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APRIL 1983 95p

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R.R.P. £1300
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When you trade in your old monophonic



CRUMAR STRATUS POLYPHONIC SYNTHESISER

The Crumar Stratus is the first polyphonic synthesiser that satisfies the needs of both the creative synthesist and the multi-keyboard player. It offers a powerful array of sound, from the explosive to the expressive. And yet the majority of control comes from the keys you play, not the dials you turn. The heart of this outstanding versatility is found in the six actively engaged Filters and Envelopes that span the keyboard. These generate true polyphonic capability, letting you depress as many keys simultaneously as you want. Most polyphonic synthesisers are limited by their 5 or 6 voice capability. Go beyond that and notes drop out. The Stratus also features unique trigger modes (both Multiple and Mono) which allow you to turn on the Oscillator Glide, reset the LFO delay and alternate between the sawtooth and the square waves all directly from the keyboard. You can retrigger a particular effect whenever a new note is played, even though other keys are depressed. With most other polysynths you can only play one sound at a time, but with the Stratus you can play 3 separate sounds simultaneously from the polysynth section, organ section and string section for multilayering effects. There are other noteworthy qualities to the Stratus, like two independent oscillators, continuously variable and invertible envelopes and polyphonic resonances. But we suggest you experience this 'synful' sound for yourself at Chase. At a price under £500, it's a devilishly exciting way to burn up a stage. Instrument comes complete with carrying case.

R.R.P. £900
CHASE PRICE £499

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CRUMAR TRILOGY POLYPHONIC SYNTHESISER

Crumar's Trilogy combines polyphonic synthesiser, strings and organ sounds in one instrument, then lets you combine them in any proportion for limitless creative potential. Usually we do not think one single instrument should do everything or be everything to the professional musician, but with the 'TRIOLOGY' natural events 'lead' us to betraying this ideal. Accordingly, Crumar have created the most complete polyphonic synthesiser the musician would wish to have. Big, fat, aggressive, today's sounds combined with some unique features such as alternating waveform keyboard, trigger and invertible envelopes in a polyphonic format. Add to these, a comprehensive, easy to use bank of programmable presets (which may be altered to your own taste), together with two super string sections, and an organ section, and you have all the ingredients to make the TRIOLOGY live up to our highest expectations. Instrument comes complete with carrying case.



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 All goods subject to availability

KEYBOARDS

★ **ROLAND:** JUPITER 8, JUNO 60, JUNO 6 polyphonic synthesisers. SH-101, SH-09, SH-2, mono synths. 100M modular synth system. EP 6060 and piano plus el. Piano range. Microcomposer MC4B, digital sequencers, TB-303 bass line. Plus all the latest goodies detailed opposite.

★ **SEQUENTIAL CIRCUITS:** The amazing new PROPHET 600 will be on demo from April onwards. This incredible 2 VCO per note, 6-voice polysynth features a built-in polyphonic sequencer and midi interface. PROPHET 5 (rev 3.3) and PRO-ONE still going strong!

★ **KORG:** Latest from Korg is the new POLY 61 polysynth with 2 VCO per note and 64 memories. Modern design with digital control, chord memory, unison, arpeggiator. POLYSIX and MONO-POLY available from stock.

★ **CASIOMAGIC:** Casio never cease to amaze with their wide range of keyboards. The latest model, CT-7000 actually features multi-layer, polyphonic digital recording! PT-30, MT-11, MT-41, MT-45, MT-65, MT-70, CT-101, CT-202, CT-405, CT-501, CT-1000P all on display.

Plus: Rhodes, JVC, Yamaha, Memorymoog, Moog 'Rogue', Korg pianos. Please send 25p in stamps for colour brochures of our keyboard range.

Roland

★ **LONDON'S LARGEST ROLAND STOCKIST — IF ROLAND MAKE IT, WE SELL IT!**

★ The very latest models revealed at the Frankfurt International Music Trade Fair in February:
 JUPITER 6: 6-voice polysynth with midi interface £2,000
 JX-3P: Programmable, preset and polyphonic synth! £850
 PG-200: Synthesiser programmer for JX-3P £200
 MC-202: Baby microcomposer: 2 voice with SH-101 miniature synth built-in £325

NEW MODULES FOR 100M MODULAR SYNTH: Portamento controller, 4-band parametric EQ, 4 x signal gate.

CUBE 40CH, 60CH: Cube combos with built-in chorus.
 SST 40, 60, 80: Full range loudspeaker cabinets.
 BOSS TU-12: Chromatic tuner with digital processing..... £49

★ These new goodies complement the staggering amount of keyboards, amps, guitar synthesisers, Boss effects and Amdex computer peripherals from the Roland range.

★ The London Rock Shop will give you 'sound advice at a better price' but also professional demonstrations of the very latest technology.

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London Rock Shop

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 a week.

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AMPS, CABS + COMBOS

★ **TRACE ELLIOTT:** The Rolls-Royce of bass amplification. We are recently appointed sole London agents for this great bass gear. Our stock includes preamp, power amp, combo (1 x 15" and 8 x 10") set-ups to choose from (subject to availability).

★ **AMPEG SVT BASS STACK:** 300 watts of pure valve power. Sole London agents for this recently updated tower of power.

★ **SESSIONETTE:** The boogie man's back relief! At last, a British made combo that packs a real punch with soft overdrive at low volumes and wails when you wind it up. 75 watt output with a Celestion 12" speaker that can handle the sting in its tail. At only £225 you've got to give a try. Optional footswitch available for clean/dirty channel change. STOP PRESS: New 'SESSION' back-relieving bass combo due soon!

★ **ROLAND:** Cube 20, 40, 60, 100, 60B Cube 40k, 60 keyboard, 40ch, 60ch chorus Jazz Chorus JC 50, JC 120 Spirit 10, 15B, 30, 50, 30B, 50B Bolt 30, 60, 100 E/V Boss MA-1, MA-5, MA-15, MS-100

★ **OHM:** 'PUKKA' 60 watt bass combo with compression, 'TRAMP' bass and guitar practice combos under £100. New 125 watt keyboard mixer combo and 125 watt bass combo.

Plus: Gallien-Krueger, Carlsbro keyboard combos, V-amp, Bose, Hiwatt, Yamaha, Fender, Vox, Electro-Voice.....

Fostex

★ **LONDON'S MUSICAL MULTITRACK CENTRE:**

250: Cassette multitracker with Dolby C noise reduction.
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 350: 8/4/2 multitrack mixer plus 3060 meter bridge.

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 3030: Dual 10-band stereo graphic equaliser.
 2050: 8 + 2 line mixer for sub-mix or monitor mix.

6301: 10 watt self-powered, portable mini monitors.
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 3070: NEW stereo compressor/limiter expander.

★ Simply turn up at our door and we will give you a full demo of how, why and what for... musical multitracking with Fostex may be easier than you think. For an outlay of around £700 (which includes Accessit accessories) the results are staggering with up to 10 sounds layered together. Why not let us show you how?

GUITARS AND BASSES

★ **TOKAI REPLICAS:** You can't keep a good copy down! Mid-fifties and early sixties vintage guitars in original (Flamingo Pink, Sunburst) and new (Metallic Red and Blue) colours. Fretted and fretless jazz basses in Black, White and Metallic Red with Rosewood fingerboards. Prices start at around £200, tweed cases £59 extra. Why buy a copy when you can buy a lovingly reproduced replica?

★ **ROLAND GUITAR SYNTHESISERS:** GR-300 blue floor unit features switchable pitch changing (over 1 octave +), automatic Minimoog type vibrato, filter sweeps with variable attack/decay, built-in compressor for added sustain. Choice of four guitar controllers: G-202: with humbuckers (white, blue or red). G-303: Fitted neck, humbuckers (left-handed available). G-505: U.S.A. type with trem. (Metallic Blue, Metallic Red, Sunburst). G-808: Neck through body, humbucking pickups.

★ **IBANEZ:** 'Musician' and 'Roadster' active basses and 'Artist' guitars.

★ **ARIA:** New series SB bass and 'Cardinal' guitar.

Plus: Steinberger (when available), Fender Squier, Fender U.S.A., Gibson, Westone... selected models only.

RECORDING EQUIPMENT

KORG: SDD 3000: Digital Delay-1023 MS, 9 program memories.
ROLAND: SDE 2000: Digital Delay-670 MS, delay/flanger/chorus.
CUTEC: 1024 MS, Digital Delay with extra Sub Delay — new!

MXR: Dual limiter/compressor, pitch shift doubler.
VESTA FIRE: Rack-mount spring reverb.

ACCESSIT: Stereo spring reverb + controller.
ACCESSIT: Compressor/Noise gate/Dual sweep equaliser

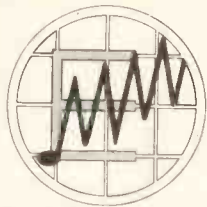
ACCESSIT: Patch bay/Headphone splitter/Dual 15w power amp.
YAMAHA: Analog echo, chorus, flanger: E 1005, E 1010.

YAMAHA: Producer Series: Stereo mixer 6/2, Headphone amp.
BEYER, SENNHEISER: Range of studio headphones.

AKG: D80, D190, D310, D320, D330 microphones.
SHURE: Complete range of new PE series microphones.

SHURE: Undyne 517, Unispher 588, SM57, SM58 mikes.
SENNHEISER: MD421-U + **AUDIO TECHNICA:** Microphones.

AMPEX: Grand Master ¼" tape + **TDK:** cassette tapes.
D.I. BOXES: Lead testers: Whirlwind cables: Switchcraft plugs.
DRUM UNITS: Roland, 'The Kit', Mattel Synsonics.



Electronics & Music Maker

April 1983

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**NEXT MONTH:
 KEITH EMERSON
 INTERVIEWED**

LEADING manufacturers of musical instruments have been aware for some time of the growing problem of interfacing between instruments of different makes. From the outset of the voltage controlled synthesiser, each make took on its own standard for control voltages and trigger levels, until it soon became apparent that 1 volt per octave was the preferred CV controller for oscillators, with 5-15 volt positive-going triggers more the norm.

Of course, these were mainly for analogue monophonic or modular systems and the polyphonic machine was a different kettle of fish altogether.

Polyphonic instruments that were truly polyphonic in operation relied on digital scanning of the keyboard to pick up the notes played. With the developing technology putting a micro as the controller in later and current polyphonics, the chances of linking up synthesisers appeared to be slim. One or two instruments appeared with sockets (quite a few not even connected!) that were destined to communicate with other things, but most of the connectors were dedicated multiway types with limited user-friendly information available to enable you to make real use of them — unless you purchased a specific ready-made item (like Roland's MC4 for the Jupiter 8 or Juno 60).

Over two years ago, some perceptive manufacturing chiefs got together, including Tom Oberheim, Dave Smith (SCI) and Ikutaro Kakehashi (Roland), and began to formulate some kind of solution to the problem.

In Autumn 1981 Dave Smith outlined his proposals for a Universal Synthesiser Interface (USI) and discussions amongst manufacturers raised questions about the suitability of a high speed serial instead of parallel interface.

At a recent conference in January 1982 at the NAMM convention in Anaheim, representatives attended from SCI, Roland, Oberheim, CBS/Rhodes, Yamaha, E-mu, Unicord (Korg), Music Technology Inc, Kawai, Octave Plateau, Passport Designs, and Syntauri.

Some Japanese companies also presented results of their own research and soon afterwards the first MIDI specification was drawn up by SCI's Dave Smith and Chet Wood. It appears that SCI and Roland made a significant contribution to its realisation, with Roland acting as liaison with Yamaha, Korg and Kawai.

And now SCI have brought out the first commercially available instrument with the MIDI interface. MIDI should open up the scope of music making and increase the useful life of your next synthesiser enormously — whether mono or polyphonic.

MIKE BEECHER
 Editor

ASSISTANT EDITOR

Due to expansion we require an additional ASSISTANT EDITOR to take responsibility for the preparation of articles for publication. Since the areas that E&MM cover in its unique field of electro-music are wide, we are looking for a person (male or female) to assist in writing or editing specific parts of the magazine.

Your background should enable you to read and play music on an instrument, preferably guitar and/or electronic keyboards. Knowledge of the technical side of music (possibly through working in a studio or building musical projects) as well as a practical interest in making music with home micros is an advantage.

The successful applicants will help to develop E&MM's important role in the future of Electro-Music. Salary is negotiable.

Please write or telephone: The Editor, 282 London Road, Westcliff-on-Sea, Essex SS0 7JG. Tel. 0702 338878.

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PT-20 Monophonic with seven digital preset voicings and 508 note sequencer. 12 pattern rhythm machine. Chord keys. 99 different chords available. Sequencer records lead line and chords. Built in speaker. Line out jack. Pitch control. Auto power off function. **Our Price £49**
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PT-30 A transposable monophonic mini-keyboard with eight digital preset voicings and a cassette interfaceable 508 note sequencer for lead line and chords. Sequencer has sub-group and edit facilities and sequences can be dumped in 45 seconds using the optional TA-I cassette interface. LCD display showing notes and transpose level. 12 pattern rhythm machine. 99 different chords available. Chord keys. Built in speaker. Line out jack. Pitch control and auto power off function. **Our Price £69**
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MT-41 3 octave, 8 note polyphonic with 22 remarkably faithful preset voicings, including one of the best electronic piano sounds available today plus brass, strings, flutes etc. 6 pattern rhythm machine with fills. Bass keys give 4 octave capability. Vibrato and sustain. Auto bass accompaniment. Pitch control. Built in speaker and line out jack. **Our Price £89**
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RRP £175 Inc. P + P



Massive investment in research and development has resulted in a sound quality/reality unavailable in equipment many times the price.

"...the first comparison that comes to mind is the PPG Wave's digital effects. Obviously the same degree of control over the effects doesn't exist, but the unusual envelopes and internal movement of the sounds bear some resemblance to a machine which costs about 20 times the price of the MT-65, and that can't be bad..."

ref. EMM Mar '83 on the MT-65

MT-45
8 note poly. 4 octaves. (1 1/2 for melody 2 1/2 for chords). 8 sounds. Vib, sus, 8 rhythm patterns. Accompaniment and arpeggios. **Our Price £99**
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CT-1000P
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Full size MT-65. **Our Price £275**
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Accessories		TA-I	Cassette interface	£19.50
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CS-H	Stand	MT	Hard Case	£ 6.50
VP-E	Volume Pedal	CT	Hard Case	£40.00

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MT-11	£49.00
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News & Events

Compact Disc

In the wake of dire warnings as to its popularity from Quarterly Leisure Forecasts and anxious speculation about increased piracy, the Compact Disc system was launched in the U.K. on March 1st.

Several companies including Sony, Philips and Polygram held launching events, and most of the major record companies introduced CD discs selected from their catalogues. Deutsche Grammophon announced a major new series for the format comprising 23 items ranging from Vivaldi ('Four Seasons') to an opera selection, with new items to be added each month. Virgin Records have introduced a selection of CD discs chosen from their top-selling albums and including Mike Oldfield's 'Tubular Bells'. CBS list 10 classical and 12 pop titles, while some other companies are waiting to assess initial response before going ahead with CD releases.

Members of the British Phonographic Industry however expressed some concern at the Sony launch. The Compact Disc, as a virtually noise-free and indestructible recording medium, makes an ideal master for pirate tape or vinyl copies of albums. CD players can be connected to any domestic hi-fi, and although expensive and in short supply as yet, are expected to become common over the next few years.

