synergy are faced with a similar problem of having a limited number of oscillators to work into a polyphonic, timbre-changing situation, and one of the compensatory software techniques that has been developed centres around re-allocating oscillators according to what their respective ADSR envelopes are up to. Taking the example of an oscillator that's being fed

with a waveform packaged in a very brief and percussive ADSR, the software needs to be capable of seeing that the oscillator only gets transient use before it's down to zero amplitude, and at that point it could then be re-allocated to another voice that needs the benefit of an extra oscillator. Unfortunately, Turbo-Traks ties up all the oscillators assigned to a preset for as long as a note is sounding or a key held down, regardless of the amplitude state of those oscillators, which is bad news when using those oscillator-greedy presets in a piece of more than a few parts.

Another single keypress ('W') moves one to the Wavemaker side of Turbo-Traks (Figure 3). Various options are available for constructing waveforms, but the principle remains the same; namely building a 256-byte waveform table and storing it in the Apple's memory.

The first option is 'CREATE'. This allows you to additively synthesise waveforms by setting the relative levels of the first 16 harmonics using a bar chart display (Figure 4) and a few twists of a games paddle. At any point, the waveform can be displayed, or one can go back to the preset display to actually try playing it. Apart from using sine waves as waveform building blocks, the 'MOVE' option allows the user to take any waveform previously constructed and make this the basis of additive synthesis.

The third and most interesting option is 'EDIT'. This provides the means of using the games paddles to 'redraw' or edit any displayed waveform (Figure 5). That way, you can have a nice, plain sine wave in the first half of the waveform cycle and a crazy sort of sawtooth in the second, though still maintaining the zero amplitude in the middle and at either end of the cycle. Lots of possibilities there...

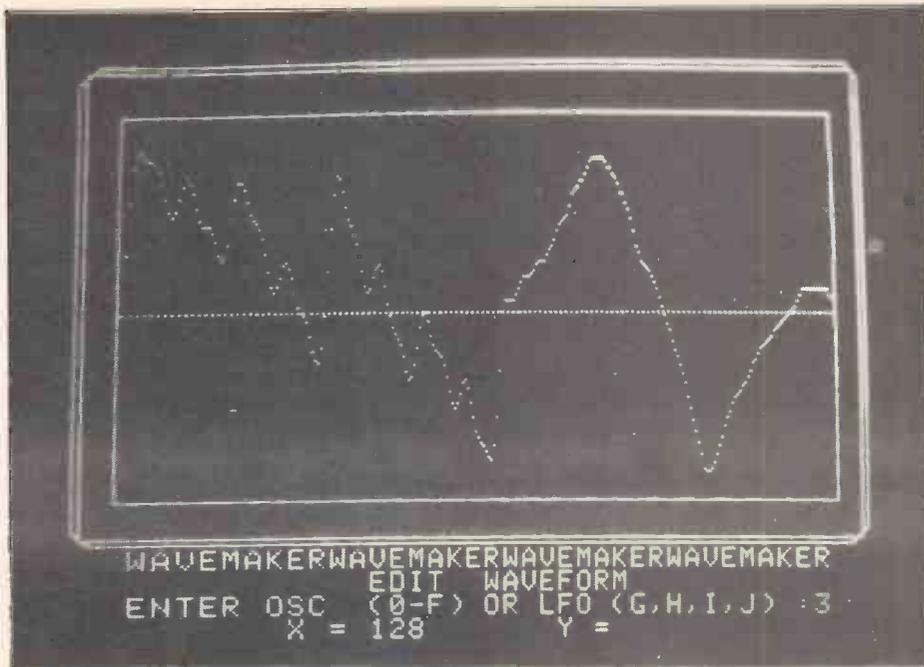
Lastly, there's the 'SMOOTH' option, a 'digitally-simulated low-pass filter'. Again, watch out for Passport's terminology — this isn't a real-time digital filter! Instead, it simply recalculates the contents of a waveform table according to a user-selected cut-off frequency i.e. removing harmonics above a certain level. This is particularly useful when you've been messing around with 'MOVE', using already harmonically-rich waveforms for additive synthesis, as it enables unpleasant aliasings to be removed without starting the CREATE process all over again from scratch. Oh yes, there's also a TUNE option to adjust A above middle C from its standard 440 Hz to virtually anything between 200 and 600.

Sequencing

Finally, the part of Turbo-Traks that arouses the most expectations — the '16-track digital sequencer' (Figure 6). Switching to this is another single-key command (the 'ESC' key, in this case), and pressing the same key again toggles back to the preset display. The manual tells one that 'Turbo-Traks is distinguished from earlier computer music systems by the incredible power and flexibility of its Sequencer'. My dictionary informs me that 'incredible' means 'cannot be believed'. Hmm...

Each track has three possible modes, 'play', 'record', and 'off'. Switching tracks to one or other of these is achieved by keying 'M', the track number, and then 'P', 'R', or 'O'. Presets assigned to tracks can be similarly changed — and that includes whilst the sequencer is playing back — a rather nice feature.

The third column provides for per-track volume adjustment, in theory very useful for balancing things on playback, but, in practice, severely limited by the bizarre way in which it goes about it. Just 9 volume steps



Waveform editing.

are provided, with 0 silence and 8 maximum, and each step upwards doubles the volume. Assuming that one had the master volume control set to VOL = 7F (half maximum), then anything less than 8 as a track volume setting will be operating the MusicSystem oscillators at no more than a quarter the maximum output, and that automatically means a further worsening of the noise level. Obviously, some sort of balancing act is necessary when you've got a number of parts vying for the ears attention, but why concentrate all the control resolution at the bottom end of the volume range? Very weird.

Actually going about some 'recording' is very straightforward. You simply select the track you want to record onto, assign a suitable preset (which can, of course, be changed on playback), and then press the space bar to start the process. Anything you play, mono- or polyphonically, will then be stored away in the Apple's memory until you press the space bar again to stop recording. Another part can then be recorded on top of the playback of the first, and the 'MERGE' facility will then add on your latest part to the notes previously stored away out of harm's reach (ie. non-erasable unless the plug's pulled out).

A metronome or click track can also be put on one of the tracks so as to help synchronising your playing. The manual informs me that this is a 'stable reference beat'. In fact, this click track should carry a Government Health Warning, because it makes you think its timing discrepancies are your own – and that leads to an awful lot of soul-searching and head-scratching. Painful.

A definite negative point for Turbo-Traks is that the sequencer is firmly anchored in the real-time camp with a complete absence of any editing facilities. This means that errors can only be corrected by going back and starting all over again. Frankly, I thought computer music systems were meant to make life easier rather than more difficult. If a note file has been created, surely it's not too much to expect to be able to display those notes and edit mistakes, change pitches and timings, and so on?

The frustrating thing is that Passport do in fact offer a non-real-time music editor, but for the 4-track software rather than Turbo-Traks. This 4-track music editor sounds impressive, and advertises itself as such ('the most powerful music editor available' – I wonder what the Synclavier would say to that?), but I'm unable to say more as it

seems to be unavailable at present (the Sinclair bug of advertising before the event, perhaps?).

What about the '16-track' label? Well, yes, the software does enable you to put down 16 independent monophonic lines and play them all back at once – provided you only use single-oscillator presets. However, single-oscillator sounds are rather like consonants without vowels, or vice versa (to use the analogy of a certain Japanese keyboard manufacturer), and, for anything other than a bass drone, they're next to useless.

Now, when I first got my hands on Turbo-Traks, I thought I'd be able to do what is possible on the alphaSyntauri (the Soundchaser's direct competitor), namely using the multiple tracks rather like writing a piece on 16-stave MS paper for a limited number of players (the human equivalent of logical oscillators) doubling on different instruments. That way, I thought I could start a piece with a multiple-oscillator, contra-modulating sound on track 1, bring in some sombre bell sounds on track 2, a sequencing bass line on track 3, and then the main body of the piece on the other tracks. In fact, you can do that, but there's a major problem: if you assign a multiple-oscillator preset to a particular track, then, no matter whether there's one note or a thousand on that track, all those oscillators remain out of commission for use by other tracks and their presets.

There is a way around this – by switching off a track assigned to a multiple-oscillator preset and switching on ones you want to take over the liberated oscillators – but all this is incredibly fussy to do whilst the sequencer is playing back, and well-nigh

impossible if you're actually wanting to play over it. Passport's main competitor makes sure that if a track hasn't got any more notes on it then the oscillators assigned to that track are routed to a track that does have notes.

The other possibility would be to add in a further 'mixdown' section to the software so as to emulate a computer-based mixing desk that can be programmed to remember fades, track switchings, preset reassignments, octave transpositions, and the like.

On the positive side, the transposition and speed change facilities work very well. Setting TRANS to 'Y' allows you to transpose the sequencer playback by as much as up or down an octave, by pressing any key from C below to C above middle C.

Sound Quality

This is a tricky area, because the sound of a purely digital system is very different to what one's accustomed to from analogue equipment. The quality certainly has similarities to what comes out of the better Casio keyboards, but the modulation and waveform construction options means that it's nothing like the average preset keyboard. If there's an immediately obvious let-down, it's in the noise and bandwidth department. As with the Synergy, the MusicSystem oscillators are fed waveforms at a 32 kHz sample rate. That translates into a theoretical top end of 16 kHz. Now, in order to remove clock frequencies and nasty things like that, the MusicSystem boards also have a couple of low-pass filters on the outputs. These are what are normally called 'anti-aliasing filters', though they aren't that really, as aliasings will creep in regardless of the presence or absence of such filters.

That's by the way, for the point about the MusicSystem filters is that they chop out most of what comes out of the boards above 10kHz. Whilst that certainly spells a mellow sound, it also leads to a rather bottom-heavy sound, which goes rather against the grain of what musicians expect from digital synthesis. So, my advice to anyone contemplating the purchase of the Soundchaser, or any other system using the MusicSystem boards, is to think about replacing the filters with your own. I've done this myself, and the considerable improvement in sound quality certainly warrants the effort.

Conclusions

Well, looking back on this review, I see an air of exasperation liberally dotted about. That really shouldn't be the case – especially since the bulk of the problems lie with software rather than hardware. If Passport take heed and update the software accordingly, then that'll clearly demonstrate the advantages of acquiring a 'soft' instrument; if they don't, then they're really being rather silly, because they'll be throwing away the potential of turning a fair computer music system into an excellent computer music system. **David Ellis CM**

LIKES

Quick booting and Diversi-DOS
Single-key commands
Split keyboard facility
Choice of lin/log ADSRs
Flexible modulation options
Waveform-building options
Paddle editing of waveforms
Sequencer transposition
Variable speed playback
Real-time parameter changing

DISLIKES

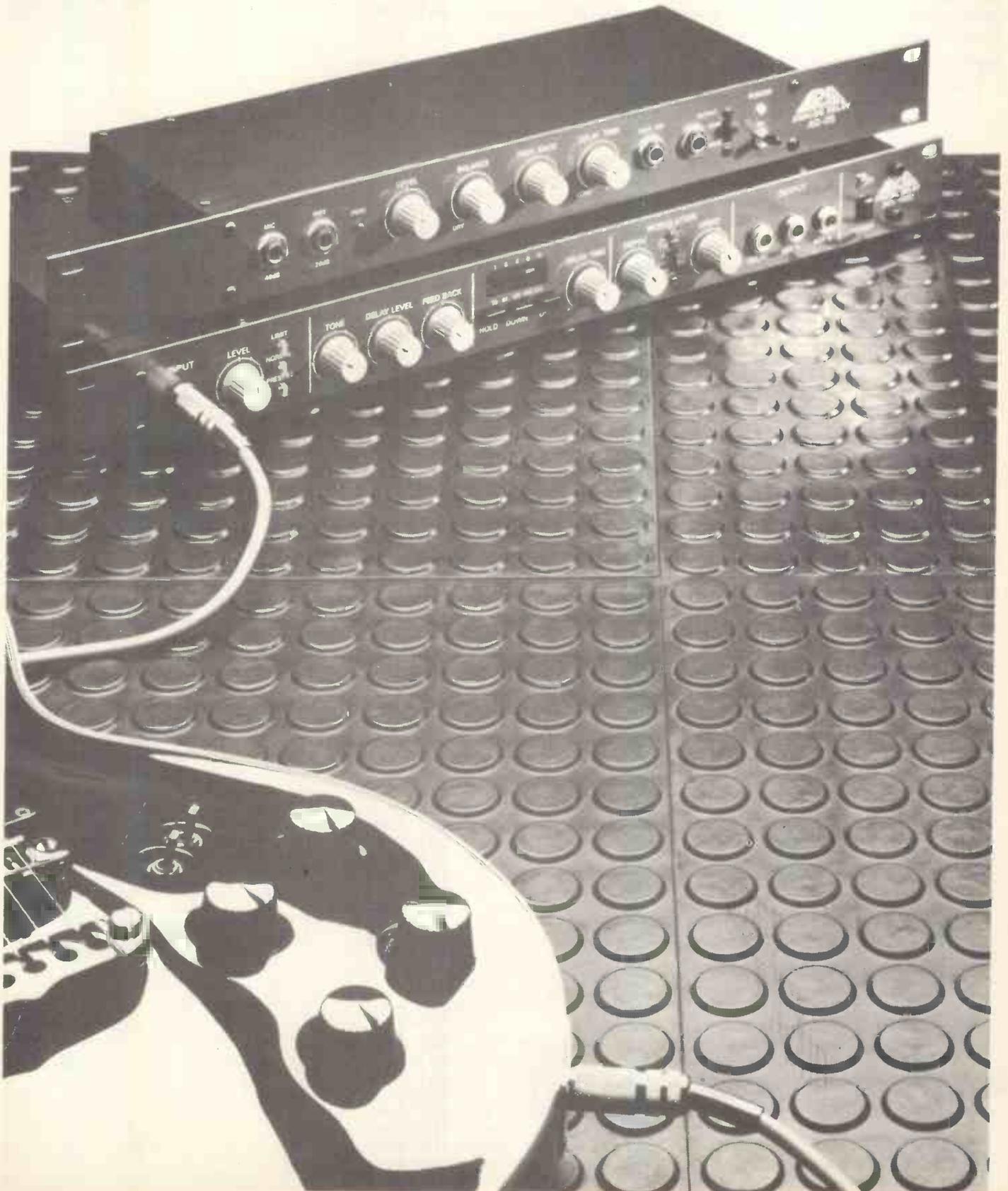
Interface card in slot 7
Unscaled pitch bend and modulation
Playback volume control
Lack of sequencer editing
Background noise when nothing playing
Filters on MusicSystem boards
Irregular click track
Lack of non-real-time entry
Lack of dynamic oscillator re-assignment
Slowness of 'merge' facility

Availability: currently only from Triangle Software Ltd., 38 Belleville Road, London SW11 6QT (Tel. 01-223 4192), whose prices are quoted in the text of the review. Syco Systems are also intending to market the system, but, at present, they don't stock it, nor do they have any pricing details available. Outside the UK, contact Passport Designs direct, at 116 North Cabrillo Highway, Half Moon Bay, CA 94019, USA (Tel. 415-726-0280).

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chip chat

Chip Chat is an occasional series that will make an appearance whenever there's a new chip with relevance to micro music that looks interesting. This month, we're looking at one of the new breed of speech chips, the Texas TMS5220, a device that's achieved some degree of notoriety on account of its ability to synthesise Kenneth Kendalls out of thin air.

Texas Instruments have been responsible for many of the advances in speech synthesis technology, particularly in the field of linear-predictive coding (LPC). Commercial evidence of this is provided in the shape of the (in)famous 'Speak n' Spell' and 'Speak n' Maths' educational toys, devices which use the TMS5100 4-bit speech synthesiser (incidentally, also the basis of E&MM's Wordmaker project, back in June 1981). This particular chip is designed for low-cost devices, but the 8-bit version, the TMS5200, offers much higher quality (because of the greater resolution gained from 8 bits) and general compatibility with 8-bit micro-processors.

The TMS5220 is basically an advanced version of the TMS5200, but with the important addition of allophone synthesis capability. Apart from it being the chip that's responsible for making the BBC Micro sound more like a Hereford human than a Detroit Dalek, the TMS5220 is also finding its way into other micros (the Echo II speech synthesiser for the Apple, for instance) and even into cars (the Austin Maestro).

Speech chips like the TMS5100, 5200, and 5220 operate from LPC data, which represents a 100:1 data compression of the information in spoken words. You'll recall from the article on speech synthesis in October's E&MM that this compression is derived from analysis of formant bands, the vocal equivalent to harmonics. Whilst this data could reach the speech chip from the micro's memory space, there are certain advantages in having the data come from a special speech ROM (what Acorn have dubbed a 'PHROM' (PHrase ROM)).

In fact, with the 5100 and 5200 speech chips, this is the only way the chips can get their daily diet of LPC data. The 5220, on the other hand, goes several steps further by offering a choice of high quality LPC synthesis, medium quality allophone synthesis, or a combination of both, and all with a minimum of supervision from the processor.

What's gained from allophone synthesis is more accurate speech than that generated with low-cost phoneme systems (like the Votrax SC-01 and National Semiconductors' 'Digitaler'), which can neither mesh neighbouring sounds smoothly nor provide all the sound variations necessary to model the intricacies of the vocal tract. However, allophones aren't exactly the pinnacle of achievement, because speech gained from stringing together allophones is a compromise between the greater naturalness of a complex and costly standard LPC system and the cruder, more mechanical effect of a phoneme system.

However, such apparent limitations of allophone synthesis may have more to do

with the way in which one applies the allophones than any inherent limitation in the principle of allophone synthesis. What's also worth remembering about the 5220 chip is that the combined allophone-LPC mode of operation enables virtually any degree of speech synthesis to be obtained by simply adjusting the mix between the two.