Of course the Compact Disc is a play-only medium, and as such does not outdate cassette tape. The industry should therefore still have an incentive to improve the quality of pre-recorded tapes over their generally very poor standard - an effort which has begun with recent Chrome Dioxide releases - and so decrease the temptation to home-tape in an attempt to gain reasonable quality. Although CD prices are being kept at a "prestige, non-discounted level", hopefully the competition provided by a new medium will lead to reductions in the retail mark-up on vinyl as well.

The CD system has been universally acclaimed by hi-fi enthusiasts, who now hope that future releases will be digitally mastered as well as being digitally cut. The quality of the system is so high that the limiting factor has become the tape hiss from analogue masters!

Instruments

CBS have added several new shops to their list of dealers for the Rhodes Chroma. These include Future Music (Southsea), Duck Son and Pinker (Bath), Eddie Moors (Boscombe) and Sound Control (Dunfermline). Meanwhile, the Fender

division has launched a range of new amps at Frankfurt, including the Twin Reverb 2 with channel switching, FX loop, mid boost and presence control, available as amp head or combo. Other High-Tech combos include the Yale, Harvard 2, Studio Lead, Stage Lead, Montreux, London Reverb and Showman. Aria have made a new range of pickups available via Gigsville. The Shadow six-transducer Recording Bridge pickup is designed for fitting to classical guitars (model 900) or western guitars (model 910). Tel. 01-897 3792.

Computing

Byteshop in Manchester has expanded into new premises and is intended to deal with the whole of the North West. They are currently dealers with IBM-PC, Osborne, Comart Communicator, Cromemco, North Star, Epson and BBC Micros. Tel. 0480 215005. Acorn Computers are to host a family and educational computing show at the Cunard International Hotel, August 25-28, at which the Acorn Electron will be introduced. Acorn User Magazine will also be present. Further details: 01-930 1612.

Business

Elka-Orla celebrate their 15th anniversary in 1982/83. Based on the amalgamation of two accordion manufacturing companies, each almost 100 years old, the company continues to manufacture accordions under the name S.E.M., but now specialises in keyboard instruments. A recently modernised factory in Italy produces the Elka range of home organs, the Rhapsody 490 and 610 as used by Tangerine Dream, and the powerful Synthex polyphonic synthesiser. Elka-Orla UK, based at Halstead in Essex, operates an administration and service centre for Elka in Britain and gives full back-up facilities for their new Professional Keyboard Products Division, which includes the Elkatwin 61, Micropiano, X50 and speaker cabinets among its stock. Elka-Orla, 3/5 Fourth Avenue, Bluebridge Industrial Estate, Halstead, Essex CO9 2SY. Tel. 0787 475325. Bob Styles joins HNB Hire and Sales from Rod Argent's Keyboards and SCI. As Sales and Marketing Manager he'll be responsible for Amcron Power Amps, PZM microphones, Gauss Speakers, Sony PCM F1 digital recorder, specialised microphones and a wide range of other equipment. Tel. 01-961 3295. Mary Baxter becomes the new Chairman of the Federation of Music Industries. Business for 1983 includes the organisation of the Trade-only British Music Fair.



Moscow.

Musicians

Live Sound '83 is a day-long training course covering theoretical and practical aspects of sound systems, mixing, signal processing, power amps and monitors. Projected date is 14th May, 1983, and further details are available from Andy Ledbetter on 01-361 1015. Pink Floyd release 'The Final Cut' on March 21st, and may tour without Richard Wright. The keyboard player is currently working with De Harris, ex-of Fashion, on solo projects. Kraftwerk's 'Techno Pop' album is due for late March/early April. E&MM reviewees continue to do well nationally. Of the six finalists in the Battle of the Bands, to be shown on BBC in April, two have been well reviewed in recent months. Moscow (Jan. '83) were described as "almost

certainly a band who can look forward to some commercial success", and Umo Vogue (Nov. '82) seem to have lived up to the prediction that "we'll probably be hearing more of them." E&MM awaits the announcement of the winner with baited breath. Klaus Schulze seems to be in the usual state of confusion regarding his U.K. plans, but some details are confirmed. There are to be London and provincial dates, including one at Coventry Cathedral, in April, together with U.K. release of the German double album Audentity. Illuminated Records, distributed by Stage One, are to release two sides of it as a single album, minus the gatefold sleeve, in late March, with a possibility of cassette release of the whole album later. Catalogue number is JAMS 25. Further details 01-381 1391.



Umo Vogue.

IN BRIEF

Electronical Dreams is a sale list of electronic music issued by Clive Littlewood, Silverton Villa, Higher Bugle, St Austell, Cornwall PL26 8PY. Send an sae or 2 IRCs for the latest copy. Neumusik magazine is quiet while Dave Elliott gets through his finals, but the linked YHR tapes is still active, with 9 recent releases by Rudiger Lorenz, Andrew Cox, the very wonderful Gunther Schickert and others. Send an sae for a list to 128, Cedar Drive, Chichester, West Sussex, England. BAEC is the British Amateur Electronics Club, who publish a quarterly newsletter and run a technical library. U.K. membership is £4.50 per year, and further details are available from Mr. J. G. Margetts, 113, South Road, Horndean, Hants, PO8 0ER, for an sae. Turnkey, the leading studio equipment suppliers, are mov-

ing from Barnet to new premises. They can now be contacted at Brent View Road, London NW9 7EL. Tel. 01-202 4366 (Turnkey) 01-202 4155 (Bandive).

Dates

All-Electronics/ECIF show, Barbican Centre, 19-21st April. Tel. 0799 26699.

International Music Show, Alexandra Palace, 29th April-3rd May. Tel. 01-254 4474.

Home Entertainment Spectacular, Olympia, 17-25th September. Tel. 01-486 1951.

British Music Fair (Trade), Russell Hotel, 31st July-3rd August. Tel. 01-730 2636.

National Festival of Music for Youth, Royal Festival Hall, 14th-16th July. Tel. 01-730 2686.



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E&MM 4

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282 London Road, Westcliff-on-Sea, Essex SS0 7JG.

The Great Debate

Dear Sirs,

In reply to Stuart Lambert's excellent analysis of the frustrating cost implications of the extraordinary creative potential that exists with the use of the new digital micro-based music machines, have faith! There is quite possibly a successful solution sleeping soundly in the womb of time.

At present, plans are going forward for a national promotion campaign for a central fund for the setting up of audio/video centres to be formed as separate charities under guaranteed liabilities, to operate as part commercial studio, part community studio, with hopefully the co-operation of the TUC, Musicians' Union, Equity, the Church Council and Manpower Services Commission with possible funds from the EEC.

What is needed is for you, the musician, the performer and the public figure to come forward to lend your support to a project which will give the creative opportunity to people with latent ability and potential, and help serve the needs of the community both business and social, with a view to stimulating the process of evolution through the modern miracles of communication development.

However, it's early days yet. The child is still sleeping soundly in the womb, so an appeal is being made for people with the ability and responsibility to assist at the birth of what would quite probably be a landmark in the future development of the arts in this country.

Michael R. Humby
Southend

Dear Sirs,

As I was browsing through the February, '83 edition of E&MM I was rather surprised to see a letter from a certain Stuart Lambert of Dorset. The cause of this surprise was its content - I could hardly believe what he was actually saying. Does he really think that one cannot make good music unless one has a Fairlight? While it's true to say that improved technology can add polish to a good piece of music, it cannot make a bad piece a masterpiece. It would appear that Mr Lambert simply does not read the articles in E&MM and the words of wisdom contained therein - he only has to read the 'Home Electro-musician' column to see that an awful lot of people are creating music on very modest amounts of equipment. He only has to read the 'Fact File' to see that even the 'pros' make much use of Casios, DR55s, etc. and that their home studios extend only to a simple 4-track setup.

I started my musical career on an ARP Axse and two Sony TC377 tape recorders, but that didn't prevent me from getting work in a number of very interesting projects. Now, by sheer bloody hard work and total commitment I have a more elaborate studio comprising ARP 2600, Juno 6, TR606 and TB303, 4-track, etc., and with that same physical, emotional and financial determination I intend to expand even further.

Mr. Lambert said that reviews of

more complex and expensive instruments such as Fairlights, Synclaviers, etc., are worthless - I think not. True, you can't 'toddle down to your friendly music store and try them out' as he so succinctly put it, but does he propose that revolutionary new instruments such as these should be totally ignored - after all, it is the major innovations that give rise to the development of more financially accessible instruments - from the huge Moog modular studio systems came the ever popular MiniMoog; from the large ARP 2600 came the Odyssey and Axse and from the big Yamaha GX1 came the CS80, CS60 and CS50 range of polyphonic synthesizers. A quick look at the Frankfurt show this year will prove that this trend is continuing as Korg, Roland, Sequential Circuits, Yamaha and others are all presenting instruments which are scaled down versions of their larger synths (some even have improved facilities!) which will be available at a far more reasonable cost to the average musician. Has Mr. Lambert not noticed that many reviews of fairly inexpensive instruments appear in E&MM very regularly - my own review of the Korg Polysix for instance, compared it favourably with a Prophet 5 or a Jupiter 8 but its price is less than a third of those particular instruments. The review of the new Roland SH101 showed that it has features on it that even two years ago would have been unheard of, yet it sells for around £200 (the price of a decent copy guitar).

Don't forget, also, the sophisticated TR606/TB303 drum/sequencer combination that offers powerful percussion and multi-sequencing capabilities for about £400. Recording equipment also gets extensive coverage and both the Fostex and Teac 4-track cassette systems have been reviewed and are proving popular with thousands of musicians in the country. I really don't think that Mr. Lambert's complaint about reviews of exclusive equipment is entirely justified considering the fact that instruments and equipment such as I have mentioned above get more than adequate coverage in the magazine.

And if Mr. Lambert complains about the gear owned by the wealthy stars who have 'made it' perhaps he could give a good reason why they should not own it. I'm sure if he was offered a hefty advance from a record company he would go for a Fairlight or a PPG rather than a Casio VL-Tone (I know I would!). The reason the people he is so jealous of are in the position to afford the more expensive equipment is because they have won through for one reason or another, be it originality, style, image or simply musical ability - remember, they had to start on something. It's not only the 'well-heeled' musician who can work within the comfort of his own home (yet another complaint of Mr. Lambert's), every muso does this even if it's simply banging down a new guitar riff onto a cheap portable cassette recorder.

There are two things one needs to succeed in life (and by life I don't only mean the music biz) - they are determination and commitment. By

determination I mean getting off one's spotty behind and going out and doing something constructive instead of whining on about class difference, and by commitment I mean both musical and financial. It is possible to equip a fairly versatile studio for under £1,000 - not cheap, I grant you, but not impossible. If you borrowed the money you'd be talking of about £30 a month repayment. Now that is not that much when you consider how much the average person spends down the pub and on cigarettes, etc., in the space of a month. If one is determined enough one will forego little luxuries such as these in order to afford a musical instrument - in turn, that will give you more time to concentrate on achieving success. Contrary to Mr. Lambert's theory musicians are far more creative when they're starving and the rent has to be paid - I speak from experience!! Just look at the bands whose music has suffered since the money started flowing into their lives.

No, I'm sorry, Stuart, if you're waiting for a Fairlight to land in your lap you're going to have to wait a hell of a long time so do us all a favour, get out and buy a synth (even if it's only a second hand Wasp or something) and do something positive about achieving the success you obviously want so much. If, after years of determined struggling, you still haven't become one of the mega-stars you are so envious of, then at least you can die relatively content in the fact that you went down fighting. If you can be bothered to do anything, then why not try and actually read ELECTRONICS and MUSIC MAKER - who knows, you might actually learn something.

Steve Howell
(Angry of Cardiff!!)

Electro-Musicians

Dear Sirs,

Remember us? Home Electro-Musicians February '82, cassette no. 6 and all that. I just thought I'd drop you a line to keep you in the picture, because the article you published really gave us sufficient morale boost and encouragement to keep plugging away. The result has been that a record company has released two of our numbers, and additional ones are going to be recorded by other artists. We are presently completing material for a double LP.

Johnny Demestros
Gosport

Starting Problems

Dear Sirs,

Could you please tell me the name of a book that would introduce me to synthesizers. Although I've been buying E&MM for several months I'm still rather baffled about what VCO, VCA, EG and so on mean, and what the differences are between programmable memory synthesizers, symphonic ensembles, monophonic synths and so on.

David Griffiths
Hertfordshire

Chroma Problems

Dear Sirs,

I'm a musician who's worked with piano and guitars for 12 years. I've worked as a producer and self-taught recording engineer, dabbled with all the early monophonic synths and a little with the Prophets, Yamaha and Korg polys.

I hesitated for several months before purchasing my ultimate keyboard, then finally went for the Rhodes Chroma, feeling at home on a real keyboard with so much available synthesis. But having read the manuals several times, the machine has still got me wondering whether I am playing in E flat or 3 Volts or +3 Chroma units. Even Rhodes apologise for their unmusical layout of the manual, but for me it's

'back to school'. Can you suggest a book, course or whatever so I can understand synth programming from the beginning upwards?

Pete Gage
London

The Chroma is an advanced keyboard designed for musicians with fairly long experience of synthesiser techniques. Having said that, it doesn't include any facilities which can't be deciphered by anybody whose knowledge of synthesiser basics is sound. Two books which might help to strengthen such basic knowledge are Dave Crombie's 'The Complete Synthesiser' (published by Omnibus Press and reviewed in E&MM October 1982) and Devarahi's 'Complete Guide to Synthesizers' (published by Prentice Hall International and reviewed in November 1982). Further advice on the Chroma specifically will be gladly provided by CBS/Rhodes, Fender House, Centenary Estate, Jeffreys Road, Brimsdown, Enfield, Middlesex. Tel. 01 805 8555. Additionally the reviews and workshops in back issues of E&MM (see last month's index and back copy advert this month) give exactly this sort of information.

Novatron

Dear Sirs,

I was very keen to read the report on the Novatron in your February issue, but after reading it I felt that many of my questions remained unanswered. For example, how long do the tapes and heads last and how much do they cost? How do you keep so many tapes in tune? What are the different models, and how much have artists helped to develop them? I understand that Mike Pinder, late of the Moody Blues, did a lot to his 'Pindertron'. What kind of tricks can you get a Novatron to do, and is there going to be a more compact Novatron? What happened to the Birotron?

Any road, I like E&MM almost as much as the spooky sound of the Novatron. It has to be the best music magazine on the newsagents' rack - long may E&MM live.

K. Crowston
Farnborough

Several Novatron models are currently manufactured, including one with an integral flightcase. All work on the same electromechanical tape strip system, giving a playing time on an individual note of about 8 seconds. Further advice on the costs and durability of tapes and heads will gladly be given by Streetly Electronics, 338 Aldridge Road, Streetly, Sutton Coalfield B74 2DT. Tel. 021 353 3171. The Birotron was intended to be an improved Mellotron-type instrument independently designed by Dave Biro, but never went into large-scale commercial production. Artists still owning Birotrons include Rick Wakeman and Craig Wuest (Earthstar).

Synergy Demo

Dear Sirs,

In your article on the Synergy (August '82) I couldn't find out whether it is possible to play all the voices with smooth tonal differences to produce fat Leslie-type chorus sounds. I'd be pleased if you give me therefore some further information. I also want to tell you that I like your magazine very much the way it is, because there's a lot of information on new musical instruments.

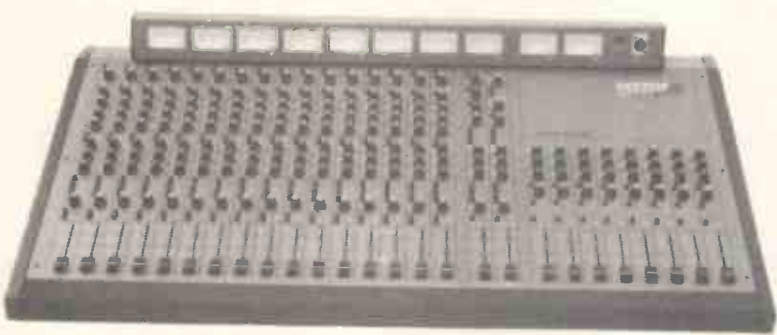
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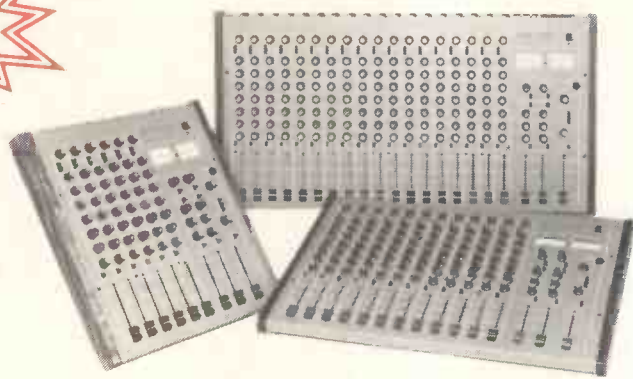
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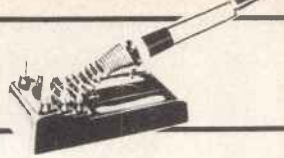
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INTERFACE



IC Suppliers

Dear Sirs,

Could you tell me where I could purchase an LM13600 used in your Comp-Lim. Maplin don't list it in their catalogue and I cannot find it in any other catalogue or shops.

Paul Dreczko
Surrey

The LM13600 should be available from most electronic component retailers. Two companies who stock it are:

Technomatic Ltd.,
17 Burnley Road, London NW10
Tel: 01-452 1500

Watford Electronics,
34/35 Cardiff Road, Watford, Herts.
Tel: (0923) 40588

Maplin do in fact stock the LM13700 which is pin compatible.

Wasp/Micro interface

Dear Sirs,

I have a query concerning the use of digital synthesisers with computers, in particular an EDP Wasp and a BBC micro.

I have successfully connected the two machines and written a program to play the synthesiser by entering music into the computer in conventional notation using the function keys and cursor keys.

However, communicating between the two machines in the opposite direction (i.e. reading codes into the computer from the Wasp) is totally unsuccessful.

There are two main problems:

1. When the connecting cable is plugged in, the Wasp will not sound at all when played from its keyboard. If the trigger line is disconnected, then it will sound. I have partly solved this problem by using one of the timers on the 6522 VIA to pulse the trigger line.

2. The codes output by the Wasp appear to be completely random, and jump about. When the trigger line is pulsed automatically, as above, the notes representing the codes actually sound, producing a completely useless random burbling.

Does this sound like a faulty Wasp, or do I need additional components, a latch for instance? Perhaps I am reading the codes too often, or pulsing too fast. I wonder if any readers have encountered this problem, or better still, found a solution?

Nigel Williams

When a note is pressed on the Wasp, six digital pulse trains are output from the link socket, along with a 'Trigger' pulse train, the pulse width of which varies along the keyboard.

The correct digital data is read by latching the six signals on the positive going edge of the trigger pulse. This edge should be delayed by approximately 100µs to ensure that the data settles before being read.

Your computer should therefore be connected to the Wasp via a latch. A suitable circuit is shown below. The six bit code at the output of this latch will now only change when a new key is pressed.

To ensure correct operation the Wasp should be powered from a separate 5V supply.

MF1/Roland connections

Dear Sirs,

I am writing to you requesting some info regarding how I wire up the output lead from your MF-1 sync unit to the DIN connector on the back of my TR808 Drum machine in order that it may be triggered.

Mick Smith
Worcester

Dear Sirs,

I have now finished the E&MM

project 'MF1 Sync Unit' (April 1981) but am at odds as to how to connect it to my Roland TR606 Drumatic sync socket. The latter, as you probably know is a five pin DIN, but no mention of 'which pin is what' is provided in the Roland handbook. Can you help out?

Secondly, a correspondent in your letters page of August 1982 issue (R. Stacey of London) suggests a start/stop switch to be used with the MF1/TR606 combination - can you tell me where to wire this in. Thanks. I must admit I'm 'dying' to get the project working! Thank you for a most interesting read each month.

Ed Conley
Liverpool

Both the Roland TR606 and TR808 have 5 pin DIN connectors for Start/Stop and Clock.

Pin 1 - Start/Stop (High level to Start)

Pin 2 - Earth

Pin 3 - Clock (Up to 12V)

Therefore the output of the MF1 should be connected to Pin 2 (Screen) and Pin 3 (tip) of the DIN.

Spectrum Synth Controller

Dear Sirs,

With ref to the 'Micro Music - Spectrum Synth controller' article in the November 1982 issue.

I note from the accompanying text that the trigger signal is +10V. I have a Moog Source, and am informed that the signal required would have to be at least +15V. Could you please advise me of the necessary alterations.

My Spectrum is the 48K version and thus I wondered if I would be able to expand the sequence length (preferably), or the number of sequences available, to utilise the full memory potential of the computer.

Can the sequences be linked or chained together to form a continuous program? Is looping etc., possible within the confines of the set up?

As I am not a master electrician, I would appreciate a PCB layout of the interface circuit.

Does the interface need an external power supply, or does it operate from the Spectrum's edge connector DC output?

M. A. Burton
Coventry

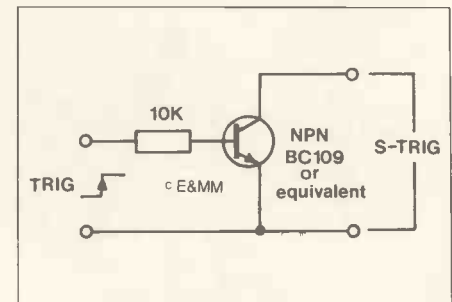
The Moog Source uses what Moog call an S-Trig or Switch Trigger, through a stereo jack.

Sleeve - ground

Ring - input

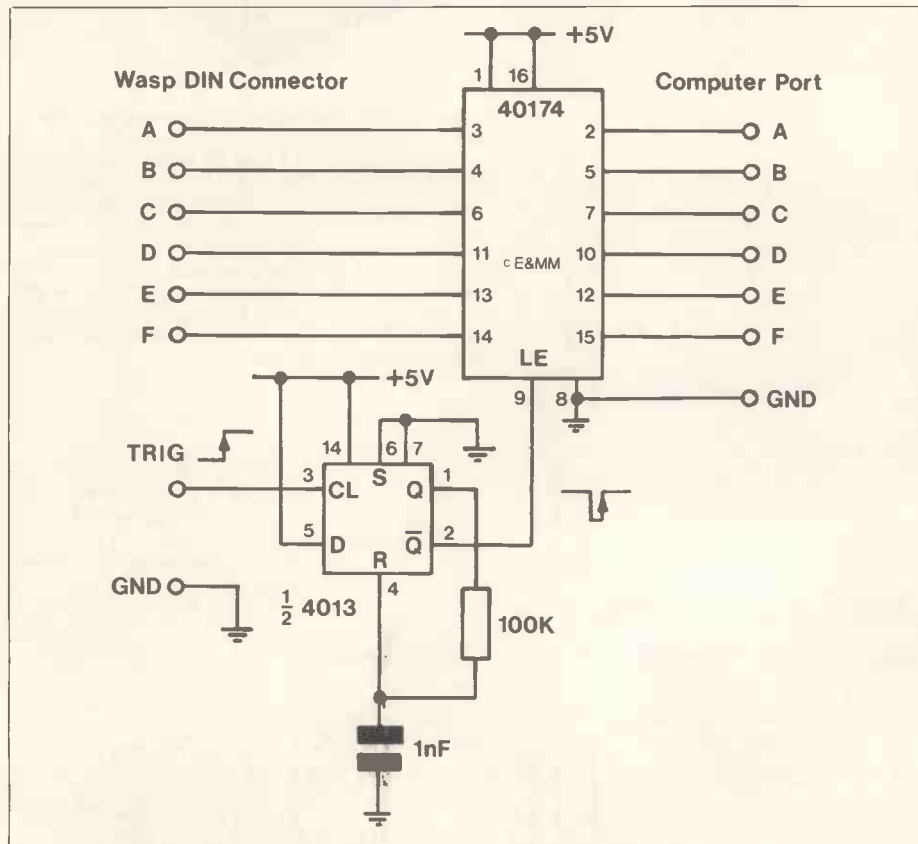
Tip - output

The machine is triggered when the ring and sleeve are shorted together. To trigger from the synth controller connect via an NPN transistor as shown below.



Micromusic articles are meant as a starting point to provoke ideas. The Sequencer program is designed to be extended and changed, adding sequences, chains and anything else you require. No PCB layout was given for the same reason, although an interface circuit will be published in the near future.

The interface does require a ±15V supply for the analogue side but the logic 5V can be supplied by the Spectrum.



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GABOR 'PICI' PRESSER

GABOR PRESSER has been the driving force behind Hungary's top rock band LOCOMOTIV G.T. (L.G.T.) for the past 10 years. In '82 L.G.T. released their 10th album 'Too Long', just released in the UK by EMI Records (EMC 3430). Despite Hungary's total population of 10 million, records must sell 100,000 copies (the same as in Britain) to qualify for a gold disc. All ten of L.G.T.'s albums have received gold discs and several have gone on to attain double-gold status.

GABOR - born in Budapest on 27th May 1948 - is known by friends and fans alike as PICI (the equivalent of the English nickname 'Tiny'). His early ambition to become a classical pianist looked like being realised when he was accepted by the Academy of Music in Budapest. However, it wasn't long before the Academy authorities became aware of Pici's passion for Western rock music and, despite his protestations that he was capable of continuing his classical studies while being merely interested in rock music, he was forced to resign.

He soon joined one of Hungary's first full-time rock bands, 'Omega', whose debut album sold 120,000 copies within three weeks of being released. Its members became stars overnight and although Pici enjoyed the ensuing months of excitement he was unhappy with the band's musical direction and left prior to the recording of Omega's third album.

The year was 1971 and at Christmas, Hungary's first ever national pop poll was organised. Pici was voted 'best keyboard player' and joined 'best guitarist', 'best bass player' and 'best drummer' for a one-off poll winners concert. Together they formed L.G.T. Since then there's been a change of drummer and guitarist but the current line-up has now been together for 7 years.

Pici has undertaken many solo projects during his career with L.G.T. One of his first was to compose the score for a rock musical which has now been showing at the same theatre in Budapest for the past 9 years. He's won many awards but ironically, after his experience at the Academy, he cites the Ferenc Erkel award he won in 1978 as the most important. It is presented annually by the government for 'an outstanding contribution to Hungarian music'. Pici was the first and so far the only rock musician to receive this accolade.

In 1981 Pici began work on a solo project. It was to be an album of electronic music but he'd hardly begun when he was approached by the State Opera Company to compose some music for a ballet they were preparing entitled 'The Rehearsal'.

The ballet was inspired by a Greek author's (Kazantzakis) interpretation of the Crucifixion - The One Who Got To Die. It portrays a group of actors rehearsing a passion play and the accompanying music is by Bach. Throughout 'The Rehearsal' we are given insights into the actor's personal relationships with each other and these are highlighted by Pici's specially composed electronic score.

'The Rehearsal' was first performed at Budapest's Opera House in June last year and was later filmed and shown on Hungarian television. The BBC is currently showing interest in screening this ballet.

An edited version of Pici's ballet score - ELECTROMANTIC - was released in Hungary in June last year. It was to meet with much critical acclaim as well as commercial success. ELECTROMANTIC (EMI EMC 3428) has just been released in the U.K. and at our interview with Pici we asked him how the LP was conceived. . .

“About 2 years ago I decided to make this album and although I already had my ideas, I had to wait a while to get into a studio. It's not every easy in Hungary - there are not so many good studios. Most of them are centered round Budapest. Just a few days before I started recording, I got a phone call from the director of the Hungarian State Opera, Andras Mihaly. (He had been teaching me at the Academy - I call him the 'father' of modern Hungarian Chamber music.) He wanted to see what he could do with my music and the ballet!

At the Academy I studied piano and did a lot of vocal accompanying, but I never learnt to compose, so I was really surprised at his offer. First of all he wanted me to use the Opera House orchestra and possibly rock band instruments too. I realised that my music I was playing could be used for both the album and the ballet. I suggested to the director that instead of using the orchestra or other musicians, I made a studio recording. He agreed and I began the work. He was familiar with electronic music of course, and in Hungary there are many young composers using this medium. The Hungarian radio station has built a special studio especially for electronic music and there is a lot of support for it on the radio.

All kinds of music are broadcasted so it is quite possible to have your electronic music played if it was recorded in their studio. (We have our own Radio 3 in stereo as in the U.K.).

Making the album

It took about 500 hours in the studio to put the music together. Sometimes I'd be working for 3 or 4 days continuously with an equal break, other times I'd have to record every night over a period - I had to fit my time in when I could over some 3½ months. I didn't have to pay because the work was commissioned for the radio. I did not use the electronic music studio, just the usual kind of recording room, and brought my own equipment in - and took it out every time too!

On my 'Electromantic' LP, believe it or not, there was only a Jupiter 4, a Yamaha electric grand, and a very old Korg polyphonic - the big one (PS3300). I have two friends, Andras and Sandor Szalay, who make synthesisers and are crazy about computers. They built a micro-controlled instrument for me to use as well that worked from the Sinclair ZX81. Their small unit (MUZIX81) connected to the Sinclair to control synthesisers. Using this and the special programs they've compiled, you can compose, edit and replay music with your own analogue synthesiser.

Full screen cursor editing shows several lines of your musical score simultaneously. Notes are entered from the external keyboard and can be moved around afterwards to make 24 different 'verses'. Then you can save it on ordinary cassettes.

I found it useful, because I could multi-track with it, using its sync output on tape. One program will 'loosen up' the notes you've entered, and another lets you program your own rhythms to control an external drum box (the E&MM stereo percussion board would be ideal).

I had only a 16-track Studer in the studio, along with an MCI desk and other items such as Lexicon delay. Istvan Kiss, the guy who recorded the album for me was very enthusiastic. We've worked together before and he contributes a great deal. Sometimes we'd wait 5 or 6 days to get hold of a Harmoniser, and I also had to wait several months to hire a very good Sony digital reverb.

Equipment supply is generally difficult, although the record company now help me with lots of things. It's nice to be able to work at night at the radio station because nobody

disturbs me, but there were times when I'd fall asleep by 6 a.m. and the studio police would have to wake me up!

I created the pieces layer by layer. I don't call it electronic ballet music - I call it 'my album.' It's not easy at all to get a contract with a worldwide record company because they don't believe that something can come out of Hungary. It was a very lucky thing that we could send the cassette to EMI - at first they couldn't believe that it came from Hungary! I have found no other record companies who give a little trust for new musicians. The Hungarian record company was really behind the thing and put a lot of money into making it successful.

L.G.T.