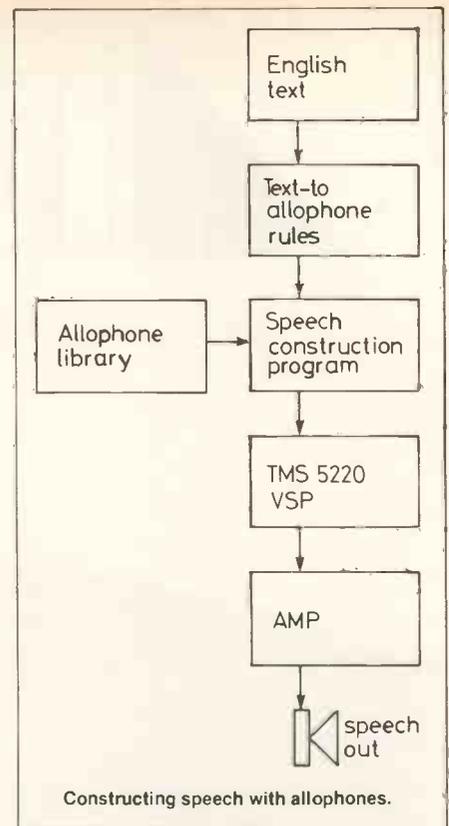
In the case of LPC-based vocabularies that are pre-programmed in word ROMs, a single 5220 chip can access up to 16 ROMs, each of 16K, to provide something in the region of 30 minutes of continuous speech without the repetition of a single word — an operation that makes more sense when dreaming up advertising copy than in reality!

Allophonic synthesis makes much more modest memory requirements: 3K to hold a 128 allophone library, 7K or so to store a set of rules (650 in the case of TI's 'Text-20 Speech') for text-to-allophone translation, and a small amount of memory for an algorithm to string together words from the rules and library, and also to 'naturalise' the resulting speech with smoothing parameters and intonation adjustments.

The library of 128 allophones and 650 rules takes the place of the unlimited ROM library that would otherwise be needed for an unlimited vocabulary. But, like any system with rules and regulations, a combination of letters will occasionally take a perverse delight in breaking the rules of text-to-allophone translation. What results is a mispronunciation, but, as 92% of text follows the 650 rules quite adequately, that's no great disaster. To obtain greater accuracy, more rules and a larger vocabulary can be added, though manual intervention in the speech construction program may be more cost-effective.

In fact, recent developments on the allophone front have resulted in the original complement of 128 allophones being replaced with 302. Whilst this effectively means more variations on the same theme (more subdividing of the traditional phonemic approach), the ordering of such a large number of speech variants inevitably makes the construction of text-to-speech rules even more complicated. According to John Horton, who heads R&D at Acorn Computers, this is the main reason why their so-called 'allophone project' for the BBC Micro has been so slow in getting off the ground.

After the input text has been converted to its equivalent allophonic strings, the speech construction program changes the strings into a stream of LPC data (Figure 1). The TMS5220 decodes this data to control a time-varying digital filter that emulates the upper vocal tract. Digital representations of voiced and unvoiced sounds pass through the filter to be formed into words. The digital



output from the filter then passes to an 8-bit DAC that produces the final analogue version of the speech.

Chip Control

One of the nice things about the 5220 is that it requires only minimal control from the host processor. Commands have to be passed to the 5220 to initiate specific activities, but the processor isn't itself involved in these activities. The list of available commands (Table 1) totals just six, including Reset, Load Address, Speak, Read & Branch, Speak External, and Read Byte. The two commands of particular interest to us are Speak, which initiates speech from phrase data stored in an external ROM, and Speak External, which initiates the allophone-stringing mode. A typical system plan for interfacing the 5220 to a host processor is shown in Figure 2. Apart from the usual eight bidirectional data lines, there are also four control lines (READ SELECT (RS) and WRITE SELECT (WS) on the input, and READY and INTERRUPT on the output). Going to the 6100 ROMs, there are four address lines (ADD1, ADD2, ADD4, ADD8), 2 control lines (M0 and M1) and a synchronised clock (ROMCLK) (Figure 4).

Four on-chip registers handle all input and output of data: a 128-bit FIFO (First In First Out) buffer register and a command

Table 1. Commands and command format

Command Code (D ₀ -D ₇)	Operation
X 0 0 0 X X X X	NOP
X 0 0 1 X X X X	Read Byte
X 0 1 0 X X X X	NOP
X 1 1 0 X X X X	Speak External
X 0 1 1 X X X X	Read & Branch
X 1 0 0 A A A A	Load Address
X 1 0 1 X X X X	Speak
X 1 1 1 X X X X	Reset

A = Address
X = Don't care

register receive inputs whilst a data register and status register hold outputs. When the WS line goes low, inputs are directed either to the FIFO buffer (in the case of a Speak External command) or to the command register. Once data is latched in a register, the 5220 lowers its READY line to signal to the processor that the data transfer is complete, thereby releasing the processor for other activities.

However, the processor can still keep track of the 5220's operations by checking its status bits and the INTERRUPT output. Upon receipt of a READ SELECT input, the 5220 delivers its status bits to the host processor over the data lines. The status bits indicate whether the 5220 is speaking (talk status), or whether its FIFO buffer is less than half full.

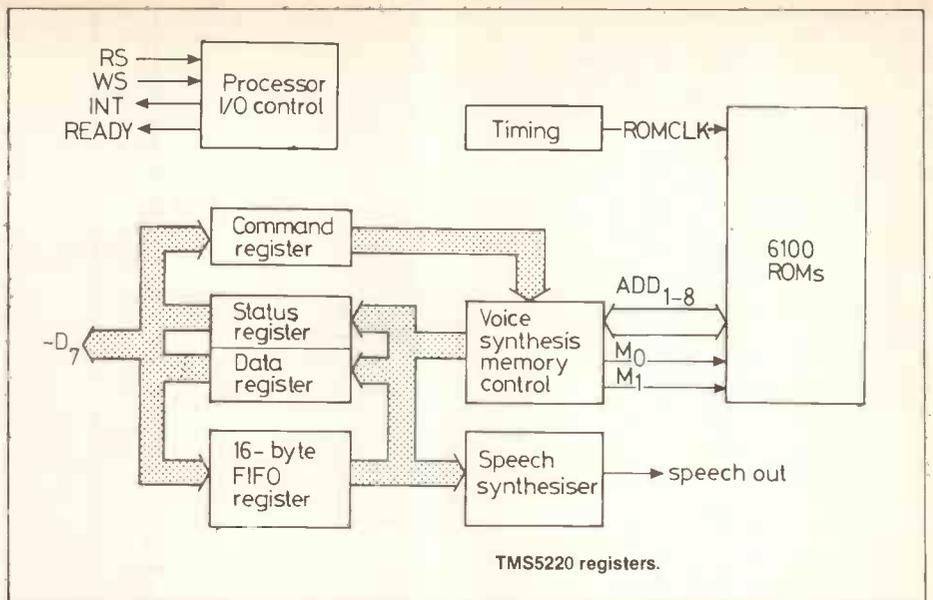
The 5220's FIFO buffer holds 16 bytes of speech data, which is about 50 ms of speech sound (equal to two so-called 'frames' of speech) when operated at a system clock rate of 160 kHz. Synchronisation of the data transfer between the host processor and the 5220 may be accomplished using either interrupts or software polling of the 5220's status register. The FIFO control logic generates an interrupt to the processor when the number of bytes remaining in the buffer falls to eight or less, indicating to the processor that more data is needed.

The typical time needed by the processor to service a FIFO interrupt request for data is less than 500 microseconds. At 20 interrupts per second, something in the region of 1% of available processing time will be required for servicing speech synthesis after a Speak External command. In practice, high quality allophone-stringing may require as many as 30-35 interrupts per second, but the correspondingly increased data transfer overhead incurred in keeping the FIFO buffer adequately refreshed can be reduced by arranging for the 5220 to work directly with a 6100 ROM for part of the time - the combined allophonic-LPC mode of operation.

Frames Of Reference

In either mode of operation, a certain amount of data has to be put in to get a certain amount of speech out. However, in the LPC mode, the 5220 must operate at a higher bit rate (1200 to 1700 bits per second) than in the allophonic mode (400 to 600 bits per second) to attain the best speech quality inherent in each method of synthesis. Also, the closer the input bit rate is to the mode's optimum the more closely the synthesised speech resembles a natural human voice.

Either way, the data that emerges from the digital filter imitation of the human vocal



tract has an 8kHz sampling rate which, after passing through the DAC and low-pass filter, enables speech to be synthesised with a maximum bandwidth of around 3.5kHz. When synthesising speech from LPC data, the 5220 joins together 'frames' of speech data. A single frame represents the amount of data needed to specify the essential components for 25 ms of speech.

Thus, LPC uses a 40Hz input frame rate for obtaining word data from ROM. The maximum of 50 bits in each frame (Table 2) defines the excitation (the quality of voiced/unvoiced input) and filter character-

istics that are linearly interpolated every 3.125 ms to produce smoothly-varying speech. Each 50-bit frame is composed of 13 parameters:

- 1 Energy (amplitude, 4 bits)
- 2 Pitch (fundamental frequency, 6 bits)
- 3 Repeat bit (repeated synthesis from a particular frame of data).
- 4 Ten reflection coefficients (K1 and K2, 5 bits each; K3-K7, 4 bits each; and K8-K10, 3 bits each).

Turning our attention to the speech synthesiser side of the 5220 (Figure 4), these LPC parameters of speech feed serially from either the external ROM or the FIFO buffer into an input register. Here, the data are 'unpacked' and several tests performed to determine whether the repeat bit is set, the pitch is zero (signifying unvoiced speech only), or the energy is zero (set by the stop code of 1111). The unpacked data are then stored in the coded-parameter RAM and serve as index values for selecting appropriate values from the parameter look-up ROM.

Outputs from the look-up ROM are target values that the interpolation logic must reach in one 25 ms frame period. During each of the eight 3.125ms interpolation intervals making up one frame period, the interpolation logic generates pitch and energy parameters for the noise and pulse wave generators, as well as the filter-excitation sequence and reflection parameter values for the lattice filter.

The reflection coefficients, K1 to K10, define the nature of the vocal tract modelling, and specifically reflect the linear predictive analysis originally carried out on speech data. The ten K parameters have been made pitch-dependent at the top end of the frequency range to give more natural female or higher pitched speech. These K parameters can also be manipulated to produce musical effects.

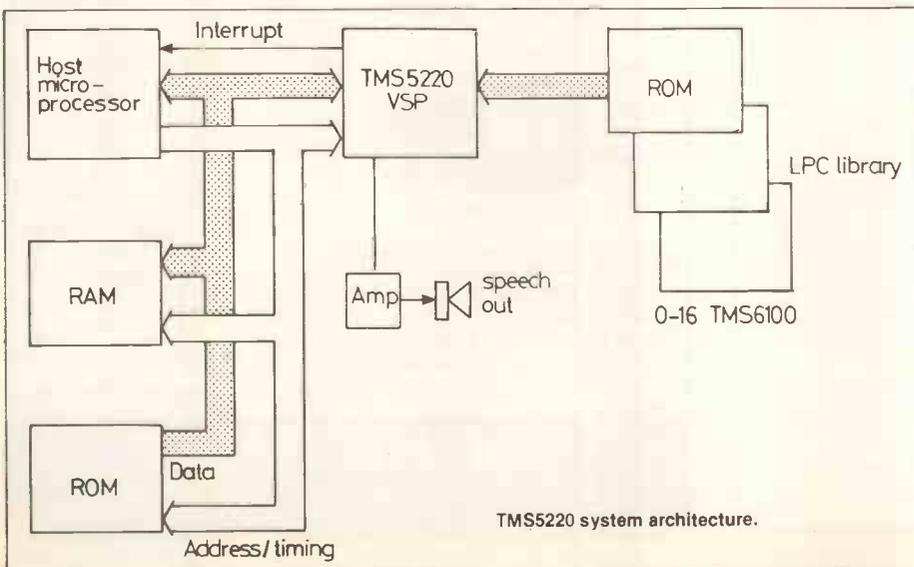
In addition, the pitch of the voiced excitation input to the filter can actually follow a well-tempered scale over 1.5 octaves, from 260Hz (middle C) to 696Hz (the F an 11th above). These features help to improve the naturalness and musicality of the synthetic speech and also offer the intriguing prospect of using the 5220 for singing!

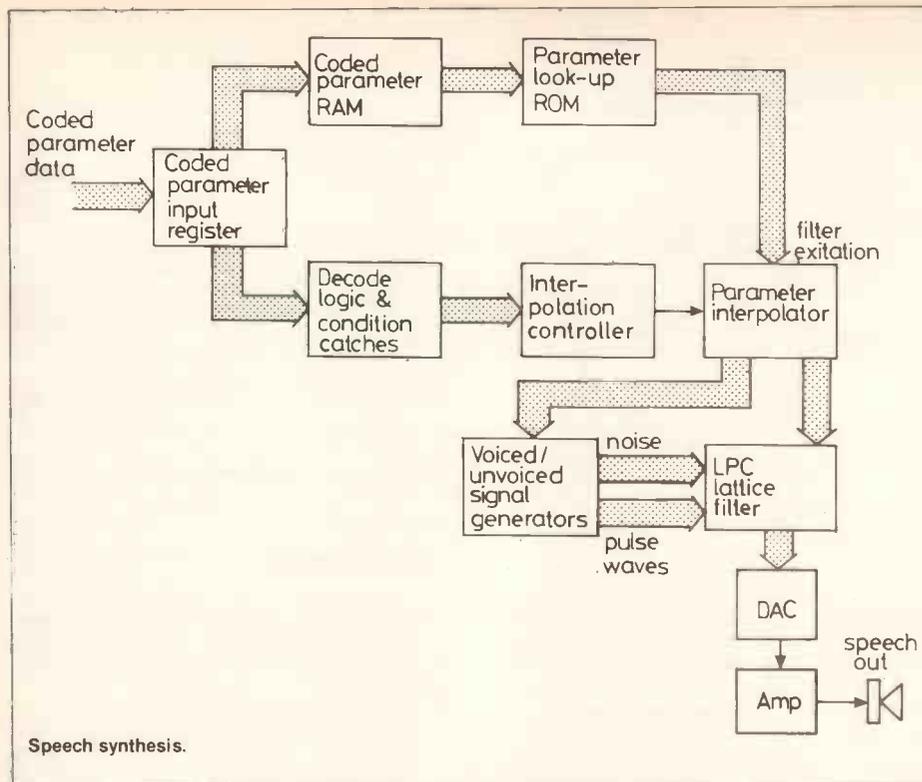
Musical Avenues

So how do the complex technicalities of LPC speech synthesis fit into the world of the average computer musician? Well, one hint of possible musical avenues is provided by the previous paragraph: the idea of changing the pitch of the voiced input to the

PARAMETER	LEVELS	CODE BITS
Energy	15	4
Pitch	64	6
K ₁	32	5
K ₂	32	5
K ₃	16	4
K ₄	16	4
K ₅	16	4
K ₆	16	4
K ₇	16	4
K ₈	8	3
K ₉	8	3
K ₁₀	8	3
12	247	49*

*With Repeat = 50 bits
Energy = 1111 is the Stop code





vocal synthesiser to simulate singing. On top of that, the mass of control parameters used to shape the synthetic vocal tract can be manipulated in ways that are wholly beyond the average human-being. For instance, the American composer, Charles Dodge, has taken standard speech synthesis techniques and applied them to more creative ends in a piece called 'Speech Songs'. By altering the natural resonance,

pitch, contour, and speed of the voice, Dodge has been able to bend the synthetic voice in directions that are alternatively musical, frightening, and downright whacky.

In principle, the set-up of the LPC speech synthesiser is similar to the traditional analogue synthesiser, with harmonically-rich inputs to filters and various control points scattered here and there. The big

difference is that you're working digitally the whole time up until the DAC comes into the picture. In fact, LPC speech synthesis is a practical implementation of one of the great white hopes in computer music: the real-time digital filter. The problem is that the 12-stage filter in the 5220 chip works at a bandwidth of 3.5kHz, which is way below what's required for music. To step this up, and, at the same time, provide a frame rate that allows filtering changes more rapid than every 25ms, needs a corresponding step up in the level of technology. That, of course, is still to come.

David Ellis

CM



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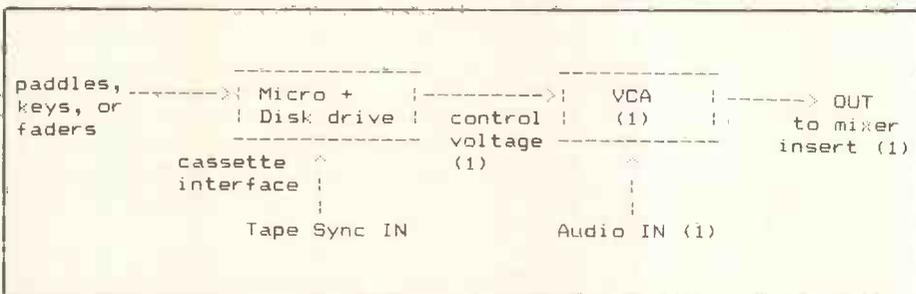
Computer MUSICIAN

NEWS & LETTERS

Micro Mixdown

Dear E&MM,

First, thank you for a great magazine. I'm running a small studio and, being very interested in synthesis and computer music, I would like to make a suggestion for a computer program (plus hardware) that would help me and probably a lot of other people, namely a computer-assisted mixdown device. I would suggest something like the Roland Compu-Mix (that's far too expensive for me) but based around a general-purpose micro (the Apple II, for example). Perhaps this schematic might help:



The advantages of this would be easier mix-down, storable mixes with update facilities and, hopefully, relative cheapness – the poor man's Solid State Logic desk, in fact. Having very little knowledge in writing programs, I would be very pleased if you and E&MM could help. I wish you the very best

for the future with E&MM and HSR.