We formed the group in Budapest in 1971 and since then there have been several line-up changes, making me the only original member. 'Tamás Sómlo', the bass guitarist, came for the second album and in '73, after recording our third album 'Bummm', we got a contract with Jimmy Miller (who produced Rolling Stones, Traffic, Spooky Tooth and Blind Faith) and had record deals with CBS in the U.K. and ABC

records. At that time everything went very well and we did a three month American tour.

I've always been the keyboard player and also do the vocals with guitarist János 'James' Karácsony and Tamas. On percussion we have János Solti. The high vocals come from James or Tamás.

With the help of our new manager, Dr. Henrik Schonthal, we were being promoted internationally and then recorded our ninth album in English and Hungarian, produced by myself. This brought a deal with EMI records in the U.K. Shortly after, Pete Wingfield was approached to produce L.G.T. and did the 'Too Long' album with us.

The lead guitarist uses three or four guitars - a Gibson, an old Framus bought very cheaply in East Germany that sounds fantastic, a custom built white 'Gibson'-style instrument, plus a Spanish acoustic guitar that's mic'ed up.

The bass guitarist, Tamás, has a Gibson - he originally came from the circus and played sax and violin and was also a juggler and clown. I forced him to learn bass because he's a very good singer and I wanted him in the band.



Our drummer has a Gretsch drum kit as well as a Sonor kit for playing jazz with his friends. There's no electronic drums, although I'm hoping to buy some. I play drums a little - we used to do a drum piece with 3 kits on stage (the guitarist played the third kit). I have my own kit because if I play on Janos' drums he goes crazy - I play very heavy!

On stage I have a Yamaha electric grand, a Rhodes piano, a Jupiter 4 and a Hohner Clavinet. I also sometimes use a Korg Vocoder that was used on Electromantic and I bought a Juno 60 a few weeks ago and I'm still trying to get it through the Hungarian customs. My contract with the publishers should allow me to have some synthesisers to take back to Hungary after the L.G.T. tour.

Effects and current music

I don't use any effects. Of course, the guitarist uses pedal effects, distortion and so on. Our sound engineer uses a Roland Space Echo, a Korg delay unit, and a Midas desk and does most of the effects processing for us.

I'm really interested in the computer type of instrument, but as an individual - the band want to keep their present image. I think so, too - you know, the beauty of synthesisers is that if someone can really use them, it can be a fantastic background for the traditional line-up of guitar, bass and real drums. We play in stereo and are not as loud as a Heavy Metal group, for example.

It's interesting I think that in Hungary we do not have the same kind of dominating situation that current trend pop music has in the U.K. charts. This new wave as far as I know comes from punk, and there is no social background for punk music in Hungary. That's why new wave came as a part of modern music - there are just a few real new wave groups who were formed by artists and painters, none being true musicians. They make a very interesting 'cabaret!' They play radios on stage and get over their poor instrumental playing by being humorous.

The 'Too Long' single just released is not the single put out in Hungary. That was 'Music Express'. But I have to tell you that the English version of 'Too Long' is 10 times better than the Hungarian version. Both LPs were actually mixed at Marcus Studios in Kensington, London.

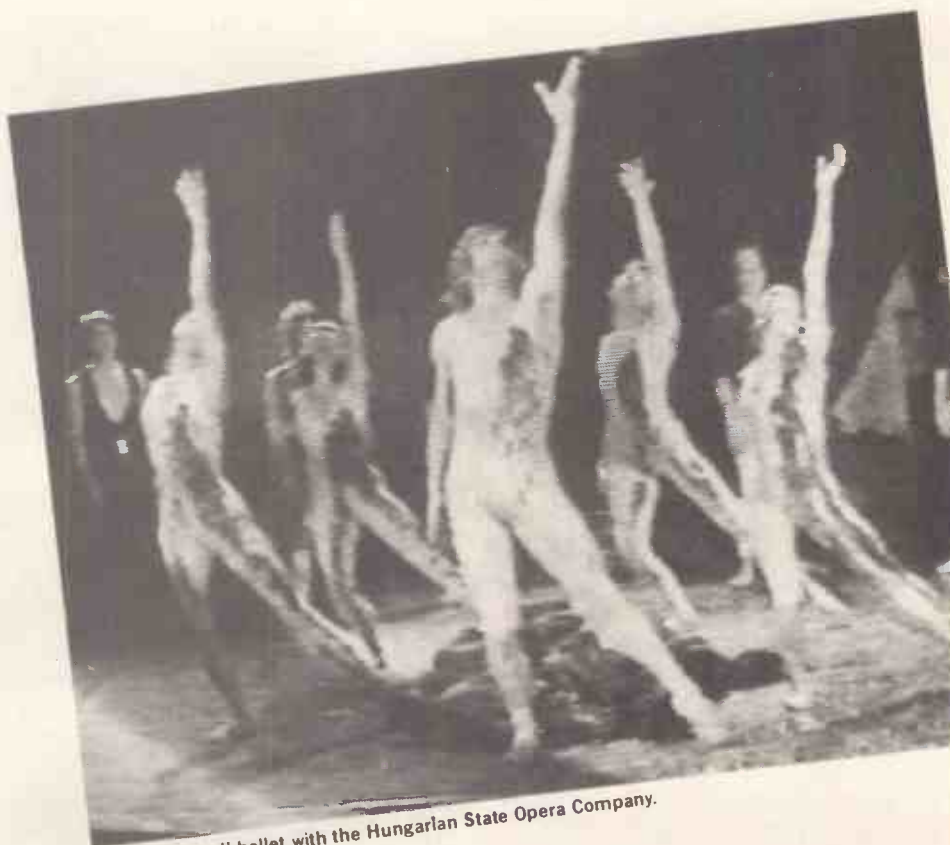
As far as my work with L.G.T. is concerned, we are currently touring with 10C.C. for the whole of March and will then return to Hungary in the first week of April. We shall then play in Budapest on the 1st May - we do this every year. We play the opening gig for a festival near the River Danube. Each year the audience gets bigger - reaching 80 thousand people last year. It's really an L.G.T. Festival! There is another group who used to play almost 10 years ago with us - they will be taking part again.

Composing

It always took me an hour and a half to set up the electronics. I always go first to my Roland Jupiter 4 and feed it to the studio quarter inch Studer. Then I start to work on some of my ideas in my mind. The programming for the ZX sequencer would have been already worked out. The large Korg proved difficult because it has no memory and took a long time to patch. I never use it to imitate an instrument, though.

I composed a further 25 minutes for the ballet performed at the Hungarian State Opera, which I don't use on the Electromantic album. I'm hoping to include that on my next album. There were two pieces not used in the ballet - 'Valvola' and 'DD'.

I've written 3 musicals already and a lot of



'The Rehearsal' ballet with the Hungarian State Opera Company.

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Gabor 'Pici' Presser

Continued from page 14

pieces that have been a hit for the group over the years. I wrote the first musical ten years ago - it was a rock musical called 'Imaginary Report of an American Rock Festival'. The story was written by a fantastic old Hungarian book writer, Tibor Dery. I've also composed 17 scores for Hungarian films.

I don't have a studio at home, but I do have a beautiful Bosendorfer grand piano. (I'm aged 34 and I'm not married). Of course, my first music was not really electronic - I only had a Fender Rhodes piano in the early days.

I think that music is a complex thing - I don't like to separate it into harmony, melody and so on. I don't like composers who write a good melody and then let the arranger take the harmony. I do everything myself. Sometimes I will begin with the sequencer making a bass line or pattern. I often use a click track and build up some harmonies on tape which we would probably wipe off later, but it gets us started. I like to choose the sound of the melody from the beginning.

I hate writing out scores, because I forget my ideas! That means I might record more than one version. I did this for the '2000 Dioptria' track. The first one was played by the Sinclair sequencer, but it was too rigid, so I did another version with just a few sequence lines and added the rest myself to give it more life. This piece uses the Korg Vocoder - I add just a little white noise from the control, but find the chorus too noisy and prefer to use the vibrato effect it has. I don't speak words into it either!

I used quite a lot of short echo from a Lexicon unit on this album, plus reverb from a chamber at the Hungarian Radio.

I can hardly talk about my music - even in Hungarian! I really can't explain what happens. I don't really practise, but I do play a lot. I think I had a better technique when I was in the conservatory. The Yamaha electric grand helps me a lot to keep my fingers agile. I'm not happy with the tuning of the Yamaha because its short strings mean I have to get the instrument tuned just before every gig. Our sound engineer has learned to do it. I don't use the tremolo effect on it too much - twice a gig!

What you won't find I've done is used thousands of pounds of instruments on this album - it's all based around the Korg 3300 and the Roland Jupiter 4. I almost killed the JP4 trying to bring out the last bit of colour from it! I used its arpeggio function on 'Adagio Electrico', done in stereo through a delay split that's panned. Also on 'Electromance' I think.

I managed to get a very clear sound onto the tape, although we used Dolby noise reduction as well. We had to mix down some pieces to get as many as 26 tracks. The drums are all live. I wanted to use electronic instruments, but with orchestral drums: real gong, bells, orchestral snare drum and timpani. I only played a few of the easy parts - with my drummer and other musicians doing most of the percussion. I really love to use an orchestral kind of score - a lot of this did not appear on the album.

Orchestral scoring

I still regard my music as synthesiser music, even though it takes on an orchestral soundscape at times. I'm not trying to get a trumpet sound from a synthesiser. I try to prepare new sounds with a bright, multi-textured quality.

I'm not interested in drum machines - just electronic drums which I'll be considering for future music.

I've been thinking about performing my music live, but I don't want to use a tape and just play some of the parts with it. They've



'The Rehearsal' Ballet

asked me to do this to promote the album. I really think the Sinclair controlled sequencer that my friends have made for me is better than the MC-4 Microcomposer. They also have been working with the Spectrum and are preparing a score writing system for the IBM machine.

If you ask me which instruments that I would like to be getting I would say 'every one!' I know about the PPG Wave 2, but they won't give me a good price! I'm not interested in their new 2.2 version with the Waveterm because we can do the same with the IBM. I've never seen the Fairlight CMI. I've tried the Emulator which I like very much and I like the idea of sampling sound. I tried the Synergy in Hamburg but I'm not sure about that one. I'm looking for the more sophisticated instruments that are still portable enough for touring with. I would probably go for an Emulator rather than a Fairlight and I'd like to be able to add natural sounds to my music.

Structuring

I never think of a set structure, such as Rondo (one track is called 'Rondo a la Terror'). I just start to play and see what happens. Fortunately my sound engineer keeps a lot of things that I would like to wipe off, but later find okay to use. I like to work

very quickly, but if nothing is 'happening' I try to use all the instruments to get a new starting point. I'm never really planning too much. The sequencer has polyphonic memory storage and I can sync it to the Jupiter 4 arpeggio and the Korg LFO. As I experiment with sounds and notes, my engineer is also looking for treatments he can give. We then agree on tempo, notes, arpeggio and we lay a first track. I would then improvise over this - I improve the melody, the harmony, and try to find the right musical balance.

Typical Pici

I think that Electromantic does represent my overall style at the present time. This is my first solo album, after 21 albums in Hungary. I did a couple of albums in the States and one in Europe and now I've done one without any compromise because I did it alone. This is the most important lesson - nobody should have to compromise their music - and that's why I'm very happy with this album."

Mike Beecher

E&MM

For details of the Sinclair MUZIX81 system contact Andrew A. Szalay, Poroszlai ut 6/a, H-4302 DEBRECEN, Hungary. Tel: (36)-52-27-424.



L.G.T. (left to right) Janos Solti, Janos Karacsony, Tamas and Pici.

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MAKING NOTES

CHORD SYMBOLS Part 11

by Brenda Hayward

Chord symbols provide a useful alternative to reading bass staff chords. If you have read the 'Chord Structure' article in Making Notes No. 4 (April 1982), you will appreciate that the notes of a left hand chord indicated by a chord symbol are simply notes of the scale with the *same name* as the chord, in established formations for each adaptation of the Major Chord.

The Chord Symbol is merely a 'short-hand' method of writing the name of the accompanying chords and bass pedal notes rather than reading a number of notes written on the bass staff. If you can play a major chord and its inversions you should be able to correctly interpret any chord symbol.

Physically, you should feel confident that you can form any chord but the mental reaction to a chord symbol such as 'F#m7(b5)' can be either 'I won't bother with that chord' or 'Help'!

Chord Symbol Interpretation

Many musicians seem to have difficulty in interpreting chord symbols. The chord symbol is read as a whole rather than breaking the symbol down into sections to make finding the notes of the left hand chord easier.

The number of instructions following the chord *name* will determine the number of 'movements' required to create the entire chord written as the chord symbol.

The most important section of the chord symbol is obviously the name, such as 'C', 'F', 'Bb' etc which if written on its own is a Major chord. Any following instructions such as 'm', '7', '9' etc are adaptations of the Major chord.

Taking the chord of symbol 'Cm6', the 'C' is telling you to play the 'C' Major chord of G--C-E (second inversion of C-E-G, notes 1-3-5 of the C Major scale).

In the second section of the chord symbol, the small letter 'm' is instructing you to adapt the Major chord into a Minor chord. This is achieved by flattening the 3rd note of the scale, with the *same name* as the chord, by a semitone. Therefore, the C Major chord with its third note of 'E' flattened by a semitone to 'Eb' becomes the C Minor chord.

The '6' in the third section of the 'Cm6' chord symbol is instructing you to add the 6th note of the C Major Scale A to the 'Cm' chord, to create the full chord with the notes of GA-C-Eb written by the composer or arranger.

After forming the basic left hand

chords you can start to interpret the more advanced chords in the same way.

The 'F' Sharp Minor Seventh with a flattened Fifth chord is easy to find if broken down into sections. The Chord Symbol will be 'F#m7(b5).

Section 1 — (F#) — play the 'F#' Major chord: F#-A#-C#
 Section 2 — (m) — flatten the third note A
 Section 3 — (7) — add Seventh note E
 Section 4 — (b5) — flatten the Fifth note C

Figure 1.

Figure 1 shows how to play the 'F#m7(b5)' chord with the notes of F#-A-C-E, and the root note of 'F#' as the pedal note. Emphasis is placed upon playing the *ROOT* note of the chord as the pedal note, as the root note will not always be included as a note of the chord, and the pedal note *NAMES* the chord you are playing.

You may feel that the notes of the 'F#m7(b5) chord looks familiar and you have played those notes as another

chord. Well, you probably have! By holding onto the notes of 'F#-A-C-E' and changing the pedal note from 'F#' to 'D' you will be naming and playing a form of 'D' chord. The notes of 'F#' (3), 'A'(5), 'C'(7b) and 'E'(9) are a 'D9' chord. The same notes are also an 'Am6' chord when played with an 'A' pedal. 'F#' (6), 'A'(1), 'C' (b3) and 'E'(5).

Recognising Chords

Look at the CHORD SIMILARITY chart in Figure 2 to see how the chords you may have already played are various other chords. Inversions of the chords allow them all to be played between the octave 'F' to 'F' above and below. The *NAME* of each chord, its root note, will be played as the pedal note.

Now refer to Figures 3 and 4 for further chord similarities.

The problem of remembering the notes which make up an advanced chord can sometimes be helped by recognising the simple basic chord containing the same notes. Ensure that the root note (Pedal note) is naming the correct chord.

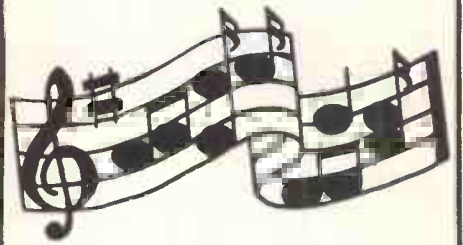
For example, the 'Abmaj7' chord is identical to the 'Cm' chord when the root note is not played in the chord.

NOTES	CHORDS				
	'm7'	'6th'	'maj9'	'11th'	
F# - A - C# - E	F#m7	A6	Dmaj9	B11	also Gbm7
F# - A B - D	Bm7	D6	Gmaj9	E11	
G - B - D E	Em7	G6	Cmaj9	A11	
G A - C - E	Am7	C6	Fmaj9	D11	
F - A - C D	Dm7	F6	Bbmaj9	G11	
F G - Bb - D	Gm7	Bb6	Ebmaj9	C11	
G - Bb C - Eb	Cm7	Eb6	Abmaj9	F11	
F - Ab - C - Eb	Fm7	Ab6	Dbmaj9	Bb11	
F - Ab Bb - Db	Bbm7	Db6	Gbmaj9	Eb11	also Fbmaj9
Gb - Bb - Db Eb	Ebm7	Gb6	*Bmaj9	Ab11	also F#6
Gb Ab B - - Eb	Abm7	*B6	*Emaj9	Db11	
Ab B - Db E	Dbm7	*E6	*Amaj9	Gb11	also F#11

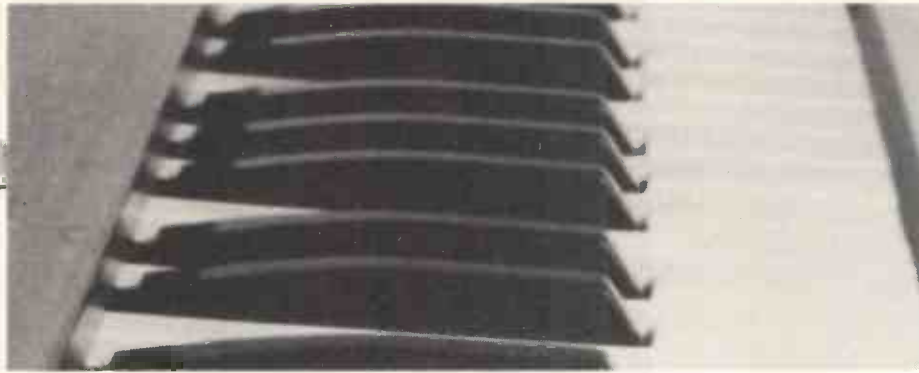
Figure 2. In comparison, you can see that the notes of the Minor Seventh, Sixth, Major Ninth and Eleventh chords are identical.

The Asterisk *, indicates that there is an 'Enharmonic' change in the notes of the chords. ie, The notes of the 'B6' chord are F#G#-B-D# and the notes of the 'E6' chord are G#-B-C#-E.

MUSIC



WORKSHOP



'Cm': G - - C - E_b C Pedal
 'A_bmaj7': G - - C - E_b

played with an 'A_b' Pedal
 The root note of 'A_b' is not included in the chord of 'A_bmaj7'. The 'D_bmaj7' chord is identical to the 'Fm' chord.

cal interpretation and embellishments to music, which can be difficult to achieve without studying established music theory for many years. This is acceptable to young people but to the home musician with restricted leisure

Unfortunately, when first starting to play, home musicians are not often given the opportunity to decide whether to learn to read the Bass Stave or play by the Chord Symbol method, as the majority of music lessons available to them by music teachers, whether private or commercial, often use the 'traditional' method of reading the Bass Stave and playing the music exactly as written. Admirable though this method is, in that many people learn to play who would not otherwise do so, this form of teaching often lacks the 'back-up' of essential music theory.

When the Chord Symbol method of learning is combined with simplified established music theory, a high standard of playing can be achieved by home musicians, who I consider to be so important, as they do not only gain great pleasure and sense of achievement for themselves but provide enjoyment for so many listeners.

My Musical Ladder introduced in previous 'Making Notes', is used for creating embellishments to music very simply with Chord Symbols for forming left hand chord progressions, establishing 'Chords-in-a-Key', harmony and many subjects in my new books Three and Four which I hope will be published this year. The Ladder can also be used by musicians reading the Bass Stave and this is also included in these books.

E&MM

Each NINTH CHORD will have the same notes as a MINOR SIXTH CHORD.

The notes of a 'C9' Chord, Are the notes of a 'Gm6' Chord,	G - B ^b - D E G - B ^b - D E	'C' Pedal. 1st Inversion. when played with a 'G' Pedal.
The notes of a 'B9' Chord, Are the notes of an 'F [#] m6' Chord,	F [#] - A - C [#] D [#] F [#] - A - C [#] D [#]	'B' Pedal. 2nd Inversion. when played with an 'F [#] ' Pedal.

Figure 3.

Each MINOR SEVENTH CHORD will have the same notes as a SIXTH CHORD.

The 'Bm7' Chord has the notes of a 'D6' Chord:-	F [#] - A B - D	'B' or 'D' Pedal.
The 'Em7' Chord has the notes of a 'G6' Chord:-	G - B - D E	'E' or 'G' Pedal.
The 'Am7' Chord has the notes of a 'C6' Chord:-	G A - C - E	'A' or 'C' Pedal.
The 'Dm7' Chord has the notes of an 'F6' Chord:-	F - A - C D	'D' or 'F' Pedal.

Figure 4.

'Fm': A_b - - C - - F F Pedal
 'D_bmaj7': A_b - - C - - F
 played with the 'D_b' Pedal

without which it can be almost impossible to create harmony, counterpoint and many other 'do-it-yourself' interpretations of a musical arrangement or score.

Chord Symbol Alterations and Additions

Any chord addition or alteration is written after the name of the chord and consists of signs such as (b), (#), (-), (+) followed by a note number:
 C7(b9), G7(#5), Fm7(-5), Dm(#7).

For the 'Chord Symbol' musicians, the following tabulation of additional signs added to the basic symbols may be of interest. Using the 'C' Major Scale as an example, some of the additional chord signs are shown in Figure 5.

time the need is for learning as simply and as easily as possible, the firm basis of music theory (such a dull word!),

The Chord Symbol controversy carries on, but over the last couple of years the Chord Symbol method of reading a manuscript has become more acceptable and is now more widely used by music teachers for encouraging musi-

	C	D	E	F	G	A	B	C	D
	1	2	3	4	5	6	7	8	9
(#5) or (+5)					G [#]				5th Note SHARPENED
(b5) or (-5)					G ^b				5th Note FLATTENED
(#7) or (+7)							B [#]		*7 ^b Note NATURALISED
(#9)								D [#]	9th Note SHARPENED
(b9) or (-9)								D ^b	9th Note FLATTENED
(9)								D	9th Note ADDED TO CHORD.

* The (#7) or (+7) means, play the normal 7th Note from the Major Scale.

Figure 5.

Casiotone CT 7000



The latest product to be added to the Casio keyboard catalogue, which incidentally now stands at 16 instruments, is quite remarkable. If the recommended retail price is £575, then you will glean that it becomes the top-of-the-range item, and as such you would expect Casio to have come up with something special, and that they have.

The CT-7000 is a stereophonic keyboard with a memory system that operates in a similar fashion to a multi-track tape machine. Of course, there is no such item built into the instrument - I'm sure Casio have a hate for most mechanical devices and only tolerate the keyboard itself because there is no real electronic alternative. No, the multi-track system is fully digital - but it is more accurately considered as a polyphonic sequencer facility operating in an accessible tape machine format, rather than an actual digital recorder.

The control panel of the CT-7000 has remarkably clean lines to it, and is fairly simple to operate - just as well, because the unit that I had for review came complete without an operating manual. But after much discourse with the fine fellows from Staples Corner (Casio UK's residence), I think that I've discovered all the exciting options that the 7000 presents.

If you are familiar with the CT-1000P you will notice the similarities in presentation - the casework is predominantly wood with a dark matt grey acrylic finish, whilst the control panel is a formed metal stamping with a plasticised silver-grey finish. Two monitor speakers are set into the top of the panel, in such a way as to give both forward, and a little sideways projection of the sound. They also add to the futuristic appearance of the unit.

The tonal quality of the CT-7000's

speakers is good, though perhaps a little more attention could be paid to perfecting the bass end response - the speakers aren't housed in any form of airtight enclosure (they're at either end of the hinged up panel) and as you can see there's enough room for a baffled enclosure to be fitted). However, as with most things it's obviously a matter of cost.

The controls themselves are set between the speakers, and again Casio have gone for a new type of switch. This time there are plastic momentaries with LEDs for selecting the preset voicings, and ordinary momentaries for the stereo effects, incremental tempo stepping, and for all the memory play features; and plastic latching switches for the rhythm unit - if Casio are using momentaries for the presets, why go for latches for the rhythms? Volume and a couple of pan controls are rotaries, and there are some nice slide switches utilised for the automatic chord facilities. Oh, and I almost forgot, a touch strip is set along the front edge of the instrument, below the keyboard, for bringing in the rhythm fills. The graphics being black on silver-grey are clearly visible, but the liquid crystal display, which is used to impart Tempo, Chord, and Memory utilisation, is less clear - but then this is a problem common to all LCD devices.

Casio have, in my book, got things right with their keyboards; for a non-touch sensitive model, the action is fast, not too light, yet quiet and smooth. I wonder if they make their own or use somebody else's? There are a full five octave-61 note (C to C), split 1½ octaves up in order to provide control keys for the automatics.

The Presets

The twenty preset voicings are selected via the double entry momentaries situated in

the middle of the keyboard. This double entry system is a little frustrating as two operations are required to change presets and it isn't instantly visible as to which preset has been selected - still, this is another acceptable cost cutting exercise.

The two levels do, however, correspond quite closely to one another with piano and electric piano on the same button; and similarly with pipe organ and electric organ.

There is no mistaking the Casio sound and the CT-7000 still utilises the same basic voice production circuitry that Casio employ in most of their other keyboards. There has been considerable debate over the past couple of years about Casio's single minded approach to voice production - i.e. the consonant - vowel system. To me it does seem strange that all the proverbial eggs are in one basket. I'm not knocking the quality of the basket on this or any other Casio keyboard, because their sounds are excellent, however an instrument's sound cannot be all things to all men, and a rock outfit has different demands on its keyboard section than does a cabaret band, or a solo performer. Casio's keyboards seem to cater more for the home keyboard player and for the musician who doesn't want a 'monster' sound, and whilst they have proved that this is what the public as a whole want, it would seem to me, as they are committing so much effort to the keyboard market that they broaden their base slightly by coming up with a new timbral character.

The above is sparked off by the fact that the CT-7000's sound is still on the thin side, even with the stereo facilities - which we shall come to shortly. The voicings are extremely accurate in terms of imitation, but because there is no apparent phase varia-

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Halfway during the stereo era, attempts were made by various protagonists to improve on the realism possible - quadrophony. But competing systems and the ill advised use of just 'double stereo' microphone techniques resulted in the failure of quadrophony in the most important area - the market place.

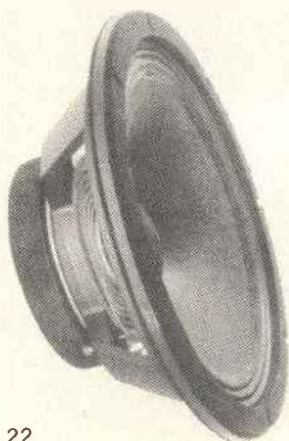
With this background any attempt to cover the same ground, even in a much more technically viable way, has an uphill struggle especially in the current economic climate.

Ambisonics, however, is here and its virtues and techniques should be of interest to musicians/composers and listeners alike.

If you accept that one of the aims of Audio reproduction is to do more than just reproduce instrumental sounds spread between a pair of loudspeakers (and all too often just in the loudspeakers) but to recreate the ambient environment in which the instruments were played, then it follows that ordinary 'stereo' has some way to go. Firstly, in the main, it only caters for reproduction of one horizontal quadrant of the original environment. One could go a stage further and cover the whole horizontal 360° of the original environment - horizontal Surround Sound. Or go even further and recreate the full sphere - Periphony. The latter is not commercially with us at the moment but the former is, horizontal Surround Sound, as one of the facilities of Ambisonics.

Quadrophony

Everyone thinks of quadrophony as a system with four loudspeakers and in its simplest form of arriving at the listener, this also applies to Ambisonics. However, that is where most of the similarity ends.



Quadrophony, in order to get into the home, was available in three competing systems. Two of the systems, SQ and QS, were 2 channel 'matrix' types, encoding the 'rear' information on the two channels of a disc, cassette or radio broadcast. Separately there was a more technically refined system, applicable to disc only, called CD4. This used a supersonic carrier to convey the 'rear' information. Obviously, there were commercial uncertainties between the three competing systems.

All of these systems, however, had one big failing - the microphone techniques were haphazard adaptations of those which had more or less worked in stereo. At the listening end it was sometimes said that, with two of the systems, things were 'better' when the wrong system was used to decode the matrix information!

There were also varying degrees of stereo compatibility in the systems, an important parameter as the greater number of listeners would still be listening in stereo. Worst still, one had a serious mono compatibility problem.

Ambisonic Miking

The development of Ambisonics could be said to have started at the microphone and with what it should do to convert the soundfield into a set of electronic signals. These electronic signals are called B Format signals and a basic understanding of these is at the heart of further thinking about Ambisonics. There are a set of four B format signals. Straightaway it must be stressed that these four signals are not directly related to the use of four loudspeakers.

The soundfield, at a point in space, can be described by three directional signals and one omnidirectional signal. The three directional signals are that which would come from three figure of eight micro-

phones; one facing horizontally front to back (X signal), one facing side to side (Y signal) and one facing vertically up and down (Z signal). The final information needed to describe the soundfield at any point in space, is provided by an omnidirectional signal (called W).

Currently, there is only one microphone which can be used to produce these signals - the aptly named Soundfield Microphone (SFM). These are produced under licence by the Yorkshire firm, Calrec.

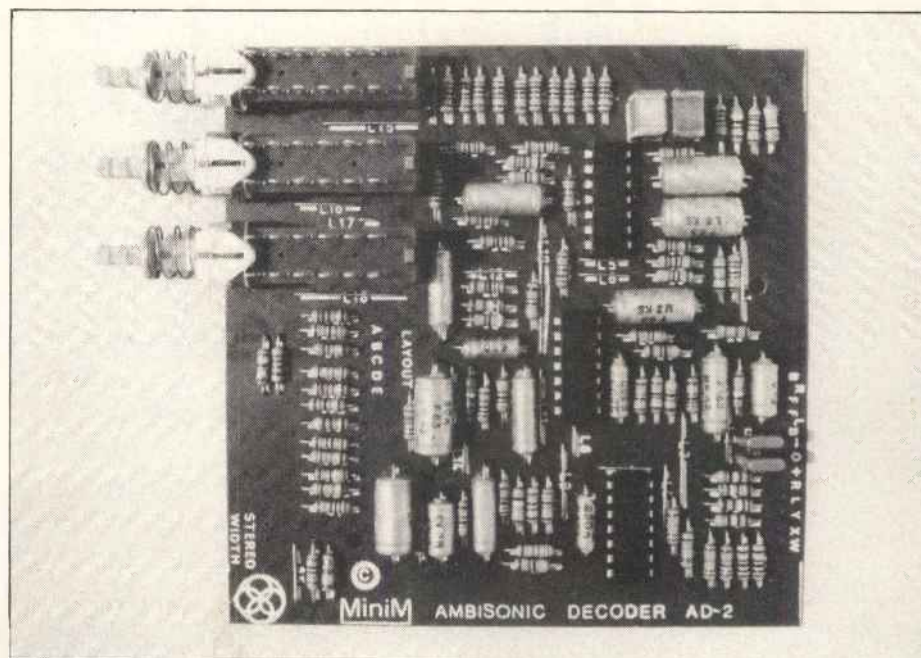
Using just one microphone in a recording or broadcast has its limitations, but is possible to introduce the outputs of other mics into the XWYZ set of B format signals, by electronic mixing from panpots so that directional information is available. Many recordings exist on disc and cassette using a single SFM, but little has yet taken place with additional mics or solely with simulated B format signals.