Willy Boehm
West Germany

Yes, a very good idea, and, with good but cheap VCAs like the Curtis chips now available, it should be pretty economical to put it into effect. We'll give this some very careful consideration – it could make an excellent project. In fact, a UK company called Analog Networks may well have piped us to the post with a micro-based mixdown system shown in prototype form at the British Music Fair in August, provisionally marked to retail for around £800. This

interfaces with their own micro and a rack-mounting multiple VCA unit, though it was also suggested that versions might be produced for the BBC Micro and Apple III/IIe. We'll be reviewing this in *Computer Musician* when it's in a state to climb off the design bench on its own two feet.

if a key was pressed an octave higher, the frequencies below 1kHz would not be doubled. On the other hand, if the section is made too long, the repeated sections become audible (a mini echo). Could you tell me how this was achieved on the Emulator?

Ian Marwood
Welwyn Garden City
Herts

PS. E&MM continues to improve! I have also built the Electro Drummer – superb!

The Emulator is somewhat unusual in comparison to other sampling machines in that a variable rate DMA controller is used to alter the pitching of the sample regurgitation. So, each voice card includes a number of high frequency VCOs controlled from the keyboard in the usual polysynth way for altering the rate of DMA to respective DACs. In contrast, machines like the Fairlight, Linn Drum, et al. use counters and something like a 555 to clock out from RAM (or ROM) dedicated to a single voice – a more expensive and less flexible approach.

As I understand the workings of the Emulator and the Fairlight, the repeating of sections of the sampled sound is not to make the sample duration equal over the length of the keyboard but to keep the sample sustaining whilst a key is held down. An alternative mode of the Emulator just cycles through the entire sample length when a key is pressed down, in which case a low note will last proportionally longer than a high note.

An important thing about setting up loop points is that one wants the start and end of a loop to be at the same amplitude level. That way, looping doesn't involve sudden changes in output level, and so you don't hear the sample splicing. With the Emulator, setting up loop points is a bit hit and miss – you basically just move the sliders until it sounds right. If you were to set up a loop that went from the beginning of the sustain phase to the end of the release phase, then you'd obviously produce what you call 'a mini echo'. However, sensible loop points (between parts of the sample where the amplitude is relatively constant) should produce a natural sustain to the sample. The Emulator also adds in vibrato (easy with those VCOs), which helps to make the looping less artificial in effect.

Actually, *Computer Musician* would be very interested in following the progress of your project, so please write in to let us know how you're getting on.

Emulating The Emulator

Dear E&MM,

After buying an E&MM Digital Delay Line, I got interested in the idea of sampling and digitising sounds, and have decided to build a keyboard similar to the Emulator. Several features would be the same as those on the Emulator (30kHz sampling, 128K RAM), but it would be 8-note polyphonic and also have a facility for being programmed by a PET (not in real time, of course!).

As you reviewed the Emulator, I was wondering if you could help me on one aspect. As you know, the sound is sampled

and stored, and then output by the keyboard at various frequencies. In a delay line, this is accomplished by cycling through the memory at varying rates. This has the disadvantage of changing the length of the sampled sound, and therefore it is necessary to repeat sections of the sound (for higher frequencies) or omit them – and there lies the problem.

If the repeated section is too small (say 1 ms), then any frequencies in the sound below that frequency (1kHz) will not be affected ie.

operation as yet is that from Yamaha, in the form of the truly wonderful DX7 linked up to an Apple II running a 6-part, non-real-time sequencer program. Another MIDI program to watch out for is that from Octave-Plateau (for the Apple and IBM), but various problems are apparently being encountered in squashing a program written for the IBM onto the Apple. Other possibilities (though non-Apple) are the two German MIDI software/hardware packages mentioned in this and last month's 'Rumbblings'.

Obviously, as these programs emerge from the woodwork, so interface cards for various micros will also appear, so I shouldn't worry on that score. E&MM also has a fairly humble MIDI software development plan underway, but, at the moment, the general feeling is that we should see what the big boys come up with over the next few months before embarking on an all-out effort in this direction.

CM

Midi Mania

Dear E&MM,

For the past few months, I have been trying to extract information on the new MIDI system from various manufacturers and suppliers. The result? – I'm still at the level of knowledge gained from past issues of E&MM!

I have a system based on an Apple IIe with a Roland CMU-800 controlling a Pro-One and Juno 6, synced to a TR808 and TB303. My future intention is to run up to four different MIDI-equipped synths, ranging from a most definite DX7, to Prophet 600, Juno 60 and similar, using the Apple II. The main questions I have are:

a) Will it be possible to have real-time input to the Apple (via the DX7) as per the Rhodes Chroma; by numbers as with the Compu-Music; and with a very comprehensive editing mode that would also give access to the keyboard sensitivity of the

DX7, and all from the same program?
b) Can you advise as to who can supply MIDI interfaces for the Apple?

c) Who could I contact to write the program to suit my requirements? My own programming skills are very limited, but I can lift heavy weights!

Here's hoping that you can clear the air for me, and keep up the good work with E&MM.

Mike Mayles
Portishead
Avon

With all those keyboards in tow, you'll need to be good at lifting heavy weights! Seriously, though, what you're asking for is well within the reaches of the MIDI interface, and most synth manufacturers using this standard have real-time/non-real-time software in development for various micros. However, the only one I've seen in

Talking SHOP ROCKBOTTOM



From a fairly unpromising start as a major re-development area following some horrendous bomb damage during the Second World War, Croydon has grown in significance to such an extent in recent years that it is now the epicentre of commerce, leisure and administration for much of South London and Surrey. It comes as something of a surprise therefore to find that the area is blessed with only one music shop of any importance (discounting a couple of home-organ dealers, that is).

The shop in question is RockBottom, and its location – a little way to the north of Croydon's centre along the London Road – is one which enables it to serve musicians from as far away as Watford to the north and Brighton to the south, though it should be emphasised that in addition to selling equipment to personal callers, the company also do a considerable amount of mail order business which, of course, covers the whole of the UK and beyond.

RockBottom was founded seven odd years ago under the guidance of two musicians, Carl Nielsen and Neville Crozier. From the start, their aim was to provide far more than a warehouse at which customers collected their instruments in brown paper bags, and handed over their cash to unscrupulous proprietors without so much as a demonstration or even the promise of a money-back undertaking should the product prove faulty. To this end, they ploughed almost every penny of profit back into the business, with the result that the shop rapidly became known as one of the best-stocked music shops in London's suburbia.

This in itself would not have been a problem had it not been for the fact that, at that time, RockBottom occupied only the ground floor of 74 London Road. Controlled expansion (mainly in an upwards direction) has resulted in the shop currently being composed of no fewer than five storeys, housing – from the ground up – new guitars and amplification, secondhand guitars, keyboards, drums and drum-machines, and acoustic guitars.

Since both of RockBottom's founding members are essentially guitar-orientated, the keyboard side of things had tended to be neglected before the

arrival of Ian Penman-Dick, who is now in charge not only of pianos, organs and synthesisers, but also of mixers, effects and home-recording equipment. Under his guidance, the keyboard department has undergone rapid expansion in the breadth of its coverage, and hand-in-hand with this has come a policy of letting whoever might come into the shop play with whatever instrument he/she chooses for as long as he/she cares to. Although this can cause the regular staff not inconsiderable strain, it's based on past experience that has taught Ian never to judge prospective customers by their appearance, as he himself recalls:

'I remember there was one guy in particular who kept on bothering us. He can't have been more than eleven or twelve, but every Saturday he'd come in and mess about with the synths, distracting other (more serious) customers. I was tempted to just show him the door on several occasions, but one day he came in and said "that's the Roland Jupiter 8 isn't it?" I nodded and he played about with it for a while, and then he said "OK, I'll take it" and promptly handed over the requisite two and a half grand! Apparently an uncle or someone had left him the money in his will, but it only goes to show.'

The trend in recent months, according to Ian, has been a decline in monophonic instruments and a corresponding increase in the interest shown in polys. Among RockBottom's top-sellers are the Roland JX-3P, the Korg Poly 61 and the almost ubiquitous Yamaha DX7.

Apart from an exceptionally wide choice of hardware, all the shop's departments have one thing in common – lack of space. As hinted at earlier, this stems from the shop's owners' desire to plough profits back into the store, with the inevitable consequence that it's almost impossible to move freely in any of the departments without knocking over *something*. This isn't too bad on a weekday such as the one we'd pencilled in in our diary to visit Croydon, but on Saturdays the situation worsens considerably, leaving the RockBottom staff with little option but to consider transferring to larger premises.

Which is exactly what they are about to do.

By the time you read this, preparations should be well under way for a move two or three doors down the road into a larger and more modern building. Obviously, the move won't cure RockBottom's problems overnight, but it should ease the overcrowding a little and, perhaps more importantly, allow a slight but significant re-organisation to take place.

Ian Penman-Dick, for example, wants to see the keyboard department split into two, with the bigger, costlier instruments (such as the Rhodes Chroms and PPG) occupying one area and the smaller, more mass-appeal ones another. The drum department could also do with such a division, because with the enormous increase in the popularity of electronic drums, it's been difficult for the followers of both camps to rub shoulders amicably in the same room.

RockBottom claim to have the largest stocks of any non-specialist hardware retailer in South London, and it's a claim that's difficult to refute, the new premises should provide an additional incentive to the already-bulging list of assets which could make any musician within striking distance of Croydon take time out to visit the shop. The atmosphere of a dealer run specifically by musicians for musicians is one well worth travelling for, and in addition to the advice and expertise which all the RockBottom staff have to offer, there is now an improved service department with both a low turnaround time and a reasonable scale of charges – both rarities on their own, let alone together.

Even more excitingly, the same service department is currently working on one or two projects not unconnected with MIDI interfacing, though as yet details are a little sketchy. It's further proof of RockBottom's commitment to serving their customers and serving them well. I wouldn't be at all surprised if, in the not-too-distant future, RockBottom find themselves contemplating a further move – into still larger premises.

E&MM

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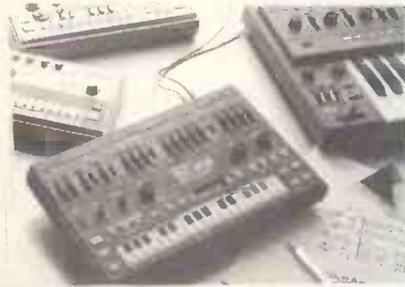
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CASSETTE REVIEW



Ssuraea

RADIO SILENCE: (Toronto, Canada) Five Tracks. "On The Edge Of Perception". Michael Murphy, synths and drum computers. Eric Hopper, synths. Larry Gentle, synths. Scott McGregor Moore, synths and drum computer. Interesting but a restrained effort from Canadian group formed around synth basis. Recorded at various sessions between 1980 and now, the band have created a Genesis type feel, coupled to Floydian vocals – but with a severe lack of drive. The musical ideas – especially those on the title track, and on Only When I Laugh, are clever and not contrived, but the dreamy flowing feel to the whole cassette is a little light weight. The addition of a 'real' drummer would aid here I think, since their Roland TR808 cannot give the musical structures the push they need to become real classics. Having said that, Radio Silence do offer some versatile variations on the standard synth lineup. The title track was recorded 'in real time', instrumentation being Maxi Korg, Minimoog, Crumar DK II, Korg 3100 and Crumar Brassman. Effects were a Roland RE 30L and Electro Harmonix Memory Man deluxe. With this set up they have produced an essentially pastoral sound, but with some excellent string and vocal sounds (created by Larry using the Brassman and the Memory Man) which weave around the track quite successfully though the drone becomes wearing after a while.

Music:6 Production:6 Presentation:7 Tape:7

ALTAMONT: (Hemel Hempstead) Five Tracks. Steven Wilson, electric, acoustic and bass guitars, synths, percussion, vocals/vocoder. Vocking, 'various devices' and keyboards. Lyrics by Ally Duffy. (No equipment details). Very promising effort from 16 year old Steven Wilson, who has managed to create a very 'mainstream' synth album while avoiding the pitfalls of banality that many fall into. Interesting lead breaks run over a standard sequencer while it is tempered by the creative use of acoustic guitar and drums – creditable, but the sequencer runs on a bit too long and yawning can set in... The vocoder adds an

Alan Parsons touch to the whole venture, and the 'dry' vocals are adequate but a little weak – something that a good studio could solve quite easily. There are some echoes of Oldfield here, but these fall rather short due to the missing squealing lead guitar (on the track Tell Tale Heart). A good producer/record company could make much of this talented young band. The cassette, entitled *Prayer For The Soul* is available for £1.00 (or a C60 and SAE) from Steven Wilson, 82 Couper Road, Boxmoor, Hemel Hempstead, Herts.

Music:7 Production:6 Presentation:4 Tape:4

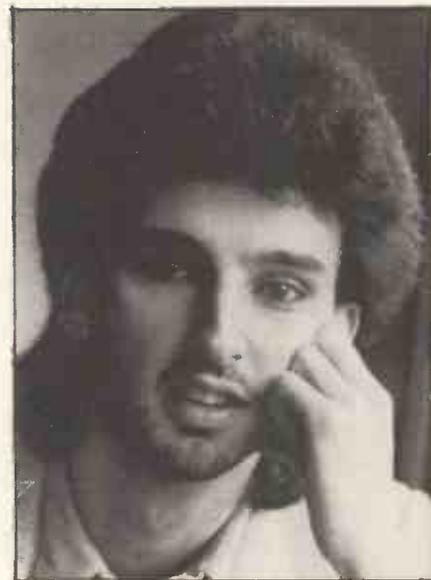
GEORGE BOUTZ: (California) Five Tracks. Georges Boutz, synths. Pretentious and essentially boring compositions from Georges, a French synthesiser player, based now in California. The problems that many players escape from – that of letting the sequencer play on and on – are the basis for this album, but at least they make no bones about it... "Sequencer patterns dominate, while establishing a solid base for this aural journey..." There is little melody here to speak of, and all in all, the cassette could be used as an interesting practice aid for synth players guitarists or vocalists to work over. The tape is available for \$9 from Synth Music Records 930 Palm Avenue 320, Los Angeles, Calif. 90069 USA.

Music:3 Production:3 Presentation:6 Tape:5

SSURAEA: (Nottingham). Two Tracks. Julie Davies, Darren Scothern, Mike Sinclair, Rob Williams. Hardware: Korg MS20, Roland SH101, Roland SH09, EDP Wasp, Casio MT30 keyboards, Roland TR808 rhythm compo composer, Teac 3440 recorder (4 track), Carlsbro analog echo, Amdek chorus HH Mixer (12-2). Almost new wave, with a touch of pop from this band, making a very nice coupling that is attractive both for its composition, and also for the production. Simple catches and hooks are combined here with the lush synth sound, that is in turn made powerful by the clever

use of vocals. Julie has an effective, but slightly unemotional voice, but this is made up for with the lyrics. Their compositional and production skills are refreshing – they have taken the best pop elements from the rhythm composer, and added the MS20s forte for energetic lead sounds to make Melodramatics a great pop song. Siouixie has already explored this area, but Ssuraea are making the clearing a little bit bigger. The Human Touch, the second song, does not fare so well due to the insipid lead synth sound, and the predictability of the chord changes. Sugar sweet it is, but you can only eat sugar for so long... Ssuraea could make a big impact, but they are hampered by tired musical clichés – to escape from these would make them very hot property indeed. Keep us informed!

Music:7 Production:5 Presentation:7 Tape:5



Steve Howell

STEVE HOWELL: (Cardiff) 'Waveforms' Nine Tracks. Steve Howell: ARP 2600, Axte, Juno 6, EDP Wasp, EDP Spider digital sequencer, Roland TR303 Bassline, Roland TR606 Drumatix, Teac 4 track (A3440), Evan Delay, Boss Chorus, EH Flanger, EH Distortion, Akai and OK, OK, so he is an E&MM contributor... so why should that stop him coming under the eagle eyed scrutiny of your cassette reviewers? As it happens, this is an intriguing tape, and the fact that it was made on just 4 tracks makes it even more so. The detail that has been put into the tapes is very creditable indeed and makes for an overall sound that is melodic synth rock, and the bassline and the drumatix combine very nicely to form the rhythm section, over which Steve has overlaid his backing and melody both of which counter melody until a pattern emerges far from the stifling worlds of sequencers. Conversely, the tracks are very 'samey' in their sound. Nevertheless a nice alternative to the usual approach to synths, (OK Steve? Can I have the cheque now...!)

Music:7 Production:6 Presentation:8 Tape:6

Here endeth this months review, meaning that we are catching up with you all... please keep the cassettes coming – live tapes would be especially welcome. As you can see we also cover home sale and small independant releases and we would be interested to hear from anyone with small cassette release companies with product for review.

RECORD REVIEWS

Yes

90125

WEA 790125-1

This album is the result of an interesting evolution. The origins of this incarnation of Yes lie in a collaboration between the perennial rhythm section, Chris Squire and Alan White, and Trevor Robin, critically acclaimed guitarist/keyboard player. This was to be the nucleus of a new band called Cinema, with these three augmented by the original Yes organist from the early days, Tony Kaye. It was this band who recorded the backing tracks over the past year or so. The original intention was for Trevor Robin to sing but eventually Jon Anderson had a listen to the material and was drafted in to share vocal duties. Meanwhile his replacement in the last version of Yes, Trevor Horn, who has made a fair old reputation for himself as a producer since then, was brought in to supervise this side of things.