What follows the B Format?

It is the B Format signals which can be used to create Mono, Stereo, Horizontal Surround Sound or the Periphony hinted at earlier.

Consider the stereo (or for that matter mono) usage. By manipulation and mixing in amplitude and phase, the B format signals can be used to produce a microphone that can be steered - controlling the direction and tilt, gives apparent movement (forward/back or up/down) - apart from the choice of polar pattern (omni, cardioid, hypercardioid or figure of eight) and 'capsule' angle! Further more, if the B format signals are recorded, then these facilities are available for modification afterwards.

However, we are digressing, the case in point is the Ambisonic use of B format



The Minim AD2 Ambisonic Decoder.



Calrec Soundfield microphone.

signals. The X, W and Y signals are used for a quality of horizontal Surround Sound which far exceeds the performance of the ill-fated quadrophony with its unsuitable mic techniques. And you've guessed it - the X, W, Y and Z signals can be used to create the further extension of surround sound, that with height, Periphony.

In the home?

At the present time, this has to be with a 2 channel Matrix System, not dissimilar to the basic ideas behind the earlier matrix systems. With the undoubted improvement after many years of research into the use of matrix encoding techniques things are altogether more satisfactory. The system that has evolved is the UHJ system. It is difficult to try and relate the historical (and political) aspects of the meaning of the letters, but for the record -

U - Universal, in the sense of the amalgam of two systems.

H - The BBC Matrix H system of a few years ago.

J - The Ambisonic Research Teams 45° J system.

It is, in the writers view, a system of mono and stereo compatibility and I would even say that stereo is enhanced, this being confirmed by others, giving less listening fatigue and almost having a 3D effect, albeit from a normal stereo loudspeaker presentation. It is perhaps interesting, that when I give musicians a choice of crossed pair stereo from a SFM or of a UHJ stereo encoded version, they choose the latter!

To get from the B format signals to the 2 channel form suitable for Disc, Cassette or FM Radio, the X, W and Y signals are passed through a UHJ Encoder. At the playback or listening, end the encoded signal is passed through a UHJ Decoder and four 'loudspeaker' signals are derived. Of course, each needs its own amplifier to feed a loudspeaker. Incidentally, decoding at the listening end is not limited to just four loudspeakers (one might be financially!) but six can be used from the same four amps. However, the effects from four loudspeakers in a horizontal surround sound Ambisonic system are good.

Ambisonics vs Quadrophony

The writer dabbled in quadrophonics, years ago, recording four mics on four channels and simply playing back via four loudspeakers. I wasn't all that impressed. Now with the SFM, and the optimised feeding to four loudspeakers, one has a remarkable improvement. Consider the stage/ambience presentation which forms the basis of most Ambisonic UHJ material - the performers are correctly displayed, as in good stereophony, but with more depth, the

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ambience surrounding and enveloping the listener. There is not the crude, front and rear type of presentation of quadrophony. Also the speakers are not the apparent sound sources allowing one to move in the soundfield without the effect collapsing.

Practical ambisonics

Ideally one should have four identical loudspeakers, preferably with the units in a vertical array. But even if you haven't got, initially, four identical loudspeakers, it is still worth a try, the 'best' pair placed at the front. Again it goes without saying that low colouration speakers with little 'boom' and a 'peaky' top response are going to be best. If the loudspeakers are identical then the control of their levels is going to be much easier.

Ideally, four identical amplifiers should be used, again reproduction levels will be more easily set and any chance of frequency, or especially phase irregularity, reduced.

The most cost effective way of getting the UHJ Ambisonic Decode circuitry is to use the Minim AD2 module. A little DIY around this and one has produced an excellent source of four signals to feed the above mentioned four amplifiers and loudspeakers.

The author runs an Ambisonic system with ILP HY60 amplifier modules and four Coles 8" plus Motorola Piezo tweeters in very rigid reflex boxes. As 'tone controls' are not believed in, the whole affair is simple, straightforward and remarkably low cost considering the excellent performance.



Internal view of the Soundfield microphone.

The Minim AD2

The PCB is 100mm square with short ribbon cables to a potentiometer and a rotary switch. There is a unity gain between the UHJ input and the outputs. Levels ranging from 50mV to 2V are intended. The input impedance is 20K and the source impedance of the outputs is 6.7K. Three push buttons provide the following facilities:

UHJ/Stereo - allows playing of ordinary stereo sources with a simulated surround sound. The rotary potentiometer gives soundfield width control, from mono to super-stereo. This 'decoding' of stereo sources is a very useful, unsung feature of Ambisonics which performs very well. No need to feel that one's stereo sources are redundant!

Layout - compensates for loudspeaker layouts other than square. Used for 'oblong' layouts in either direction.

B Format - in case there should be B format signals available (the compact digital disc?) there are X, W and Y inputs.

For setting up this latter feature is very useful. The W (remember - the omni component?) input will feed equally to all outputs and will allow level setting. A suitable subjective signal is noise from an off station FM tuner.



The Minim AD2 module is well built with close tolerance components, many tests being carried out after construction. These are logged for possible future reference and each board has its own serial number.

Ambisonic recorded material

A number of record companies have quite full catalogues of UHJ material recorded with a single soundfield microphone. These include Nimbus, Unicorn, Music from York and the loudspeaker manufacturer IMF. Real Time duplicated cassettes on several labels are available from Whitetower Records at the address below.

The Future?

The NRDCs parent body, the British Technology Group, are currently of the view that the time is right for expansion of the marketing of Ambisonics.

It is recognised that it will only be when the multimic/multitrack techniques of the current stereo era, are readily incorporated into Ambisonic products from studios all over the world, will there ever be 'public acceptance'. It is of course this public acceptance and desire for Ambisonics that will make it commercially viable.

A program of design and construction of mixdown equipment to take multitrack material and convert it to the B Format form is underway and hence UHJ issues from such sources are likely soon.

Having more popular recorded material - the software - should increase interest among the playback equipment manufacturers - the producers of the hardware. However, with the advent of the Compact Digital Disc, has the boat been missed to incorporate in this medium, the actual B Format signals? This for many would be the imaginative step forward.

Mike Skeet

E&MM

Whitetower Records are making available the MINIM AD2 Ambisonic decoder at the special price of £45 including P&P. Orders should be sent with cheque or PO to DEPT E&MM: Whitetower Records, 2 Roche Gardens, Bletchley, Milton Keynes MK3 6HR. A list of Real Time duplicated UHJ encoded cassettes is also available on receipt of a sae.



Casiotone Ct 7000

Continued from page 20

tion to the sound, the overall effect is rather clinical. Nevertheless, the voicings are still streets-ahead of most of the competition, in terms of value for money, and, as I say, for many people, the CT-7000 provides exactly the depth and richness that they desire. One can get too fat a sound, which can be most awkward, especially when multi-tracking.

The presets are certainly well observed. I particularly like the elec. organ and elec. piano, both rather delicate, but the organ has a lovely clean percussive attack, whilst the piano offers that nice digital harmonic quality that has come to be highly regarded. The acoustic counterparts of these presets weren't so impressive. Other voicings include harpsichord, flute, clarinet - all good imitative presets; trumpet, horn - not so good, the consonant/vowel system doesn't perform well with brass sounds; violin, cello - okay as solos, not so fine as polyphonics; accordion, vibraphone - quite nice well rounded voicings; synth. guitar, synth. flute, funny, cosmic tone - which are all usable as electronic as opposed to imitative presets; and elec. guitar and banjo - which if played in the correct fashion can sound most authentic.

Incidentally, Casio have put a noise gate on the output of the CT-7000 which is quite noticeable especially if you are wearing headphones.

The Automatics

The rhythms are again much as those you would find in any other Casio keyboard - there are 12 of them, all nicely voiced, and very well arranged. They too utilise the dual entry switching system and are: rock, pops, disco, 16-beat swing, Latin swing, bossa nova, samba, beguine, tango, waltz and slow rock. The tempo is set by incremental buttons, and the actual value of this parameter is shown in the LCD display. As one would hope, fills are introduced by means of a touch strip that is located along the front edge of the instrument.

The remaining automatics are also of a kind that we've seen before, only this time they are working in stereo. Chords can either be fingered or programmed automatically whence major, minor, seventh, or minor seventh can be utilised - again the chord played is displayed in the LCD. The selected



chord can then be set to run continuously or pulsed from the rhythm unit.

Arpeggio and auto bass are programmed to follow the chord sequence - I'm particularly impressed with Casio's auto bass function, not only on this instrument, but on several of their earlier machines. They seemed to have gone to a lot of trouble to match the bass line to the rhythm, and have captured quite a nice degree of 'feel' in there.

Separate level controls are provided for the bass, chord, arpeggio and rhythm, though for some strange reason these are located away from the pan controls, which in turn aren't next to the master volume.

Stereophonic Sound

Well, those of you hoping to find that the CT 7000 has some kind of spatial effects generator on board will, I'm afraid, be a little disappointed. There are ten buttons located beneath the display, and these are used to position the sound in the audio spectrum. They range from hard left, left, light left, centre, etc. to hard right. And, for those of you who are fans of 'ping-ponging' there are three automatic panning options (differing speeds and depths) which can be used to good effect, i.e. sparingly, but if selected for just a single keyboard line, e.g. without rhythm and auto accompaniment, then the swirling effect is somewhat disturbing, especially if you've just had lunch. The automatics viz. bass and chords, have their own 'static' pan controls, whilst the arpeggiator is preset to flash back and forth between channels, and there's nothing you can do about it.

Memory Play

This is the biggy. Next to the right hand speaker can be found the controls for this section, which bare a resemblance to a

PortaStudio, or the like. There are three musical channels - two for polyphonic melody lines (CH-1 and CH-2), one for chords (Chords), and two channels marked 'Tone-Effect-Stereo Control' for Channels 1 and 2. See Figure 1. The CT-7000 has 1800 steps of memory and, with each note requiring 1/2 step, there's a fair bit of memory to play with.

To operate this 'multi-track' section requires little technical skill, though to realise its full potential requires a fair bit of musical talent. As a simple guide I'll give a quick run-through of its operation, at least how I found it was best to use it, because no manual was available.

Firstly, it is necessary to put a melody line (polyphonic if desired) into channel 1; then a contrasting passage into channel 2; you can proceed then to put an accompaniment into the Chord channel if you want. Effects channel 1 can then be programmed with voicing info for channel 1 along with stereo options and the rhythm fills. Effects channel 2 is also used for channel 2's voicing and positioning data - remember these can be changing throughout the course of the recording.

Now comes the nice bit. You can bounce down channel 1 and 2 into just channel 1 leaving channel 2 free for a new line. The only problem with this is that the combined channels both now take on effects channel 1's voicing data. This is a most useful section to find on a keyboard and I can see that it is just the start of things to come. There are some nice touches like the fast forward and rewind, with which you can actually hear your composition spooling back and forth for easy editing.

Once you've reached the peak of compositional excellence, you can utilise the 7000's cassette dump facility, which entails the connection of your machine to two sockets on the units rear. With the aid of the stereophonic positioning buttons, a file number can be assigned to each composition (1 to 99) so you can keep better track of your masterworks.

Internally, things are a bit sparse and there's really very little to see. Though I did notice that Casio are using the new ribbon cable, which has the ends pre-formed into gold plated contacts, that plug directly into the board mounted multiway socket - this must keep costs down a fair bit.

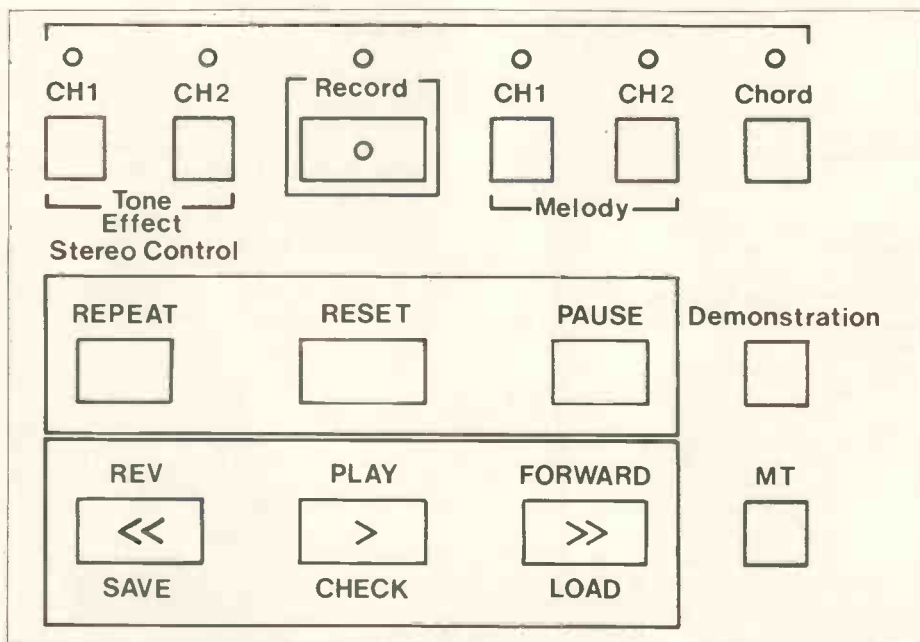
On the rear panel we have the customary input/output ports. Stereo/Mono jack audio outs, stereo headphone out, cassette interface sockets (mini jacks), foot volume, and sustain pedal sockets.

The CT-7000 is a superb instrument, and although some may prefer a slightly meatier sounding product, the control facilities that it offers are really second to none (none in this price region anyway). Keep an eye out in the shops for this one, because initial demand, I'm informed, is considerable, and they are bound to be snapped up as soon as they appear.

Dave Crombie

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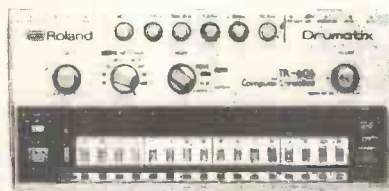
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Electro Music Engineer

Dave Rossum, E-mu Systems designer, talks about his involvement in the Electro-music industry.

For the last 10 years, Dave Rossum has played an active part in the design of some of the most important developments in Electronic Music technology. Recently, he was in this country promoting the release of his latest design, the Drumulator.

"My schooling is in Biology, I was a graduate student studying the Biochemistry of Ribosomes, at the University of California. My advisor walked into the lab one day and said, 'Have you ever seen a Moog synthesiser, they're unpacking one in the music room, do you want to go and help them?' So I went to the Moog room and sure enough they were unpacking a model 12. By the end of the day I was teaching everybody how to use it even though I'd never seen it before. It just kind of clicked with me so I spent the whole quarter not doing biology but teaching synthesisers and by the end I was just so intrigued by the whole thing. We got schematics and I figured out how the thing worked. My training in Physics and Computer Science gave me a basic understanding of what a transistor did and plenty of maths to go with it. So I was able to pick it up pretty easily, checking up on a few things in the library.

Over the summer of '71 a group of six of us from Caltech and the University of California got together and decided to build a synthesiser. We started out with some very primitive uni-junction type oscillators and so on, but proceeded fairly quickly to the type of VCO design you see today, with dual-transistor, temperature compensated exponential convertor and op-amp integrator with a discharge transistor. We used the universal filter approach, the state variable, back then with a Moog ladder type network. Transconductance amplifiers weren't available then, it was the end of that summer that RCA announced the release of the CA3080. We used the 3060 which was similar, but pretty non-linear, for our amplifiers. My first patent was in fact how to make the 3080 into a Voltage Controlled Filter.

We built the first unit as a sort of modular system similar to the ARP2600 with a single front panel, pre-patched behind the panel, but which could be externally patched from the front. We learned a lesson from that, every patch you did you wanted one more oscillator or a different kind of filter or another input to the mixer, it just made you realise how much you wanted a true modu-

lar system. We had two custom front panels made so we built two of them which we then sold."

E-mu Systems Inc.

"When we went into business in November '72 we decided to go for the high end of the market and designed a modular system which is still in production today. It's built like a Sherman tank, front panels 1/2" thick, walnut cabinet made by my brother and has very expensive pots and stuff which make it last forever. They go into universities and don't fall apart even although the students seem to play them with hammers!

We really tried to get the circuit quality better than anybody else's. There's a wonderful story which happened during the development. We had as reference the ARP 2500 manual which had a thing called the multi-mode resonator. We wanted a standard of excellence, basing our designs on the best of each system available, be it Moog's filter, ARP's multi-mode resonator or whatever and studied the spec sheets on each of these things. I worked for weeks getting our State-Variable filter to have a Q of 500 at 20KHz, which requires a 10MHz gain bandwidth, learning a tremendous amount about filters, high frequency amplifiers, how to get a VCA to run to 10MHz and all these wonderful things. We laid out the circuit on the double sided PCB and had to re-compensate the whole thing for trace capacitances from one side to the other, since at those kind of frequencies they are very significant!

It ended up that the last 'tweak' on the E-mu modular system active filter is that you take a piece of superstrip, which is stuck on, and clip it to a point where the filter goes 'bing'. Then you look at it on the scope, running at about 18 or 19KHz, watching it ring down, then you clip it again and again until just before it goes into oscillation. So it's 'tweaked-up' to the limit to get to the specifications we read on the ARP spec sheets. About 2 years later I actually had my hands on the multi-mode resonator for the first time and it didn't come anywhere near those specifications! Still it was a wonderful way to really push yourself and learn electronics. Once you know something can be done you'll figure out a way to do it. That's really the company attitude towards electronics and engineering.

I've been, up until very recently, really the only engineer in the company. Scott Wedge, our president, is capable of digital design but I do the current hardware and software design.

I had some formal courses in software, even in Biology you use computer simulations, and I was always interested in such things at a machine level. At college we had an IBM1800 which was a process control computer which you could play with at 'bit' levels. I would spend days there writing programs in assembly or machine code language. I then used a 360 model 20 which was a little less powerful than an 8080 microprocessor but still a good computer back in those days. It was simply used for listing out punched card decks, but it was a multi-purpose computer. So we worked out how to punch an entire operating system in assembler! It was all on punched cards, we didn't have a disk drive in those days. That was one project at college I learned a lot of my software training from as well as studying the more sophisticated computer techniques.

Both the Emulator and the Drumulator use the Z80, which is an extremely good processor because of its interrupt structure. You can go into one routine, interrupt to another and still interrupt with higher priority routines. In the Drumulator it does everything except the audio path, since it's not fast enough to do digital audio with the required fidelity. However, we're doing a lot with that processor, which makes the Drumulator so cheap."

SSM development

"I met Ron Dow, an engineer wanting to start a company to make his design for a VCA chip (which became the SSM2000), but at the time he wanted someone to help finance the integration. We could have scraped together the money but unfortunately it was on a 24V process and our modular system had $\pm 15V$ supply rails as standard. He then went off to EXAR to get a quote on the integration and they offered him a job because he had done such a good custom integration design! He took the job but kept working on his designs and eventually found a company called Solid State Music (making computer boards and selling surplus parts to hobbyists) who were willing to put his design into chip form. Two years after my first

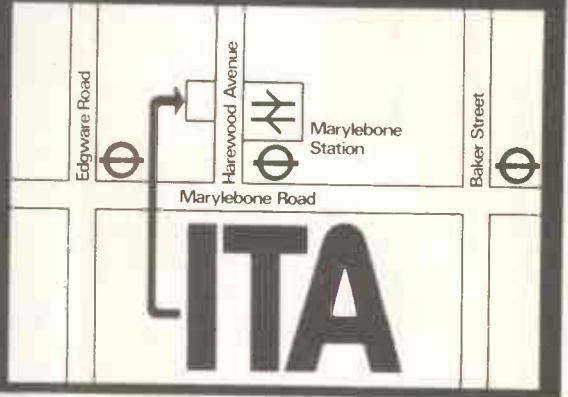
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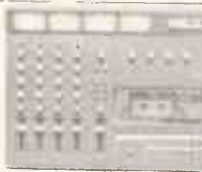


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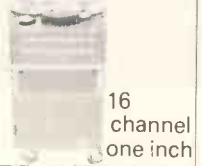
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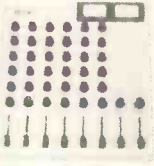


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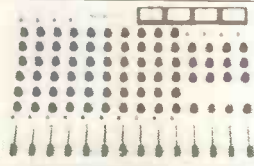


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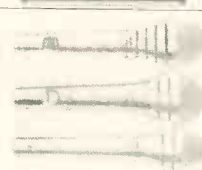
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ELECTRO MUSIC ENGINEER

Continued from Page 26

meeting I went to SSM to buy some parts and ran into Ron who told me about his new design using a 36V process, with all of the original problems solved. So we then started designing chips together, Amplifiers, Oscillators, Filters, ADSRs and came up with an amazing amount of technology for what was really second generation linear design.

When Dave Smith, a good friend at the time, started to design the Prophet he asked our help as consultants on a royalty basis. So our help with the design using SSM chips really got Sequential Circuits off the ground. When CEM (Curtis ElectroMusic) brought out their temperature coefficient resistorless oscillator design, which SSM had not developed yet, SCI changed to CEM chips. CEM was probably the best thing to happen to SSM who have just released eight new products."

Emulator Design

"After the May '80 AES, at which we had seen the Publison and the Fairlight, people seemed very interested mainly in the sampling capabilities. I knew that the Fairlight had individual memories for each one of the sound generators, so the idea that we could share memory and cut the cost down led to the Emulator. A group of us got together one afternoon and figured out basically what the Emulator would do. So I crawled into the back room, was chained to the bench and started work.

Two months later we had pretty well proved that the sound quality from companding was acceptable. The next trick was managing to get the bus bandwidth fast enough so that you could get all the sounds out. When you pitch shift up you get a pretty high bandwidth. For example, sampling at 30KHz, then shifting up an octave, giving 60KHz, in eight channels is about 1/2MHz which is a lot on a microprocessor bus. I didn't want to have a separate sound bus and processor bus, so getting that system to work was a little tricky. We still use a 2.5MHz Z80."

The Future

"As far as future products are concerned, I don't know what we are going to do next, we have a lot of ideas but I still have a month or so of work with the Drumulator. The software has been developed but there are bound to be production headaches.

We're still producing modular systems but the sales come in little waves. A few years ago we went for 6 months without selling anything, around the time when the Fairlight and Synclavier were being introduced. When people saw them, realised they weren't God's gift to men but had their own particular sound, they came back and started to buy modular systems.

As far as the future is concerned I think everything will be digital. By the year 2050 you'll probably have something identical to the Prophet 5 but completely digital, a total simulation. The big thing you'll see at the maturity of digital technology, which I think is a long way away, is the Filter knob coming back! I mean the filter is a real nice thing, you've got to admit. The ear just knows what that's going to do, because it works along the same lines as the ear does. You can't do that with digital, you turn a knob on almost any of the synthesis algorithms right now and it doesn't quite do as 'nice' a thing as a filter does. The beauty of digital filters is of course that you can program them to do anything. Unfortunately, they have to be done to at least 24 bits of linear precision or go into some kind of floating-point technology to do it. It won't be until the digital filter becomes easy, which is about 10 years off, that a strong analogue filter IC will become



Dave Rossum with the new Drumulator.



The new Drumulator.

obsolete. The digital oscillator, however, is coming of age - essentially that's all the Emulator is, it's a fancy digital oscillator. As times goes on we'll find other interesting things to do digitally along with the analog stuff.

The next big step in electronic music is the human element, getting the expressive-ness into the controllers, the sequencers

and the sound in many ways. After all that's really what music is all about."

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Part 2

Setting Words to Music

In the second article of this series, we investigate the problems posed by setting words to music — how to set about writing a lyric and how to fit the words to a syncopated melody to give an authentic rock feel, with exercises to give the necessary practice.

Anyone who has tried to write a song will have attempted to solve the problems of finding an idea for a lyric, shaping this idea into verses and choruses and fitting these to a melody. There are other considerations to be made which we will look at in future articles, as well as how to write a melody which we have already discussed. In my experience, many writers do not consciously separate these elements, often working simultaneously on every aspect of the song, starting from the initial idea which might be a part of a melody and an odd word, or perhaps an interesting chord sequence or rhythm. But, whether worked separately or in various combinations, these elements can be seen in the finished song.

It is an advantage, initially, to be able to work in a logical way, solving one problem at a time. Experience will enable shortcuts to be taken and several elements to be worked at the same time, but it helps to have a clear idea of what you are trying to achieve, especially when things go wrong.

If we first consider the lyric of a song, it can be seen that every song from *Subterranean Homesick Blues* to *Raindrops Are Falling On My Head* communicates a feeling or message using one of a variety of devices. These range from the juxtaposition of unrelated words and phrases to create images, through straightforward story-telling, to nonsense lyrics of little value except that they fit the tune. A good exercise is to write out the words of songs that you like and study them in isolation from the music. Note for example how the words are used to tell a story, whether single syllable words are used, the length of the various lines, the number of lines per verse or chorus, whether there is a rhyming scheme, what kind of mood is created, etc. Try writing a verse to replace one of the verses from the song. Start collecting words and phrases that you like for future use. These are all ways in which you can learn about lyric writing from other writers.

When thinking of ideas of your own, there are many sources that can provide inspiration. Quite a good way of writing a lyric is to take a short news item from the newspaper and convert

that into verses and chorus. Even if the exercise results in failure, you might discover one word or phrase which is worth saving for future use. Another way of stimulating ideas for a song lyric might be to do something which I heard of recently which is to imagine the video that you would make to promote the song when completed, and write a lyric to suit. It is often a good idea to remain detached from the lyric, as a close emotional involvement can obscure objectivity. For example, John Cage has used *I Ching* (a book of chance) to determine solutions to problems in his music and at the time of *Sergeant Pepper*, Lennon and McCartney were inspired by the wording of old posters.

Writing a lyric is something that becomes easier the more it is practised. The idea of saving single words and phrases at first is a good one as it will conveniently tie in with the initial stages of learning to set words to music, where single words and phrases are considered first.

If we take a word like elephant, we can see that it consists of three smaller units called syllables. These are shown here separated by hyphens: el-e-phant

When the word elephant is used in normal speech, it is usual to stress the first syllable thus (v marks the stressed syllable):

v
el-e-phant
v
not el-e-phant
v
or el-e-phant

There are some circumstances in song writing where syllables that would not be stressed in normal speech are stressed in a song lyric, either to make the line in which the word occurs fit a tune previously used for another line, or to create a particular effect. Normally though, the art of setting words to music is to make the accents or stresses in the words coincide with the accents in the music. If we were to set *elephant* over a straight 4/4 crotchet rhythm we might arrive at:

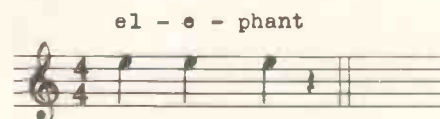


Figure 1.

Here the accented syllable sits on beat one, the strongest beat in the bar. This rhythm doesn't take into account the relative length of the syllables in normal speech, which might be:

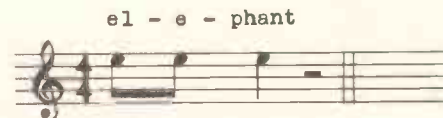


Figure 2.

There are many ways in which this could be varied. Try experimenting with the numerous possibilities.

When the concept of syncopation is applied (see last month's article), we would want the accented syllable to be placed off the stressed beats in the bar.

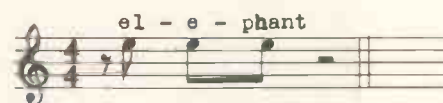


Figure 3.

Here the rhythm of Figure 2 is brought forward by half a beat.



Figure 4.

In Figure 4 the rhythm of Figure 2 is held back by half a beat.

Practice tapping a steady 4/4 pulse and speaking the word *elephant* in the rhythms shown in Figures 1-4. These are the basic principles that give a rock lyric its effect — syncopation of the stressed syllables of the words.

A glance at any song lyrics will show that it is useful to use words of one syllable as these can be more easily manipulated from a stress point of view than can multi-syllable words when it comes to fitting second and third verses over existing tunes.

v v
The cat sat on the mat

If we look at a whole line, fairly well known, it might be said that the stressed syllables (words in this case) should be cat and mat. Sometimes the word *on* is stressed, but in general it is better not to stress unimportant words of this type.

A rhythm for this line might be:

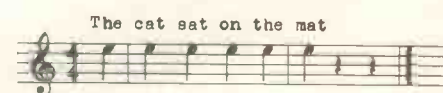


Figure 5a.

Syncopation produces Figures 5b and 5c.

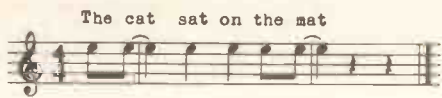


Figure 5b.

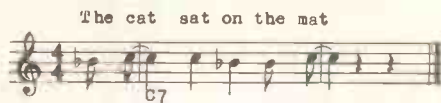


Figure 6a.

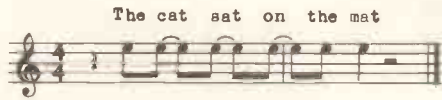


Figure 5c.

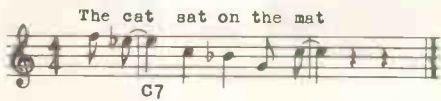


Figure 6b.

V V V
Ma-ry had a li-ttle lamb
V V V
Its fleece was white as snow
V V V
Ev'-ry-where that Ma-ry went
V V V
That lamb was sure to go

Figure 7a.

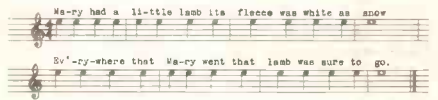


Figure 7b.

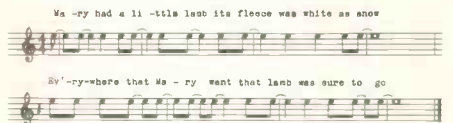


Figure 7c.

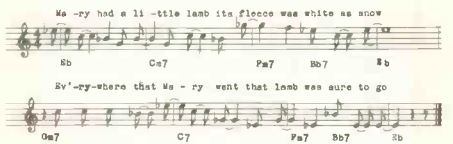


Figure 7d.