The single 'Owner of a Lonely Heart' (with which you must all be familiar as it is currently storming the chart and the discos - two very unfamiliar territories for a Yessong) opens with very heavy power chords,

but settles into a Police-style groove (I always thought Sting's different again, having more in common with Styx or Kansas. The guitar solo gives a nod in the direction of Tim Renwick (in his Al Stewart days) and then it's back to brief burst of 11/8 to end the side.

Tricky time signatures are also the order of the day on the side two opener, the instrumental actually called 'Cinema' (presumably because Anderson is not featured). The band slip effortlessly from 11/8 to 7/8 to 3/4 with perhaps a hint of 'Los Endos'. The final chord has not even died away before they launch into the virtuoso vocal show piece 'Leave It', with that same attack as the beginning of 'All Good People', and the finale has the complexity of 'We Have Heaven' (Anderson's solo effort on 'Fragile').

'Our Song' begins with a bevy of keyboards with a syncopated rhythm section. The bridge is backed with the sort of fluid guitar runs Steve Howe specialised in which takes the whole thing up a gear (cf. 'Turn of the Century') and bursts into the joyous chorus. Synth and guitar take a harmony riff through a series of key changes and then back to the frenetic keyboards.

'Hold On' interposes a 'heavy' instrumental with a full vocal verse, sometimes unaccompanied, the chorus being a marriage of the two. The guitar solo is real vintage Yes, climbing slowly to a high climax, and then back to the overlaid vocal textures. 'It Can Happen' opens with a 'sitar' sound with a great repeated bass line under the vocal. Then it moves into a Gilmour-type echo guitar rhythm building to the straight rock chorus.

'Changes' begins with a demon riff in 11/8, but for the actual songs moves back to a Summers-type picking style. When Rabin's vocal comes, the verse sounds not unlike Rush.

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Samples on the Fairlight and backwards vocals over a repeated two-note bassline give the opening of 'City of Love' a spooky feel but it soon settles into the heaviest track on the album. The tension builds until the harmonies of the chorus come as a real relief. A slide guitar enters and wreaks havoc in the closing instrumental. Real American HM this one, but with perhaps the catchiest chorus line - the next single maybe.

The final track 'Hearts' comes as a real contrast. A sort of mini-'Awaken' at 7½ minutes, with hand bells, tuned percussion and surrealistic lyrics to match. The complementary singing styles of Anderson and Rabin really shine through in the opening section. Rabin delivers his finest solo yet and then comes a real blast from the past from Tony Kaye on Hammond.

An album to rank with all the others, combining instrumental dexterity with majestic songs and beautiful tunes. Perhaps the heaviest album yet, but the poppiest as well. And with the up-to-date production of Trevor Horn, it could win them many new friends without alienating the old faithfuls.

Paul Wiffen

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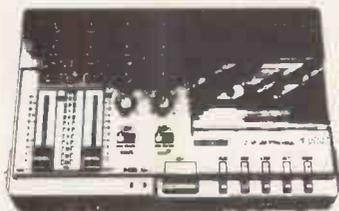


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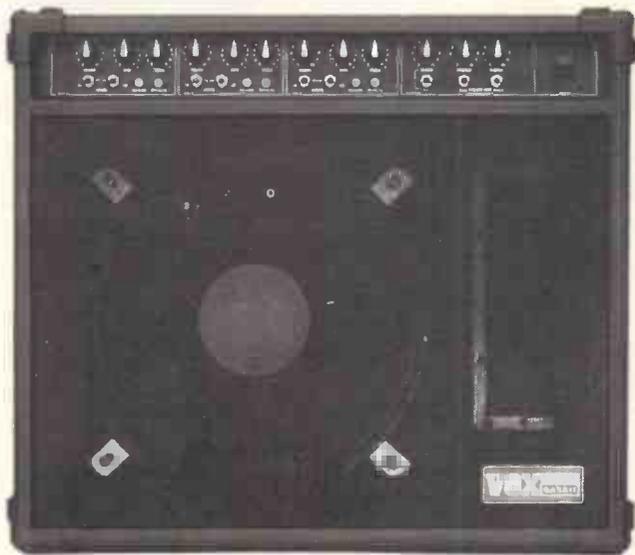
The **Venue lead amp**, for example, comes at an undistressing £199* (inc. VAT). For which you get 100 watts of solid power through a heavy duty 12" speaker; a three-band active eq., gain and master volume controls, and fully switchable overload and reverb, with LED indication.

The **Venue bass amp** will also push out 100 watts. In this case, through a 15" speaker, though still with three-band active eq., also with send and return for separate compressor or special effects units. All for £189*.

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It does this by mixing, using the 3 controls, Direct, Oct 1 and Oct 2, harmonics which are one octave and two octaves below the fundamental pitch of the input signal. It has special circuitry to minimise the decay 'hiccup', with which users of early octave dividers (and certain guitar synthesisers) will be only too familiar, where the guitar string's second harmonic is locked onto as it decays more slowly than the fundamental.

The Kit

The Amdek OCK-100 Octaver kit comes in bubble-pack form, complete with all parts, a spanner for tightening nuts and a detailed instruction sheet. The extra tools required are a 15 to 30 W fine tipped soldering iron, wire cutters and strippers, small pliers and a cross-head screwdriver. A PP3 battery powers the unit, although an external DC 9V input jack is provided.

Parts identification is best done by first laying them all out when they can be checked off one by one, using the component drawings in the handbook for guidance.

Step by step assembly commences with the preparation of 9 lengths of connecting wire which are attached to the three pots. This process is simplified by the provision of a scale and useful tips on soldering. In steps 4 to 6 the battery clip, LED and footswitch wires are prepared ready for connecting these, to the factory built PCB assembly in steps 7 to 11. These steps also include fitting the footswitch and the LED bezel to the metal case.

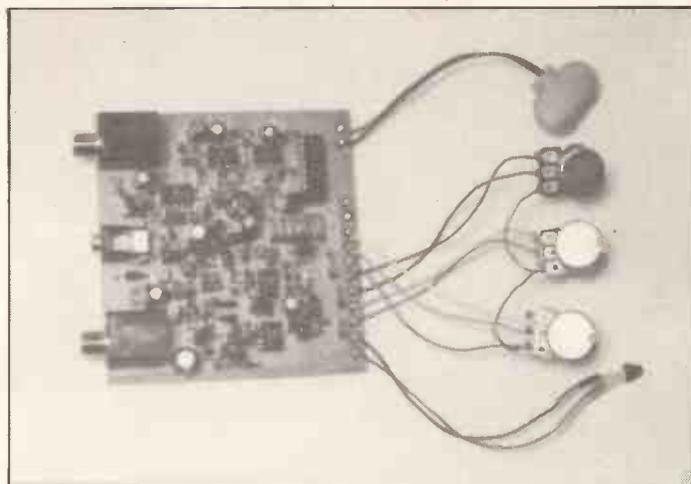
After the pots have been mounted into the case in steps 12 and 13, the PCB assembly is fixed in place by means of the jack socket nuts as shown in step 14. A self-adhesive plastic sheet insulates the PCB track side from the case base. A sponge insert is also stuck in place to restrict the movement of the battery. The base then screws neatly in place. The rubber battery cover gives simple and effective access without the use of screws (steps 15 to 19). The construction is completed by the addition of two stick-on feet and the three control knobs.

Circuit

As might be expected, the frequency division is performed by a CMOS dual flip-flop, IC7. The outputs from these two stages are used to



Complete set of parts ready to be checked off.



Pots, LED and battery clip fitted to PCB (steps 1-8).



Completed internal assembly (steps 14-16).



The completed Octaver.

control the analogue signal inverters, Q7 with IC4 for Octave 1, and Q8 with IC4 for Octave 2. The two halves of IC3 serve to filter out the switching noise.

The two divided outputs and the direct output are passively mixed by the three pots and R58-60 into the output buffer transistor via the switching FET, Q4. This, and the direct signal FET, Q6 are alternately activated by the flip-flop formed by Q3 and Q5. This is toggled by operating the foot-switch.

The anti 'hiccup' circuit comprises a low pass filter IC1, a pair of precision rectifiers IC2 and IC5, and a pair of comparators IC2 and IC5. The purpose of this circuit is to detect the lowest frequency harmonic present (the fundamental), and use it to clock the digital dividers.

Operation

The Octaver kit was assembled without any problems and worked first time. If you do have problems however, you can contact the Roland 'Hot Line' on 01-847 1671.

The unit performed quite well, although despite the ingenuity and complexity of the fundamental picking circuit, hiccups were still occasionally apparent. These were not too dramatic however, due to the heavy filtering used.

Modifications

Amdek do not recommend modifications since "The circuit may be broken". However, you may like to experiment with the values of R31, 34, 35, 51, 52 and 56 to alter the cut-off frequency of the switching noise filters. Reducing the values (try halving them) will make the sound less mellow. The side effect though, will be more noticeable hiccups.

E&MM

Panel Description

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

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 turns the OCK-100 on, so please disconnect the cord when not using the unit.

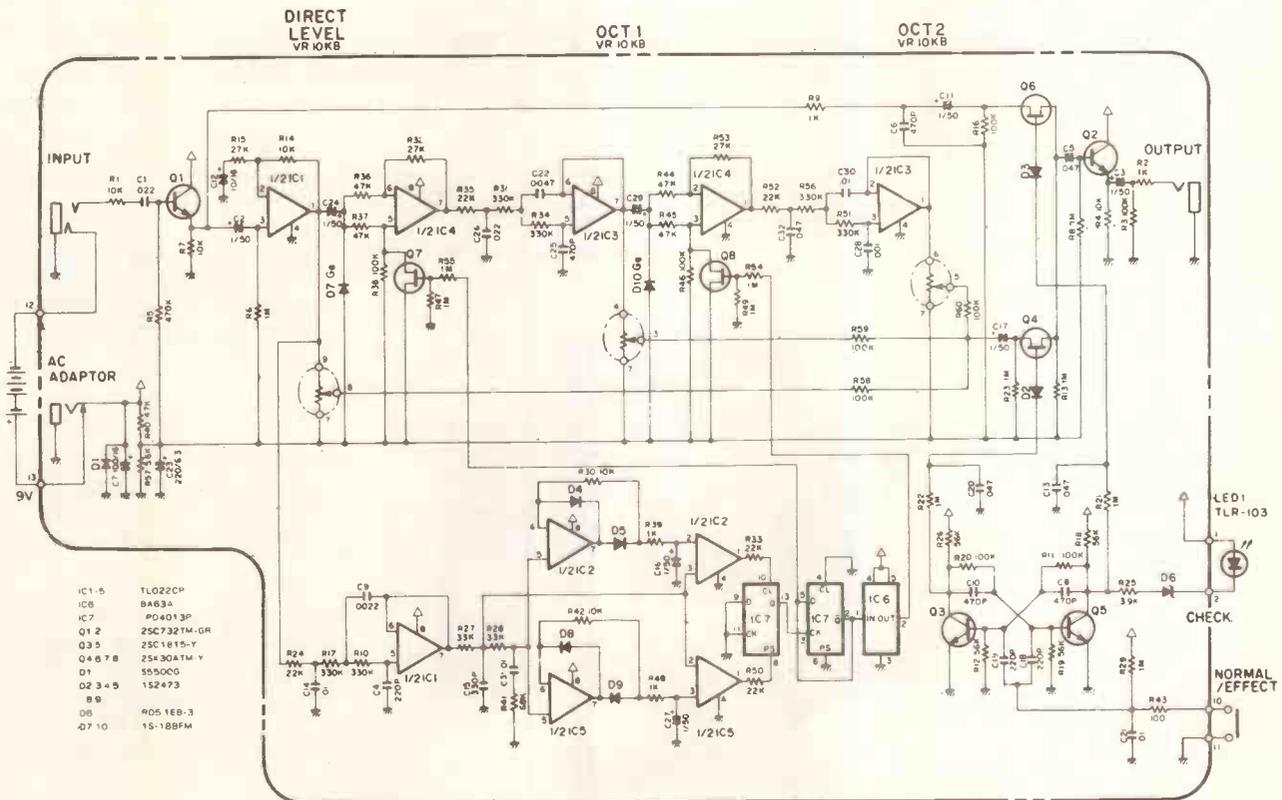
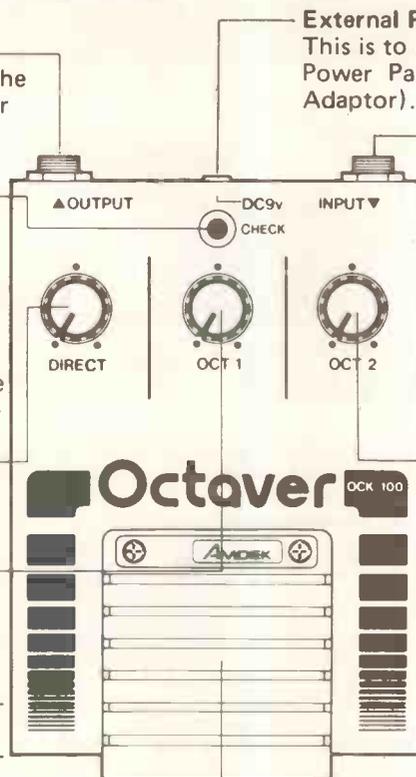
LED:
This indicates ON/OFF mode of the OCK-100. Also, this can be used to check battery. If the LED fails to light or become dimmer, the battery should be replaced.

DIRECT:
This knob adjusts the volume of the direct sound.

OCT 1:
This knob adjusts the volume of the sound one octave lower than a direct sound. Turn it clockwise to increase the volume and counter-clockwise to decrease.

OCT 2:
This knob adjusts the volume of the sound two octaves lower. Turn it clockwise to increase the volume and counter-clockwise to decrease.

Foot Switch:
This turns the effect on or off.



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The Kit & Accessories

Following E&MM's recent visit to MPC Electronics, our 'roving reporter' returned clutching a collection of 'add-ons' to the ever-popular Kit which have been released following our in-depth review of the basic Kit unit some time ago. Interest in MPC products has, of course, increased due to their innovative design, the Music Percussion Computer (M.P.C.) which enables you to play with real drum sticks (unlike the Kit) and features comprehensive computer control.

However, it is gratifying to see that MPC have not forgotten the Kit devotees, who will no doubt wish to expand the capabilities of their machine with the Synkit, Tymp and Clap (not forgetting the useful new Power Pack!). But first . . .

The Kit

The Kit and accessories' design are based around circular pads mounted over piezo pickups which, when played by your fingers, trigger the respective sounds with a certain degree of touch sensitivity. The basic unit features Bass Drum, Snare, Hi and Lo Toms, Open and Closed Hi-Hats, and Cymbal pads. The Hi-Hats can be set to play automatically (and therefore acts as a built-in metronome) with a variety of open and closed (factory preset) hi-hat rhythms, but these patterns can be added to manually and the tempo and volume adjusted to suit. Individual levels for each drum sound can be set using the front panel controls and individual line outs are available which, when used, preclude that sound from the main 'Mix Out' (useful for giving one sound a 'special treatment').

A foot switch facility on the back panel enables the Bass Drum Pedal/Hi-Hat on/off accessory to be connected.

Two mini-jack Trig Out sockets (triggers being obtained from the Hi and Lo Toms respectively) are also included which connect to the Trig In sockets on the accessories. An extra socket, marked 'Trig-Out Clap', has been added to the newer models, and this enables the Clap to be triggered automatically when the Auto Hi-Hats are in use. In 4 or 8 beats to a bar mode, the Clap triggers on beat 3 and 5 respectively. However, by selecting 8 to a bar at a fast tempo (ie. simulating 16ths) it will appear to trigger on beats 2 and 4.

The Synkit

The Kit's accessories are designed to compliment the main unit and they adopt the same stylish finish. The 5cm diameter pads match the Hi and Lo Toms in size and the add-ons can be triggered from these via Trig Out 1 or 2 from the Kit. The back panels on each of the accessories contain Trig In, Output, and 9V Supply sockets – the Output sockets are standard ¼" jack, while the remainder require mini-jacks.

The Synkit enables the user to obtain a wide variety of syndrum sounds by altering the Sweep (which varies the depth of the sound), Decay (sets the decay time), and Pitch (sets the frequency range of the sweep) controls on the front panel. As well as force-to-volume sensitivity, tapping the pad harder will produce a relatively deeper sweep and longer decay time.

As far as syndrums go, the Synkit is one of the better ones, but unfortunately (for MPC) the days of the phantom 'peeyoo' sound is past. However, considering that fashions tend to have a ten-year repeating cycle, you could always buy your Synkit early for the 1989 revival!

The Tymp

This unit claims to simulate peddle tympani and features Volume, Pitch, Decay and Mix controls. The Mix control adjusts the combination of 'Noise' and 'Tone' in the sound, while Pitch 'tunes' the drum (0 being high and 10 being low for some strange reason). Anyone with a facility on their synth for mixing white noise and a ramp wave could emulate the Tymp, and although it produces some interesting sounds, its usefulness is questionable.

The Clap

By far the most impressive of the set, The Clap produces a variety of realistic hand claps which, as already mentioned, can be triggered manually (from either of the Toms) or automatically by the Hi-Hats on the main unit. The variable parameters are Spread, Mix, Decay and of course Volume.

The Clap effect itself is produced by three (almost simultaneous) bursts of sound and spacing between these can be varied by the 'Spread' control which helps to suggest more human 'out-of-sync' hand claps. The 'Mix' control balances the 'Claps' and 'Noise' in the selected sound, while 'Decay' sets the decay time of the single noise burst.

Bearing in mind that all of the Accessories can be purchased separately (and operated without the main unit), anyone looking for a 'clapbox' could do worse than to check out The Clap.

In use, the Kit and its accessories offer a variety of layout possibilities depending on which drum sounds or trigger options you find most useful. It is possible to play the kit using pencils etc, but you may find that erroneous triggers are relayed to accessories from the 'non-trigger' pads due to vibrations.

The sound authenticity is improved considerably by amplifying through a good quality system and the use of the Power Pack is advisable due to the slight deterioration in sound quality that can be experienced when the batteries run low. The Power Pack supplies four stabilised 9V DC outputs and would pay for itself quickly if the units are used extensively.

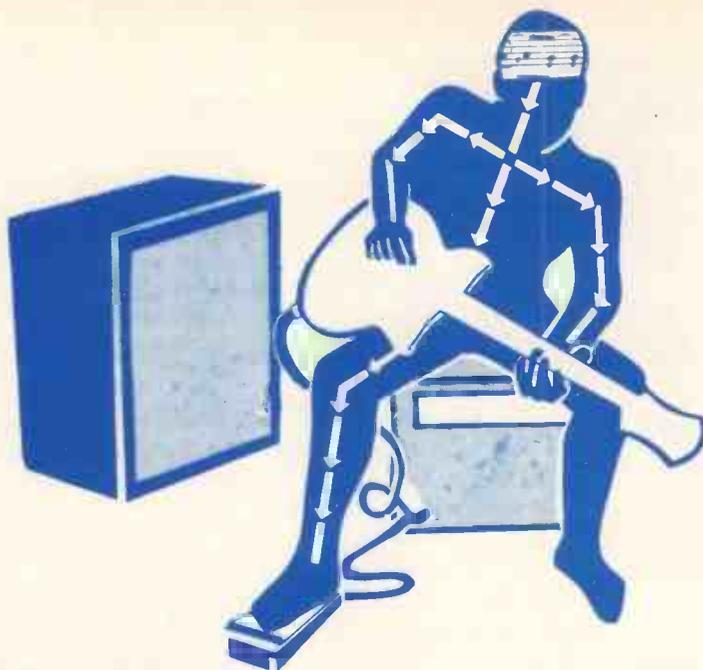
The automatic Hi-Hats can be quite difficult to follow; even though the patterns always begin on the first beat you soon lose track as the open Hi-Hats gradually appear to occur on the on-beats when in fact they don't! Perhaps a more 'cutting' and/or relatively louder closed Hi-Hat sound is called for.

With practice though it is possible to perfect a certain amount of skill and playing technique and the 'humanisation' touch can add to the illusion of a real drummer rather than detract from the sometimes aggravatingly perfect timing that drum machines produce!

Patricia McGrath

E&MM

For further information contact MPC Electronics, The Gables, Station Road, Willingham, Cambs CB4 5HG. Tel. (0954) 60264. RRP's for the above are: The Kit – £149.95; The Synkit – £59.95; The Tymp – £59.95; The Clap £69.95; Bass Drum/Hi-Hat Pedal £29.95; and the Power Pack – £19.95.



the PSYCHOLOGY of music

by Andrew Morris

How is it some musicians can create music spontaneously, seemingly at whim, whilst others cannot? New pieces seem to just flow from their fingertips, but it's often true when those who are able to improvise are asked how they manage it, they are invariably at a loss as to how to answer this taxing question – "I don't think about it, it just happens", "I hear a tune in my head...". Perhaps the difficulty we have in trying to fathom this stems from the unconscious and automatic nature of the processes involved.

An analogy of the improvisation phenomenon is spontaneous speech, in which we talk first without thinking consciously about what are about to say. This, however, does not further elucidate how it happens, but rather it points our line of inquiry to the development patterns which exist in both learning to speak and learning to play an instrument. It is likely that in the early stages of learning to do either, the processes were very much under conscious control. As our competency and technique increased in complexity and automation the 'soft'-control systems moved from conscious to unconscious levels. At some stage the systems containing the motor programs and action plans (which we introduced in Parts 1 and 2) would cease to be directly accessed by our consciousness.

Improvisation

In improvisation, a piece of music is spontaneously created. What triggers this is difficult to say, but the process must be governed to a certain extent by a set of rules that limit the final form of the improvisation. These rules involve the overall structure of pieces such as the initial statement of the melody, development, chordal and harmonic progressions, second melody, bridge, conclusion, and so on. Interestingly, it seems that these rules apply to all musical improvisation regardless of its cultural

setting: what holds true for Western jazz holds true for Indian sitar music.

Models of Improvisation

There are several perspectives from which the phenomenon of improvisation can be studied but perhaps one of the more interesting is to consider it as a sort of problem, rather like chess, having a starting state and a goal state. A problem exists when there is a difference between the two. Let's take the chess analogy a little further. The starting state is when all the pieces are arranged in their respective places on the chessboard. The goal state is the checkmate which both players aim for. Each time a player moves a piece, a new state is

formed. In this way there are an endless number of intermediary states between the starting and goal states. The range of possible moves at each state can be set out in what is called a problem space which looks on paper something like an elaborate tree diagram. For a complex problem like chess, and also improvisation, the number of branches or possible future moves becomes infinite after the first few moves.

If we consider the improvisation process as having a starting state in the particular note or chord that is played first, and a goal state in the note or chord that finishes the piece, then a problem exists, since the aim is to achieve the goal state using as many (or as few) 'sensible' moves as the performer wishes. Each new chord or note played after the first represents a new state, and at each of these there exists an almost infinite number of possible 'moves' which the performer can make based on experience and technique.

Before, let's look at another but far simpler problem. By analysing the sorts of processing we would use to solve this simple problem, we may gain some insight into the processing involved in improvisation. A tall story? Then read on.

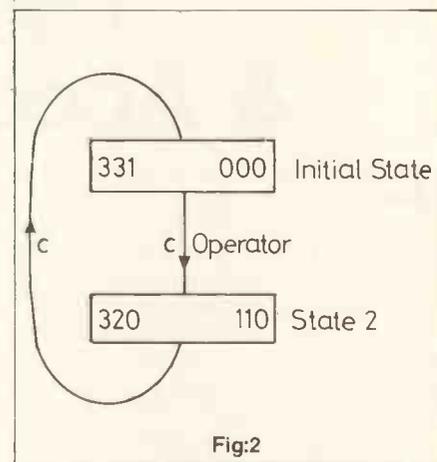


Fig:2

Missionaries and Cannibals

For the benefit of those who have not come across this little puzzle, here are the essential details: at the start there are three missionaries (M) and three cannibals (C) on the left bank of a river. There is a boat which

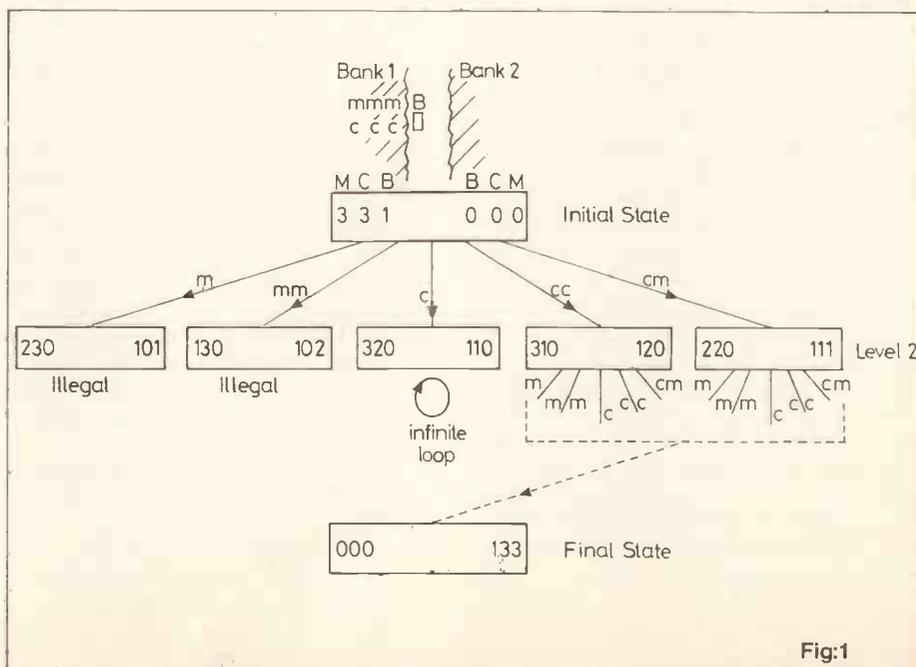


Fig:1

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is used to transport them to the opposite bank. The only rule of the puzzle is that the cannibals must never outnumber the missionaries on either bank. The aim is to transport everyone to the right bank *without* losing any of the missionaries to the bloodthirsty cannibals!

In Fig. 1, the starting state is shown with the numerical representation that will be used from now on. From this state there are five possible moves, which, in the interests of parsimony, we will denote M, MM, C, CC, and MC. These represent the limited ways in which the M's and C's can be moved across the river, and will be called. By applying each of these operators to the starting state a series of new states is formed (level 2). Each of these should bring us closer to the goal state i.e. the answer. The number of 'branches' at any level of the problem space tree is directly proportional to (i) the number of operators (in this instance five) and (ii) the level of that state. For instance, after say four moves, the number of possible branches would be 5^4 (625 moves). Of course, some are 'illegal' as they result in the Cs outnumbering the M's on one or other bank, and some result in infinite loops which are the bane of computer programmers. These are terminated. An example of this is seen in Fig. 2, where a cannibal is transferred to the right bank only to be returned to the left. The application of this operator does *not* bring about a state which is any closer to the goal.

A New Explanation of Improvisation

It has been necessary to look closely at this strange type of problem analysis in order to try to explain how musicians

improvise pieces of music. Improvisation can be represented in a similar fashion to the previous problems by a *problem space*, in which the operators are defined as the motor programs and action plans required to perform specific notes or chords. The application of an operator follows a rapid 'mental calculation' which is based on the previous note or chord. This is outlined schematically in Fig.3. The number of possible operators is almost infinite, and depends almost entirely on each individual performer's musical knowledge, experience, and technique. It is conceivable that an improvisation could take each separate state as it comes, calculate and execute a new operator in a relatively arbitrary manner, and produce an entirely satisfactory sound. But unfortunately, it is in this last respect that improvisation separates the men from the boys.

Expert improvisors generally play in a certain style which tends to reflect the way their improvisatory repertoire is chosen. Their choice of each operator is far from arbitrary. Meanwhile the mediocre improvisator has a much more restricted set of operators, has less physical familiarity with the instrument, and consequently a poor style. He or she solves real-time problems by choosing operators from a restricted and unadventurous set, creating a piece that is repetitive and uninspiring. In fact, the improvisation may take the form of a simple tonic to dominant, dominant to subdominant, and back to tonic progression. This is analogous to the short-term infinite loop we saw earlier.

Infinite loops which involve many more progressions, *do* have their uses in improvisation, serving to repeat and develop melodic ideas.

Conclusion

And so to putting all these ideas together. The starting state of any improvisation is the first note or chord. Depending on the performer's experience and ability, there are several ways to create a new state by the application of operators which reflect the result of a rapid mental calculation. This is the result of a rapid access to the performer's own library of musical knowledge, containing information about the pitch, timbre, duration, and rhythm of notes, as well as chord structure, harmony and more general information about the overall structure of tunes and their aesthetics.

In a jazz improvisation, for example, it may be necessary before choosing the appropriate closing sequence, to determine where the previous sequence will lead, and how much time is required to return to the starting state. Short-cuts can be taken if the performer knows already the result of a certain operator, and so it is obviously not enough that an improvisor knows how a performance is to be structured (such as, that a certain chord sequence must be negotiated in a given time); he or she must have rapid access to a massive compilation of knowledge, and musical experience.

It is understandable that the complexity of the improvisatory skill has severely inhibited experimental investigation and psychological theorising. At present, we cannot account for the ability which allows some people to spontaneously create music as opposed to others who just cannot. It is likely that we may never know, as the innate and learned components of most behaviours are inextricably linked.

E&MM

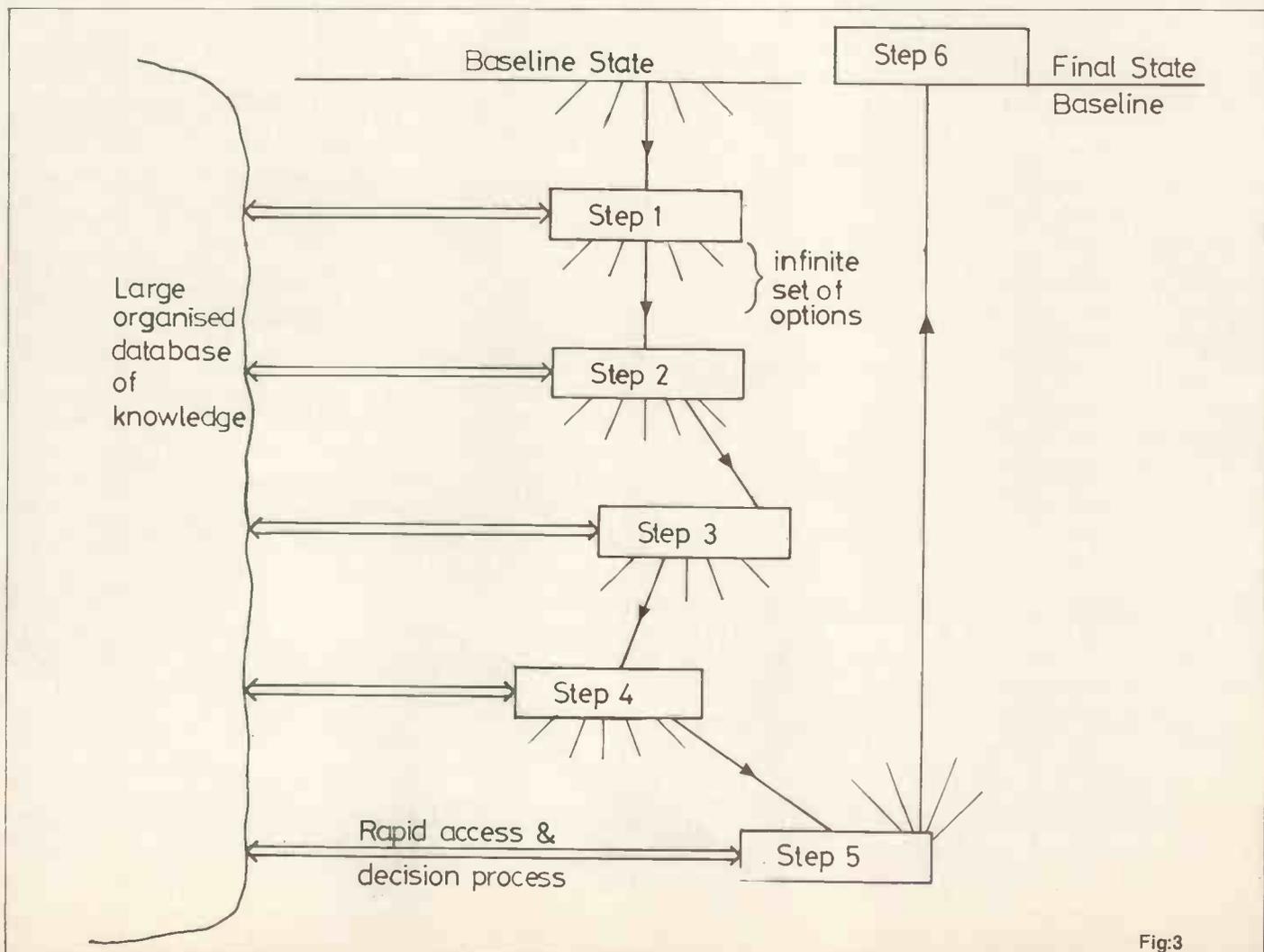


Fig:3



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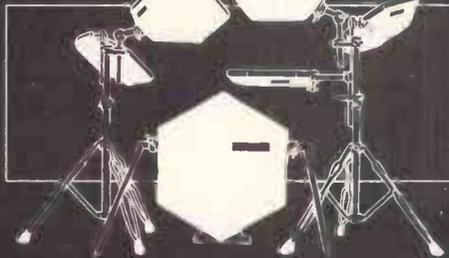
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The second reason is that certain synths often have little peculiarities which can be made to do a particularly useful job in a certain sound and we will be endeavouring to highlight this where such idiosyncrasies exist.

We hope to use many sources to make this regular feature as widely reaching as possible, ranging from Factory presets and ideas from manufacturers, through sounds programmed by E&MM staff and regular contributors, to those submitted by you the reader. We also want to cover a wide range of synths be they brand new or old faithfuls. So if you have an unbelievable crumhorn patch for the DX-7, an authentic sax for the Wasp, or a sound no-one has ever heard before, send it through to us (in as comprehensible a form as possible) and mark your envelope 'Patchwork'. All sources will be credited, so here's your chance to appear alongside the big names!

As far as the patches are concerned, don't take them as gospel! Individual instruments of the same make and model number still vary from one to the next, so if the patch doesn't sound quite right, feel free to tweak the settings. No patch is unimprovable, however respected the source.

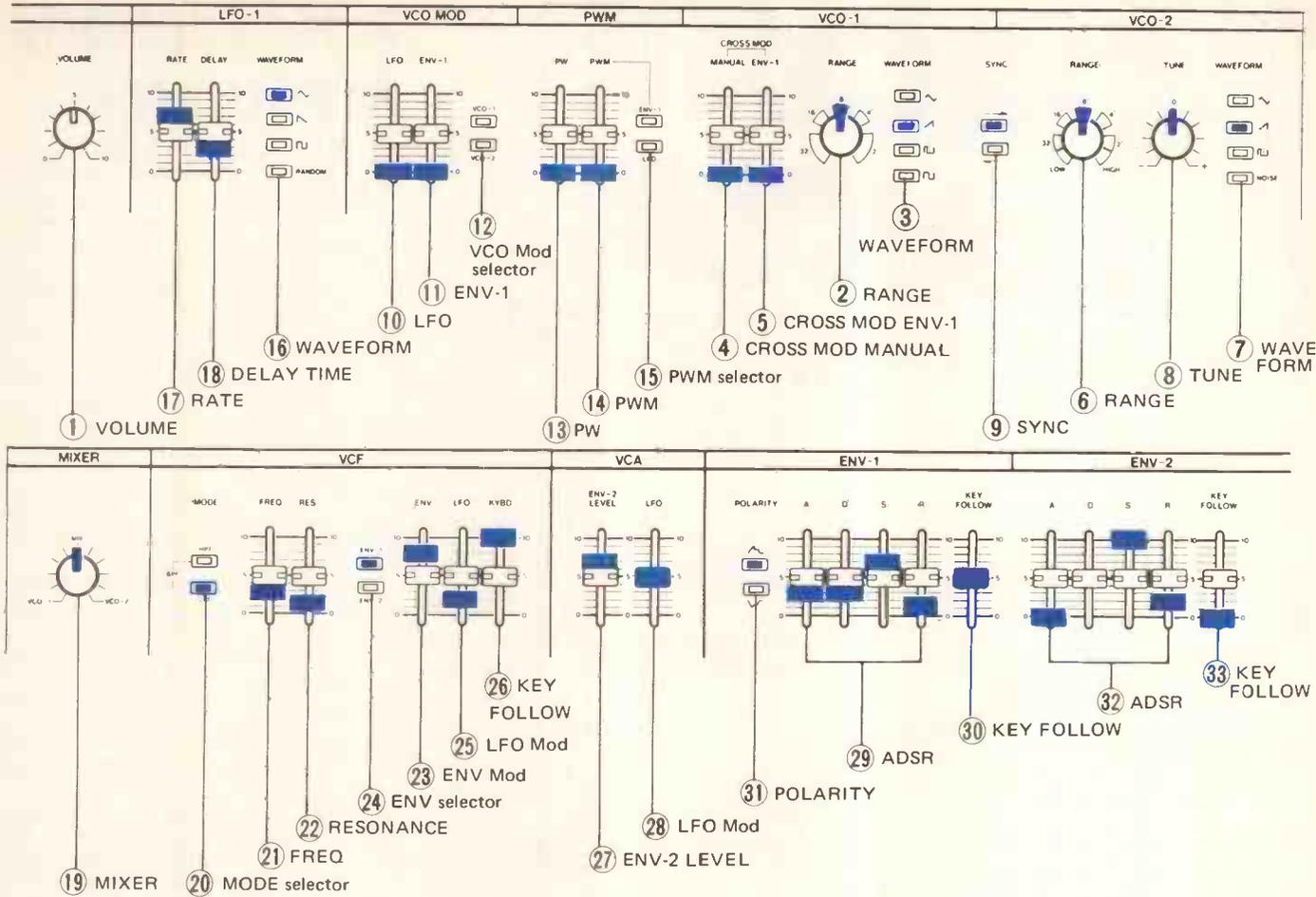
If you don't have access to the actual synth in any patch, this doesn't mean you can't try out this patch on a similar machine. As long as the basic format is the same, it should work. You never know it may actually sound better!

To set the ball rolling here is a look at how more authentic brass sounds can be created. We are beginning with a patch for the Poly 61 as the way this synth is programmed draws attention to every parameter and the role it plays in creating the final sound.

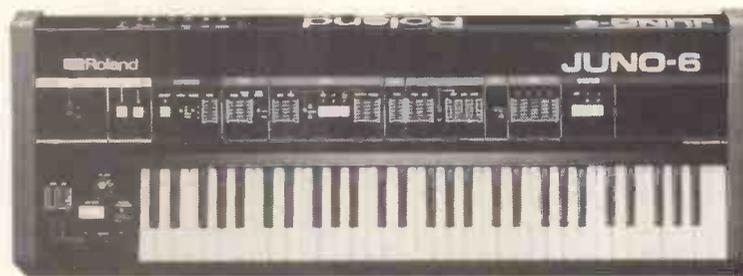
Parameter Number	Name	Value	Effect	Solo Trumpet for Poly 61 Source: Paul Wiffen
11	Octave	8'	Selects middle register for DCO 1	
12	Waveform	1	Gives sawtooth for bright full sound on DCO 1	
13	PW/PWM	0	Not used on this patch	
21	Octave	8'	Select middle register for DCO 2 (if used)	
22	Waveform	0	DCO 2 not on. If set at 1 (sawtooth) gives ensemble effect	
23	Interval	1	DCO 2 (if used) plays same note as DCO 1	
24	De-tune	2	Slight de-tune between DCO 1 and DCO 2 (if used) for ensemble	
31	Cut-off	4	Filter almost closed, allowing envelope to open it	
32	Resonance	1	Just a hint of resonance. Larger amounts give a brighter tone with more 'wah'	
33	Kbd Track	1	On to give the same harmonic content to every note	
34	Eg Int	6	Gives almost maximum filter effect from the envelope	
41	Attack	8	Looses percussive edge to note but attack not too slow	
42	Decay	13	Gives a fairly slow decay, dulling sound slightly	
43	Sustain	8	Sets sustain about half way to allow note to sound after characteristic tail-off	
44	Release	10	A fair bit of release to give the effect of a large acoustic	
51	Eg Mode	1	Causes envelope to work on both VCA and VCF	
61	Frequency	9	Sets quite quick LFO rate for tremolo effect	
62	Delay	1	Introduces tremolo after initial 'blow'	
63	DCO	0	No vibrato on brass instruments!	
64	VCF	2	Slight tremolo effect to give an expressive feel	



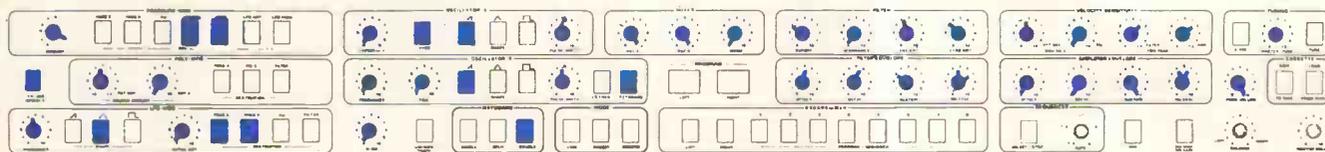
Manual Control Section



This patch (for the Juno 6) shows you how a more effective brass sound can be obtained when you have a separate envelope for the filter. You will see that the amplifier envelope (32) is a simple on, full and quickish release, whereas the filter envelope is more complex, using a slower attack, a slower decay down to a 70% sustain level, and then a quicker release than the amplifier. Combine this with the fairly low cut-off frequency and we get sound whose brightness varies in the same way as does a brass instrument. Note again the hint of tremolo (16) (17) (18) routed to the filter (25) and the amplifier (28). A touch of key follow on the filter (30) make the sound brighter as you go up the keyboard, imitating the way a brass player has to blow harder to get higher notes.



Lastly let us look at a top-of-the-range, touch sensitive synth to see how all its comprehensive features can be used to refine a sound and set the seal of authenticity on it.



Touch-Sensitive Brass on the Prophet T-8

Here we have a brass sound using sync to ensure that both oscillators are playing at exactly the same pitch and once again sawtooth has been selected. Note we still have the independent setting of the Filter Envelope to shape the brightness characteristics, whereas the Amplifier Envelope has a much more straight forward setting. Looking at the Velocity Sensitivity panel (top right), we see that there is a fair amount of positive effect on both the filter and the amplifier envelopes. Combined with a setting of 5 on the Attack/Decay Rate, this means that both filter and volume will be accentuated on fast keyboard strikes, bringing out a more strident punchy sound.

The 'second touch' (Pressure Sensitivity) effect can be seen on the Pressure-Mod panel (top left). Here a large amount of positive effect is routed to the Filter and Amplifier. This means that pushing on keys after playing them will increase the brightness and volume, giving the effect of removing a mute (a la 'big band sound').

CIRCUIT MAKER

Ever wished you could practice your keyboards without disturbing your neighbours but were prevented by the lack of a headphone socket? Well, here's a simple circuit idea to let you do just that.

Building A Headphone Attenuator

Many power and instrument amplifiers lack headphone sockets, but the necessary attenuator-cum-socket is easily added. Headphone power handling, sensitivity and impedance varies widely, but the attenuator values given below will suit most of the common models, including high impedance types from Beyer, Sennheiser and AKG. Note that, in general, low impedance cans (headphones) require more power, and accordingly, potentially large amounts of power dissipation have been allowed for in the attenuation resistors wired across the higher powered amplifiers. One advantage of high impedance headphones is that attenuation resistors need only be cheap 1/2 watt or 1 watt carbon types, almost regardless of the amplifier's power output.

Resistors may be carbon or wirewound, but above 1 watt, you'll find wirewound types smaller, and therefore easier to mount. The values given are standard, but not all the E12 values are easy to obtain in wirewound format. If you need to use several resistors in series or parallel to make up the value/wattage given in the table below, wire these on a subsidiary heavy-duty tagboard, connected to the socket via flying leads.

Resistor wattages are given assuming music signals; continuous tones at high levels may cause overheating, but it's likely that the headphones will expire first. If in doubt, uprate the wattages given, by 30% to 50%. The nominal maximum power applied to the cans (2W for 8, 15, 16 ohms, 200mW for 200, 400 & 600 ohms and 100mW for 2000 ohms) is available only at the power amplifier's maximum output, so excessive power shouldn't be available under normal circumstances.

Headphones are universally wired for stereo, but instrument amplifiers have only a single channel output. In this instance, each side is powered via a separate attenuator, and connection to the (mono) amplifier output is made via a stereo socket, so allowing standard stereo cans to be plugged in without further ado (Figure 2). Headphone sockets wired across power amp outputs cannot in general be arranged to switch the speaker in and out, as R2 remains in circuit, and would overheat when the headphone jackplug is withdrawn. Switching out the speakers/power amp is more easily arranged at line level, particularly with high impedance headphones, which don't normally require attenuators in this position. However, we've opted for connection to the power amp outputs, as this is easier for readers without technical know-how to implement, so figure 3 shows on SPDT switch arranged to select either speaker or cans. This should be a heavy duty toggle or rocker type, rated at 5 amps minimum, and preferably 10 to 15 amps for use with amplifier outputs in excess of 100 watts.

Lastly, if you're stuck for panel space, or would rather avoid drilling holes in your cabinet, look for redundant sockets you can replace. For instance, consider replacing two (mono) send-return facility (see jackfile 3, December HSR for send return wiring using a stereo socket). With this rearrangement, a spare hole will then be made available in the panel for the stereo headphone socket.

Ben Duncan

E&MM

JANUARY 1984 E&MM

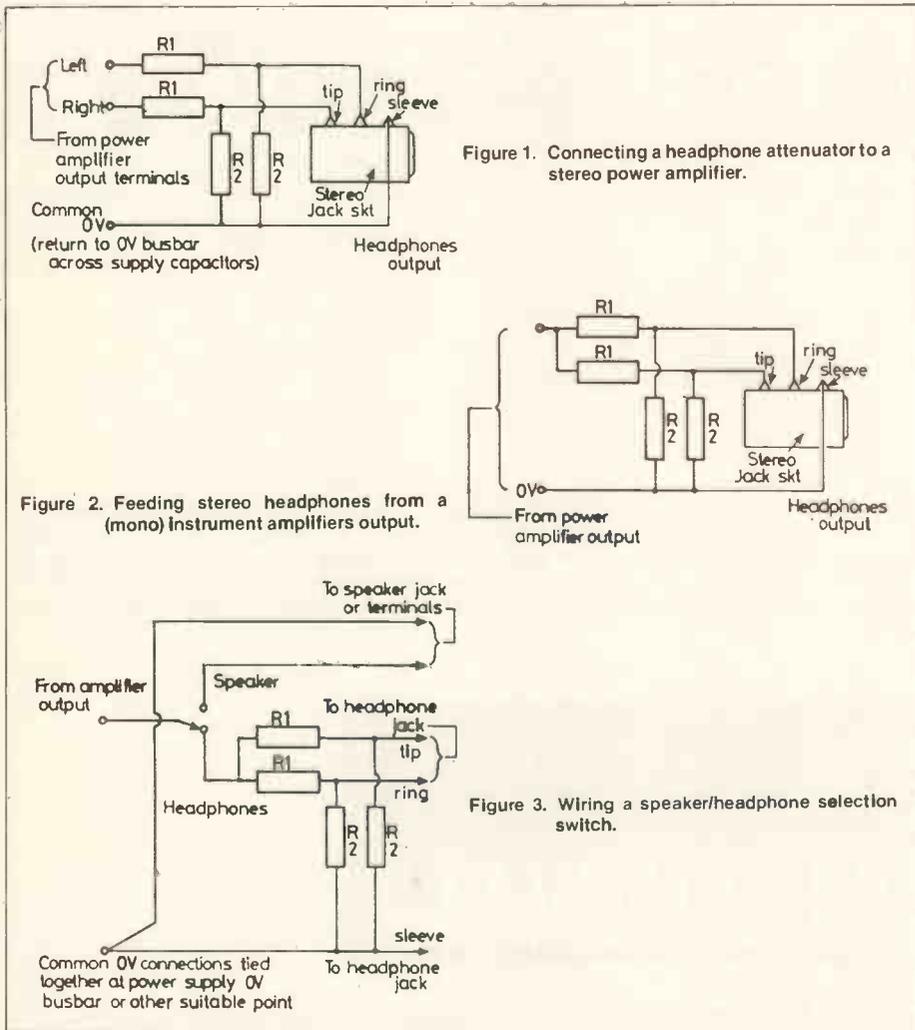
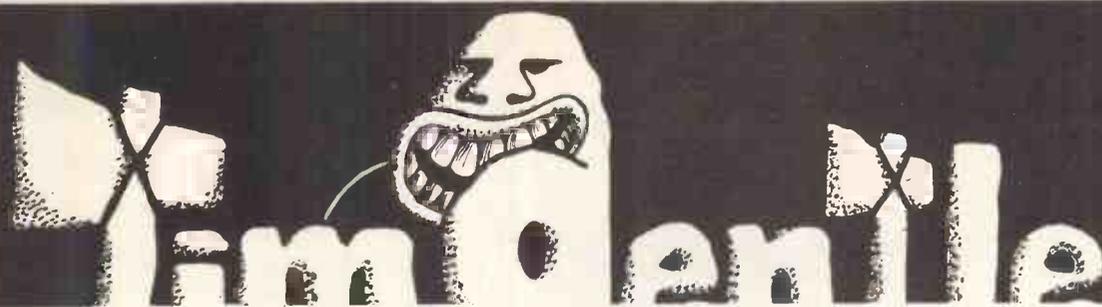


TABLE 1. Resistor values for various amplifier output powers.

Nominal amp. power into:				Headphone Impedance											
				8ohm		15 or 16 ohm		200ohm		400ohm		600ohm		2000 ohm	
8ohms	4ohms	2ohms	RMS output voltage	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
30w	60W	120W	15V	22R	omit	27R	omit	150R	220R	120R	390R	100R	620R	100R	2k2
				5W		3W		1/2 W	1/2 W	1/2 W	1/2 W	1/2 W	1/2 W	1/2 W	1/2 W
60W	120W	240W	22V	18R	8R2	22R	15R	270R	220R	270R	390R	330R	620R	560R	2k2
				17W	2W	11W	1W	1W	1/2 W	1/2 W	1/2 W	1/2 W	1/2 W	1/2 W	1/2 W
100W	200W	400W	28V	24R	8R2	33R	15R	390R	220R	430R	390R	470R	620R	1k	2k2
				17W	2W	9W	1W	1W	1/2 W	1W	1/2 W	1/2 W	1/2 W	1/2 W	1/2 W
150W	300W	600W	35V	33R	8R2	47R	15R	470R	220R	560R	390R	680R	620R	1k5	2k2
				17W	2W	11W	1W	2W	1/2 W	1W	1/2 W	1W	1/2 W	1/2 W	1/2 W
250W	500W	1kW	48V	56W	8R2	68R	15R	680R	220R	820R	390R	1k	620R	2k2	2k2
				21W	2W	15W	1W	2W	1/2 W	2W	1/2 W	1W	1/2 W	1/2 W	1/2 W



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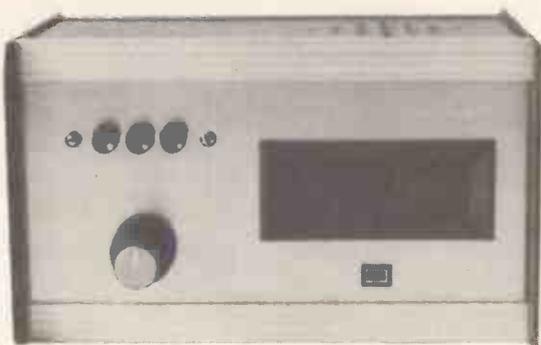
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EM2

Digital



Metronome

- ★ Accurate, stable tempo
 - ★ Built-in signal generator
 - ★ Tuning reference aid
- by Stephen Ibbs

There aren't many digital metronomes on the market, either amateur or professional, unless incorporated into instruments like the Synclavier. This is in a way surprising because it is surely easier to set a particular tempo using a digital read-out rather than an inherently less accurate calibrated dial. A problem arises when building such a unit, because the user obviously requires pulse-rates per minute, but for a reasonable response time the counter needs to read at the most pulses per

second. A possible technique is to have an oscillator running between approx 30-150Hz, and displaying this, before dividing the frequency by 60 to give pulses per minute. However unless care is taken, inaccuracies occur in the counting and gating sections.

This design aims to overcome these problems by using the Intersil gating IC, the ICM 7207A, controlled by a 5.24288MHz crystal. This will give either a 0.1 or a 1 second gate, so by using a 300-1500Hz oscil-

lator and the 0.1 sec gate, the display will read 30-150 with a very high degree of accuracy, and fast resolution. The oscillator is then divided by 600 to give the required 'bleeps'. Readers will no doubt realise that if the oscillator range was expanded it would make a useful squarewave signal generator/tuning aid . . . particularly since with the 1 sec gate there would be a direct digital read-out of Herz. It could be set to 440Hz for example with confidence, knowing that concert pitch 'A' is coming out of the speaker.

Operation

A metronome needs to cover approx 20-150 beats per minute, but a signal generator should range from approx 150Hz to at least 5kHz to be of any real use, so two variable ranges are provided by SW2a, controlling the 555 oscillator. The effect of this switch is to alter the top of the frequency range by either R2 or R3, reducing the range for the metronome function. The output is a squarewave which is fed via the NOR gate IC7d to the 4 digit counter/driver ICM7217A.

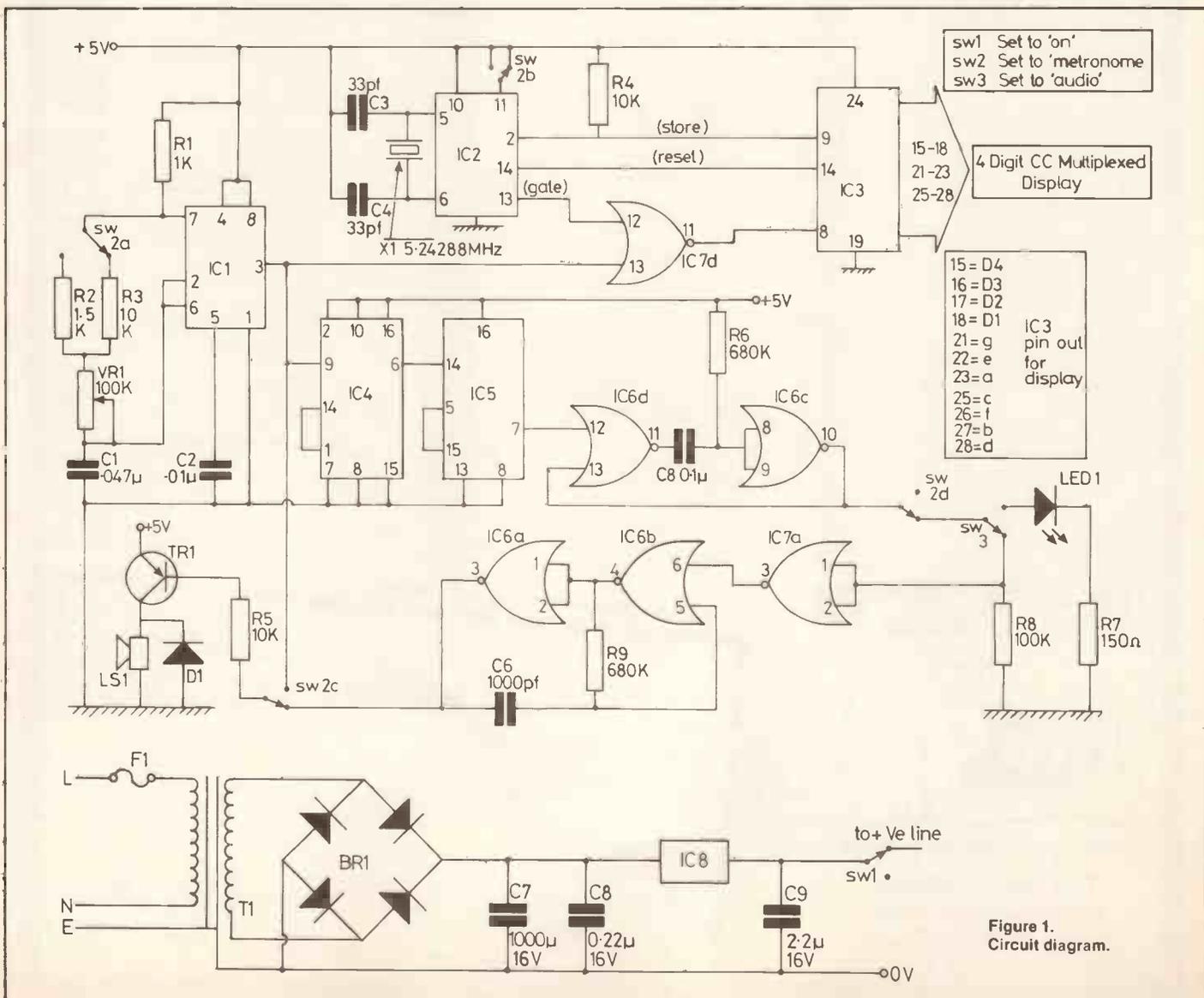


Figure 1. Circuit diagram.

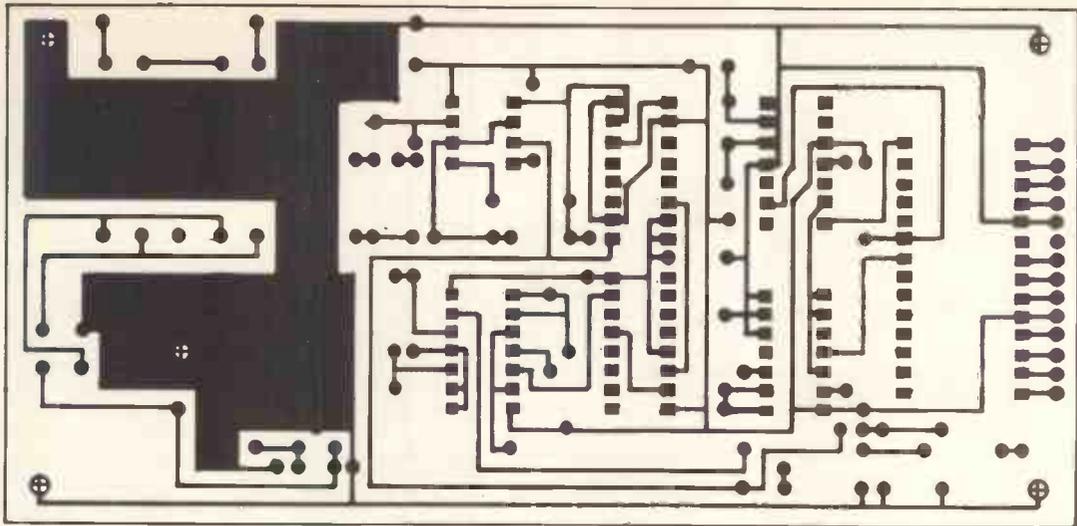


Figure 2.
PCB design.

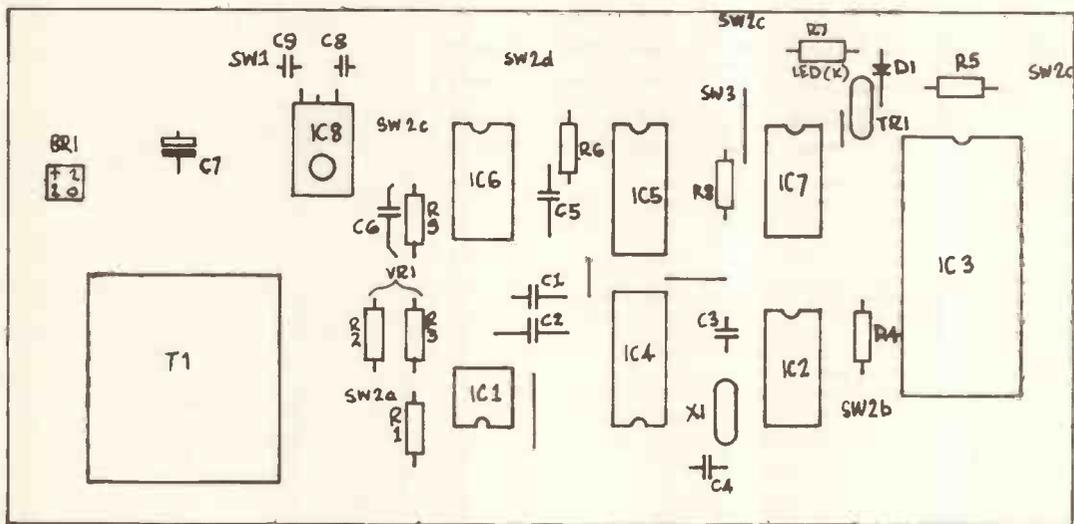


Figure 3.
PCB overlay.

The other input to the NOR gate is provided by the 'gating' output of the ICM7207A, which goes low for either 0.1 sec, if pin 11 is high, or 1 sec, if pin 11 is left floating. The 7207A also produces the necessary store and reset pulses in the correct sequence to give a constantly updating display. The output from the 7217A controls a 4 digit multiplexed CC display, mounted on a separate PCB.

The output from the 555 also goes to IC4, a dual synchronous divide-by-10 counter. The two sections are cascaded together to divide the incoming frequency by 100, and the output feeds IC5, a 4017 which, because output '6' is connected to the 'reset' pin, acts as a divide-by-6 counter. Pin 7 thus gives one high pulse for every 600 fed into pin 9, IC4. The width of this pulse varies as the frequency changes and, at the bottom of the scale, is not short enough to give the characteristic 'bleep' of the metronome. To overcome this, the pulse goes via IC6c and d, connected as a short period monostable, whose output is largely independent of the width of the incoming pulse. This is inverted by IC7a and b, (with an approximate frequency of 1kHz with the R9 and C6 values given). The resulting 'pips' are connected via SW2c into the audio amp constructed around TR1.

When the unit is switched over to 'signal generator' mode, the divide by 600 section is bypassed by SW2c, the audio amp receiving the signals direct from the 555. The range of

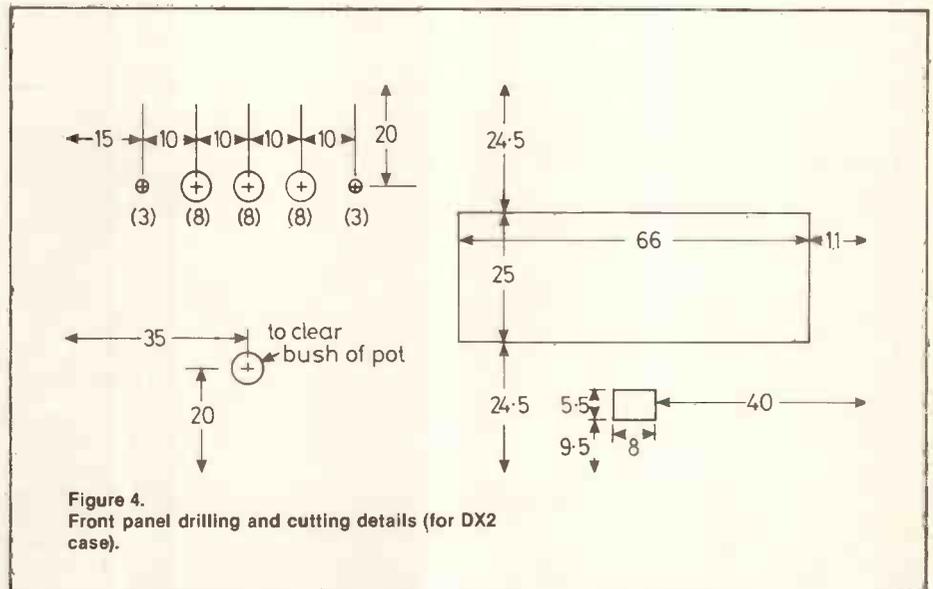


Figure 4.
Front panel drilling and cutting details (for DX2 case).

the oscillator is extended by SW2a and the gating period of IC2 is changed to 1 sec so that the display reads Hz direct. For readers who wish, a switch can be inserted between pin 20 (IC3) and +ve to blank the display when not required, but this was not included in the prototype.

The power supply consists of a PCB mounting transformer for easier construc-

tion, bridge rectifier, smoothing capacitor C7, and a 5 volt regulator with C8 and C9 included to aid stability.

Construction

This should not cause too many problems provided care is taken. A PCB design is given in figure 2, and the overlay in figure 3.

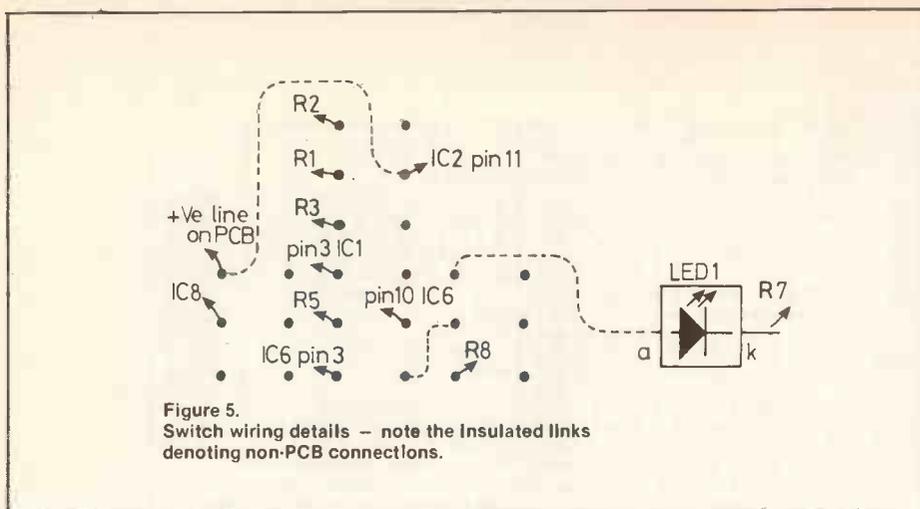


Figure 5.
Switch wiring details — note the Insulated links denoting non-PCB connections.

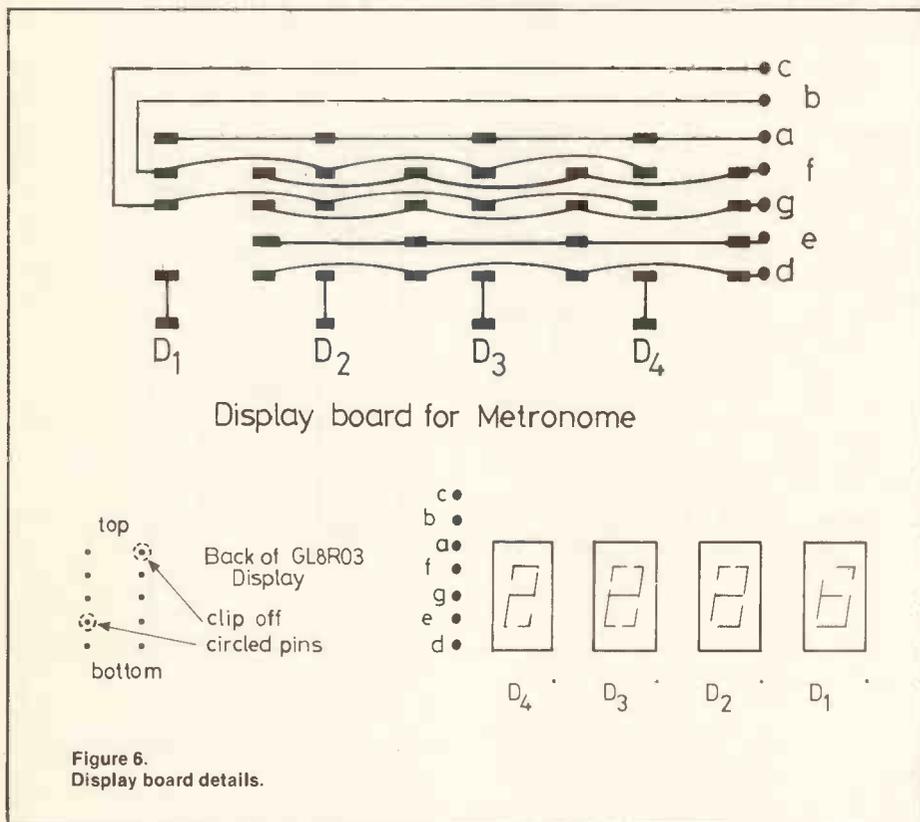


Figure 6.
Display board details.

Mount all the components except the ICs and display, inserting sockets in readiness if these are to be used. Make sure the polarised capacitors are inserted the correct way round, and use veropins and insulated leads for all interconnections. Bolt the regulator to the small PCB heat-sink. C1 has two possible dimensions, depending on whether it is polyester, or Slemens polyester and so a spare pad has been provided on the PCB.

Switch on and check that 5 volts is coming out of the regulator. If it is, switch off and insert IC1. Restore power and check that a squarewave emerges from pin 3. Switch off again and insert ICs 2, 4, 5, 6 and 7. Switch on and measure the output at pin 10 of IC6, which should show a positive-going pulse train with the frequency variable by VR1. Pin 3 of IC6 should show a gated oscillator waveform and this can be switched in via SW2c to the audio amp. Pin 13, IC2 should show a negative-going gate signal lasting for either 0.1 or 1 second, and pins 2 and 14 should consist of very thin negative-going pulses. If all is well, switch off, insert IC3 and connect the display, mounted on its own PCB, using ribbon cable. Power up and you should be rewarded with either a Hz display, (in sig/gen mode) or a display of pulses per minute. R2 and R3 can be varied to alter the tops of the ranges if required. The prototype was intended for use in an area of subdued lighting, but readers may want to change the LED for a high-brightness type.

For absolute accuracy C3 can be replaced with a 5-54pF trimmer, and adjusted against a known frequency source, but this was not found to be necessary in the prototype. Assuming everything is working, the unit can be mounted in the DX2 case. (It will fit in the smaller DX1 case, but of course the front panel details will be different). Drill and cut the front panel as shown in figure 4 to take the switches, LED, display, etc., which are mounted with the appropriate hardware. The mains lead is fed via a strain relief grommet on the rear panel, which also contains the 20mm fuse holder. Use sleeving or heatshrinking for all mains connections for obvious safety reasons. After giving the unit a final check the case can be bolted together and a useful bit of gear added to your equipment stock!

E&MM

The Digital Metronome is *not* available in kit form.

Metronome Parts List

Resistors — all 1/4 W 5% carbon film

R1	1k
R2	1k5
R3,4,5	10k
R6,9	680k
R7	150R
R8	100k
RV1	100k Lin pot

Capacitors

C1	0.047u polyester (see text)
C2	0.01u polyester
C3,4	33pF ceramic
C5	0.1u polyester
C6	1000 pF ceramic or polystyrene
C7	1000u 16V
C8	0.22u tantalum 16V
C9	2.2u tantalum 16V

Semiconductors

IC1	NE555
IC2	ICM7207A (Watford Electronics or Quarndon Electronics)
IC3	ICM7217A (Watford Electronics or Quarndon Electronics, Ambit)

IC4	4518
IC5	4017
IC6,7	4001
IC8	7805
TR1	BC212L
X1	5.24288 MHz (Watford Electronics)
D1	1N4148

Miscellaneous

T1	0-6, 0-6, 3VA PCB transformer (Ambit 57-10050)
BR1	W005
LS1	80 ohm loudspeaker
GL8R03	CC displays (Ambit 15-80003)
4-digit bezel	(Ambit 21-26044)
SW1,3	2-pole push/push SUE switches (Ambit 53-78001)
SW2	4-pole push/push SUE switch (Ambit 53-78003)
7.5mm knobs (red)	(Ambit 53-50011)
3-way bracket 10mm	(Ambit 53-78011)
Centurion DX2 case	(Ambit 21-06011)
Potentiometer knob	
Rectangular LED and clip	(Maplin QW96E)

Where necessary, suppliers have been named. Otherwise the components are standard and can be purchased from any reputable component dealer.

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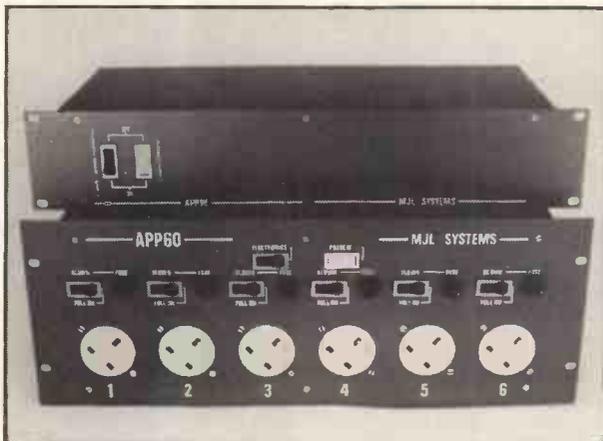
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1981

MARCH Matinée Organ ★ Spectrum Synthesiser ★ Hi-Fi Sub-Bass Woofer ★ Balanced line system ★ Yamaha SK20 review ★ BBC Radiophonic Workshop

APRIL Syntom Drum Synthesiser ★ Workshop Power Supply ★ Direct Inject Box ★ Ultravox ★ Paia 8700 review ★ Matinée ★ Spectrum

MAY Noise Reduction Unit ★ Lowrey MX-1 review ★ Apple Music System ★ Matinée ★ Spectrum

JUNE Wordmaker ★ Guitar Tuner ★ Hi-Fi/Group Mosfet amp ★ Fairlight CMI review ★ David Vorhaus ★ Matinée

JULY Alphadac 16 Synthesiser Keyboard Controller ★ Synwave effects unit ★ Matinée ★ Atari Music ★ Duncan Mackay ★ PPG Wave 2/Wersi Pianostar reviews

AUGUST PA Signal Processor ★ Powercomp ★ Hexadrum ★ Matinée ★ Resynator/Casio VL-Tone reviews ★ Irmin Schmidt

SEPTEMBER Partylite ★ Tape-Slide Synchroniser ★ Synpac 9V effects supply ★ Noise Gate ★ PA Signal Processor ★ Digital Keyboard ★ One-handed Guitar ★ Chromascope ★ Linn Drum reviews ★ Kraftwerk revealed

OCTOBER Harmony Generator ★ Securigard burglar alarm ★ Effects Link FX-1 ★ Music at City University ★ dbx noise reduction ★ Blacet Syn-Bow reviews ★ Micro interfacing ★ Disco equalisation

NOVEMBER Landscape explored ★ Casio MT-30, Roland GR-300 Guitar Synthesiser, Roland CPE-800 Compu-Editor reviews ★ Melody Making on the Apple ★ Phasing ★ Auto Swell - Electric Drummer - Soundbooster - Toneboost projects

DECEMBER Rick Wakeman in 1984 ★ *Orchestral Manoeuvres in the Dark* ★ Bio Music ★ Yamaha CS70M, Vox Custom Bass & Custom 25, Roland CR5000 & CR8000, Alpha Syntauri, Fostex 250 ★ Synclock project ★ ZX81 music

1982

JANUARY The New Tangerine Dream ★ Japan Music Fair ★ Fact File ★ Guitar Workshop ★ Reviews: Casiotone 701, Teisco SX-400, Aria TS-400, M.C.S. Percussion Computer, Soundchaser, Beyer Mics, TC

Effects Boxes, Tempo Check ★ Projects: Spectrum Synthesiser, Electric Drummer, Volume Pedal

FEBRUARY Ike Isaacs ★ Digital Audio Discs ★ Yamaha GS1 & 2 ★ Reviews: Korg Trident, AKG D330BT & D202 Mics, Menta Micro, Roland TR606 Drumatix, JHS C50PM & C20B amps, Fostex A-8 8-track Recorder, Tokai ST50 & PB80 Guitars ★ Vocal PA ★ ZX81 Music ★ Projects: Digital Delay Effects Unit, Spectrum Synth, Percussion Sound Generator ★ Resonant Filters

MARCH Klaus Schulze ★ Robert Schröder ★ Kraftwerk Music to play ★ Killing CB Interference ★ Reviews: Firstman SQ-01, SC1 Pro-One, JHS Pro Rhythm Mini Synth, Tascam 124AV, Wersi Comet, Hamer Prototype, Shure 517SA & B ★ Synth Buyers Guide ★ Projects: Power 200 Speakers, 1.6 sec Digital Delay Effects Unit

APRIL Martin Rushent, Human League in the Studio ★ Cardiff University Electronic Music Studio ★ Reverberation explained ★ Reviews: Korg Mono/Poly Synthesiser, Fostex 350 Mixer, Roland TB-303 Bass Line Sequencer ★ Projects: MF1 Sync Unit, Multireverb ★ Electro-Music Crossword.

MAY Holger Czukay ★ Depeche Mode ★ Keyboard Buyers Guide ★ The Peak Programme Meter ★ Reviews: Moog Source and Rogue Synthesisers, Suzuki Omnichord, Acorn Atom Synthesiser, Calrec Soundfield Microphone ★ Projects: Soft Distortion Pedal, Quadramix.

JUNE Jean-Michel Jarre ★ *Classix Nouveaux* ★ Studio Sound Techniques ★ Making Music with the Microtran 65 ★ Reviews: Carlsbro Miniflex and E-mu Systems Emulator ★ Projects: Panolo and Multisplit.

JULY Ronny with Warren Cann and Hans Zimmer ★ Drum Machines Buyers Guide ★ Jean-Michel Jarre Music Supplement ★ Reviews: Roland Juno 6 Synthesiser, Peavey Heritage Amplifier, Steinberger Bass Guitar, TI-99/4 Music Maker Software ★ Projects: Universal Trigger Interface, Electric Drummer

AUGUST Kitaro ★ Spectro Sound Studio ★ Jon Lord Interview & 'Before I Forget' music to play ★ Reviews: The Synergy, Korg Polysix, Tascam M244 Portastudio,

Shergold Modulator 12-String Guitar, Yamaha Professional System Effectors ★ Warren Cann's Electro-Drum Column ★ Projects: 8201 Line Mixer, Guitar Buddy practice amplifier.

NOVEMBER Patrick Moraz interview and 'Adagio For A Hostage' music to play ★ Robert Moog ★ Bill Nelson ★ K. Schulze and K. Crimson in Concert ★ Reviews: Yamaha PC-100, Technics SX-K200, Casio MT-70, Hohner P100 and JVC KB-500 MiniSynth Supplement, Gibson Firebird 2 Guitar, Alligator AT150 Amplifier, Allen & Heath 1221 Mixer, Eko Ritmo 20 ★ Projects: ElectroMix 842 Mixer, Amdek Chorus.

DECEMBER Cliff Richard interview and Little Town music ★ Patrick Moraz ★ ARS Electronica ★ Digital Recording Pt II ★ Reviews: Elka Synthex, Crumar Stratus Synth, Tokai Bases, Shure PE Series Microphone, The Kit Percussion Unit ★ Projects: The Transpozer, Amdek Percussion Synth, Canjak

1983

JANUARY Richard Barbieri of Japan ★ Ultravox Music ★ Patrick Moraz ★ Ars Electronics ★ Reviews: Westone Bass Guitar, BGW 750C Amp, Korg EPS-1 Keyboard, Clef Band Box, Zildjian Cymbals ★ Projects: Synblo, The Transpozer, Amdek Compressor.

FEBRUARY Isao Tomita ★ The Human League ★ The Novatron Revisited ★ E&MM Index 1981/82 ★ Reviews: Linn Drum; Godwin Drummaker 32P; Wersimatic CX-1; Mattel Synsonics; Simmons SDS-2 Drum Sequencer; Klone Kit; Movement Drum Computer 2; Korg KPR-77 Programmable; Memory-moog; Synclavier II; Powertran Polysynth; Vigier Guitars, Tokai TA35 Amp; Pearl Mics ★ Projects; Synbal; Caltune; Amdek 6-2 Mixer.

MARCH Klaus Schulze ★ Michael Karoli ★ Francis Monkman ★ Bernard Xoloti ★ Chris Franke ★ Frankfurt ★ Reviews: Jen Piano 73, 5 Casio keyboards, RSF Kobol Expander, Korg Poly 61, Aria Mics, BGW 7000 Amp, Ibanez Effect Pedals, Tokai Flying V Guitar, Oric-1 Micro-computer ★ Projects: The Shaper, 842 Meter Bridge, Amdek Rhythm Machine Kit.

APRIL Naked Eyes ★ Gabor Presser ★ Scarlet Party ★ Frankfurt Show Report ★ Ambisonics ★ Magnetic Cartridges ★ Reviews: SCI Prophet 600, Casio 7000, Chroma/Apple Interface, Eko Bass Pedals, Loco Box Pedals, Aiwa Cassette Copier, Vox Guitars ★ Projects: Syntom II Percussion Module, Amdek Metronome.

MAY Keith Emerson ★ Guitar Buyers Guide ★ Roland MC-202 ★

Introducing the MIDI ★ Reviews: Fostex X15 Multitracker, Echo Unit Supplement; 13 echo reviews, M&A K-1/B, Yamaha Portasound MP1, Carlsbro Cobra 90 Amplifier, Technical Projects DI Boxes, Boss TU-12 Tuner ★ Projects: MicroMIDI, Home Active Speaker, Amdek Flanger Kit.

JUNE Steve Hillage ★ Arthur Brown ★ Larry Fast ★ History of Guitar Synthesisers ★ Casio Modifications ★ Reviews: Synton Syrinx, Synclavier II, Clarion 4 track, Cutec MR402, Ovation Balladeer Guitar, Drumulator, Vesta Fire Flanger/Chorus, Aria AD-05 Delay, Suzuki, Mic ★ Projects: OMDAC, Amdek Power Distributor, Active Bass Guitar.

JULY Marillion ★ Hans Zimmer ★ Programming Yamaha's DX Keyboards ★ Reviews: Kawai SX-210 Synthesiser, Aria U60 Deluxe Guitar, Trident VFM Mixer, MXR Omni Effects, Milab Mics ★ Projects: Digital Signal Processing For Sinclair Spectrum, Tap Tempo, Amdek Delay Kit.

AUGUST Bill Nelson plus 'Chimera' music to play ★ Hubert Bognermayr ★ MIDI Dump ★ Barclay James Harvest ★ Reviews: Roland JX-3P/PG200, OSCar Synthesiser, 360 Systems Digital Keyboard, Music Percussion Computer, Fender Stage Lead Amplifier, Yamaha SG200 Guitar, Tubby Drum System, Frontline Effects ★ Projects: Digital Signal Processing (Part 2) — Echo programs for your Sinclair Spectrum, Amdek Phaser Kit

SEPTEMBER Peter Vettesse ★ Which Synth? Comprehensive Guide ★ Prophet T8 in focus ★ Goldsmith's College Studio ★ Reviews: Oberheim DX Drum Machine, SCI Pro-FX 500, Rickenbacker 360/12 String Guitar, Rickenbacker TR75GT Amplifier ★ Projects: Synclap, Amdek Tuning Amp Kit.

OCTOBER John Miles ★ Andrew Powell ★ Yamaha DX1 ★ ICA Vancouver ★ Guitar Month ★ New Pickups ★ Mains Distribution Board ★ Amdek Graphic EQ ★ Rockman ★ HH K150 Keyboard Combo ★ Fender Elite Precision ★ Steinberger 6 string ★ Octave Voyetra Eight ★ Siel Opera 6 ★ MXR 185 Drum Computer ★ Ross Pedals.

NOVEMBER Tony Banks ★ John Foxx ★ Moog Profile ★ Software Envelope Project ★ Muzix 81 ★ Ibanez HD1000 Harmonics Delay ★ Klone Kit 2 ★ Korg MX8 Mixer ★ UC1 Sequencer ★ Selko Digitals ★ Eko EM10 Keyboard ★ Ibanez RS315SC Guitar.

DECEMBER Gary Numan ★ *Psychic TV* ★ Philip Glass ★ Steve Gray on DX-7 ★ Personal Keyboard Special ★ Inkeys ★ Reviews: Decillionix ★ Prophet T8 ★ Korg MM-25 Multi Monitor ★ Yamaha PC 1000 ★ Carlsbro AD1 Echo ★ Project: The Valve Driver.

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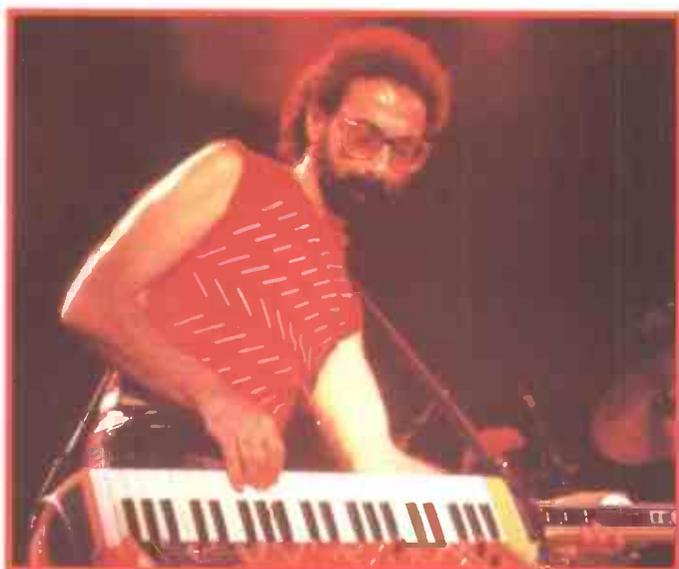
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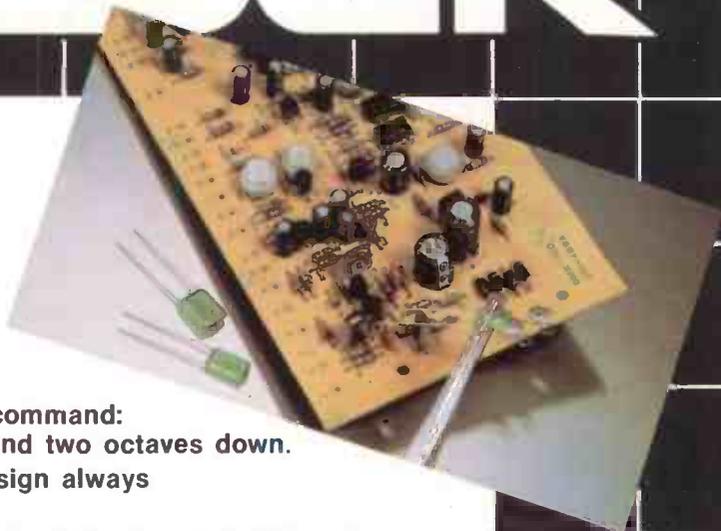
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