In next month's article we will look at the implications of rhythmic and harmonic backgrounds for word settings.

Martin Glover

E&MM

Again, practise Figure 5a, 5b and 5c with a steady pulse and try some variations of your own. Also, experiment with some of your own words, straight at first and then syncopated settings. Use a rhythm only (no pitches) saying the words to the rhythm whilst tapping a steady pulse.

The next step is to add to this rhythmic structure pitches from the prevailing harmony. For example, if this line were to be laid over a chord of C7, we could either use the harmony notes from the chord, as in Figure 6a, or use the notes from a pentatonic scale as in Figure 6b. (In theory we could use any notes over the chord of C7, depending on the desired effect.)

Practice experimenting with different harmony notes until a satisfactory effect is achieved.

Figure 7 shows my version of the nursery rhyme *Mary Had a Little Lamb*,

showing each stage in the setting of the words: a) marking in the hyphens and stresses, b) setting the words to a straight rhythm, c) syncopating the rhythm and d) laying the rhythm and the words over a harmonic background.

Exercises

- Lyrics
 - List words and phrases that you like for future use.
 - Analyse words of songs that you like.
 - Write new verses to existing songs.
 - Use such sources as the media, personal experience etc. to write lyrics of your own.
- Word setting
 - Rework Figures 1-6.
 - Repeat the exercises using words of your own.
 - Use other nursery rhymes, poems, or verses of your own to produce settings similar to that of Figure 7.

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Hot Wiring your GUITAR

Peter Maydew

Series Wiring of Pickups

Figure 1 shows the most usual wiring of a standard two pickup, two tone and two volume guitar, reiterated for those who are either unfamiliar with it or who missed earlier articles. The principal features to note in connection with this article are the ways in which the volume controls and pickup selector have to do their jobs. The selector switch needs to be a special type, in which all three contacts are connected together in the switch's mid position (to put both pickups on) rather than the normal "centre off" variety of three position switch.

Second, the volume controls work by shorting the pickups out; for the technical reader, a guitar pickup looks like a voltage source in series with an inductance. When fed into a low impedance, for instance a turned down volume control, the result is a progressive loss of treble as the volume is reduced; a well known feature of guitars with this wiring.

To see why the controls have to work this way, refer to Figure 2 which shows an alternative circuit used on some guitars. At first glance it may seem identical to Figure 1, but the difference is in the volume controls which are wired the other way round. Now, they don't short out the pickups — so no loss of treble — but they *do* short out each other!

Imagine that both pickups are on at the selector, but volume control 1 is at minimum; you'd expect pickup 2 to come through loud and clear, right? In fact, nothing at all comes through because the signal is shorted through volume 1. Figure 1's wiring avoids this at the expense of loss of tone: each circuit has its pros and cons.

Series Wiring

Figure 3 is a completely different method which I've not seen used commercially, but have employed successfully on one of my guitars. The pickups are in series rather than in parallel, and the selector switch works by shorting out the unwanted pickup. This time, the other pickup is unaffected, and the switch can be an ordinary centre off type so that the centre position leaves both pickups alone.

This circuit has pros and cons of its own, of course; apart from the simpler and cheaper pickup switch, there is no shorting problem with the volume controls. Shorting is what's required this time, after all! The treble loss is not as bad as with Figure 1, but there still is some; because the pickups are in series, the signal from each one has to find its way out through the other if it's in circuit. In technical terms, the inductance has been doubled; on the other hand, the output will have been doubled too, and with a decent amplifier and a not too long output lead, a full meaty sound is the result.

When constructing this circuit, the important thing to remember is that the 'top' pickup (no. 1) and its circuitry aren't earthed at all, so the pickup you use must not be of the sort where one side is connected to the screen of the output cable. Similarly, the controls associated with this pickup should

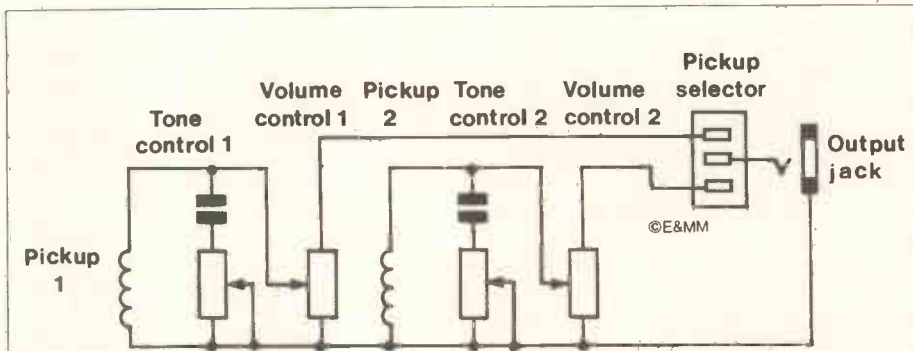


Figure 1.

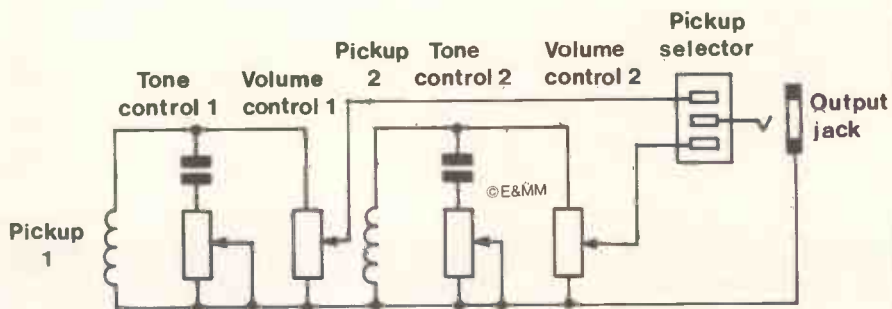


Figure 2.

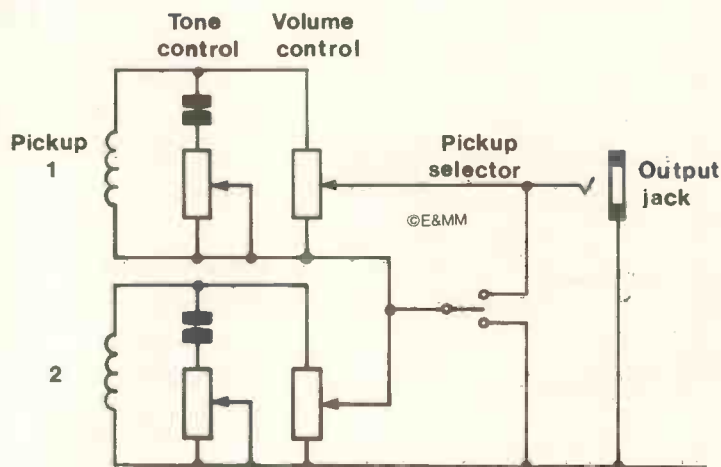


Figure 3.

have their cases earthed as usual, but none of their terminals should be earthed. In some cases, this means that you won't be able to re-use the old pickup or controls.

As for values, 500k for the volume controls with 250k tone controls and 20nF capacitors should be a good starting point. As always, experiment to obtain the sound you want. The switch is a SPDT centre off type, but should be a type meant for low level

signals, preferably with gold contacts. Some mains rated switches, although physically robust, have quite high contact resistances and aren't reliable enough.

Any of the coil switching arrangements described in previous issues can be included, but unfortunately stereo wiring is not really a simple proposition.

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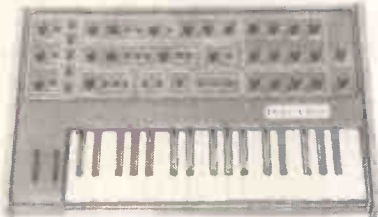
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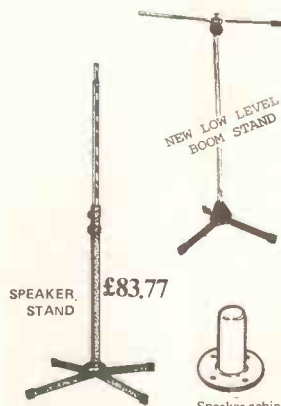
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Eko

Bass Pedalboard

One of the most useful ways to extend your solo performance is to add a pedalboard to your instrument set-up. With the keyboard instrument coming to the fore in recent years, many musicians who started on guitar, acoustic instruments and even drums have found it essential to acquire some keyboard skills. The pedalboard offers an interesting alternative, particularly as it can be played with your existing instruments. The most agile pedal playing requires sit-down performance, but plenty of guitarists do play standing up and still use pedals to add root notes as well.

Eko produce three portable instruments at low cost that are sturdy enough to take on the road and feature controls that are all operated by the foot. The model illustrated is the K.3X which retails at £239 (inc VAT) and is the largest of the three boards. The 20-note pedalboard is unusual — the 13-note board is the most common — and will enable full runs for any style of music, including classical. Three bass footages are provided: 16', 8' and 4' giving flute-type sounds, while for more attack to your playing you can switch in Guitar Percussion and Bass Percussion (nothing to do with drums, simply sharp, AR envelopes). There is also a sustain switch to extend the release time. These functions are selected by heavy duty press button switches (shown 'on' by nearby red neon).



Close-up of controls.



Additional rotary knobs adjust percussion decay, sustain length and +/- semitone tuning. These are obviously set prior to performance. There's also a clearly marked volume 'wheel' which is easily changed at any time.

The unit is completed by on/off switch and pilot light plus mono standard jack output socket at the rear. Construction is good throughout with smooth

action, well sprung pedals, silver trimmed black end pieces and grey panel with yellow legending. No case is supplied so it's a good idea to make a rexine bag to keep dust away from contacts.

Smaller units available are the K.1X at £165 (inc VAT) with 13 notes, and 8' & 4' pitch, and the K.2X at £199 (inc VAT) which is the same as the K.3X except for a 13-note board.

A final thought — why not use

a board to link extra pedal contacts to your synth keyboard or sequencer as well? Certainly, you'll find pedalboards let you do much more, and these Eko units are very reasonably priced to get you started.

E&MM

The Eko pedalboards are distributed in the U.K. by John Hornby Skewes & Co Ltd, Salem House, Garforth, Leeds LS25 1PX. Tel. 0532 865381 for details.

Gateway Sound Studio

It is now nearly a decade since the TEAC Corporation unleashed on the awaiting music business the first 4-track tape recorders for use outside the professional studio. This caused a revolution in the recording industry, the repercussions of which still exist today. In the space of a few years we have seen 8 tracks on ½" tape, 16 tracks on 1" tape, 4-track portable cassette recorders and now the 8-track personal recorder that uses ¼" tape and sits on your average dining room trolley.

From the start of the 'Great Recording Revolution' several books and countless articles have been written about multi-track techniques... many of them highly informative. But no amount of reading and burning the midnight Anglepoise can replace personal instruction, particularly that which results from several years experience in the recording business.

The staff of Gateway Studio in London have now made this knowledge available to home recordists and musicians wanting to learn the

tricks and techniques used in the professional studio. A comfortable upper part of the studio has been turned into a classroom, equipped with a Fostex 8-track set-up (with the help of Bandive, the importers). Courses run for four days (or evenings) and are organised weekly.

Dave Ward, who takes the courses, has found from the experience of running courses in arts centres that a great deal of information can be passed on in concentrated sessions and still leave time to answer and discuss all those 'niggling' doubts and questions that one finds in the jargon-filled jungle of professional recording.

Since the courses started in September, over forty people have passed through Gateway's doors, armed now with new thoughts, clearer minds and itching fingers. Dave says that in the first courses he uncovered all manner of indescribable misconceptions, probably picked up from some 'tired and emotional' engineer late at night.

Straight away it was decided that



Dave Ward lecturing at Gateway.

the courses had to start right at basics, assuming no previous knowledge. In this way the sound path or programme could be traced and explained along its perilous journey from microphone to loudspeaker. Included in this unravelling process are the mysteries of impedance matching, sound wave theory, the uses of EQ (tone controls), and techniques that are particularly suited to those recording at home (natural bathroom reverb, for instance).

It is clear that the use of sophisticated technology is expanding the possibilities within the music business month by month. But as Dave

Ward says, what is not so obvious is the need for people involved in the music business to keep up with the technology. Not just the musicians, but also A & R department personnel, community project people, school music departments and audio-visual enthusiasts.

With all these and many other groups in mind, Gateway plan further courses and seminars in many subjects at many levels. Enquiries and suggestions should be addressed to Gateway Studio, 1a Salcott Road, London SW11 6DQ, or call Dave Ward on 01-223 8901.

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SPECIAL FUNCTION: The PT-30 has an automatic Harmonization feature, which enables it to analyse notes which have been programmed, and supply appropriate chords for accompaniment. 3 different choices can be obtained to suit the taste of the player, and any chord or chords can be manually changed if desired.

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GENERAL:

31 keys - Monophonic - 8 preset sounds, 12 rhythms plus 6 Arpeggio patterns.

Transpose function and liquid crystal display showing notes and chords.

Comprehensive chord section with built-in Bass patterns.



CASIOTONE MT-65

49 note keyboard - 18 notes can be used for accompaniment. 20 preset sounds. Simulated reverb/vibrato/delayed vibrato/sustain. Variable modulation (cross tone modulation). Twelve rhythms with tempo control, fill-in and syncro start. With each rhythm a choice of 4 bass/chord/arpeggio patterns are available, Bass can be played manually if desired.

RRP £175 Micro Musical Price **£149**



CASIOTONE MT-45

49 note keyboard - 18 notes for accompaniment and 31 for melody. 8 preset sounds with vibrato and sustain. 8 Rhythms with tempo control, fill-in and syncro start. Two choices of Bass Patterns can be selected per rhythm. One finger or fully fingered chords. Arpeggio. RRP £125

Micro Musical Price **£99**



CASIOTONE MT-11

32 note keyboard - 8 note polyphonic, 8 preset sounds with sustain/vibrato. Mains/Battery operation. Standard size output jack. RRP £59

Micro Musical Price **£49**

CASIOTONE CT-405

Same features as MT-65 plus transpose function. Standard size keys - sockets for line out/sustain/foot volume. RRP £325

Micro Musical Price **£275**

CASIOTONE CT-501

4 Octave version of CT-701, with Bar code programming capability. RRP £375

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CASIOTONE MT-41

Same specification as MT-40, but with superior finish. RRP £99

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WARREN CANN'S

Electro-Drum Column

Part 6

Our electro-drum column, compiled by consultant drummer Warren Cann of Ultravox, continues this month with the final musical examples of his basic instructional course. As always, the patterns shown are equally suitable for playing on an acoustic or electronic kit, or for programming into any rhythm machine.

"This month some final examples in this session to work with. It all depends on one's musical aims and personal taste, but it's usually an excellent idea to experiment with the placing of different beats within a song rather than just use one pattern and throw in stacks of fill-in rolls indiscriminately.

"Try one pattern over the intro, one pattern over the verse, or even two different ones for the first and second half of a verse, another pattern for the chorus, and yet another variation for the bridge. There's no substitute for what may appear to be such an obvious piece of advice — try it!"



HIGH-HAT (c) CLOSED
 (o) OPEN
 SNARE DRUM
 BASS DRUM



A fairly funky two-measure pattern.



Again a two-measure pattern, a development of 29 but this time with 16ths on the high-hat.



An example of a simpler one measure pattern. When you're familiar with this sort of variation you can always expand it...



... and turn it into a two-measure pattern like this one.



As your playing becomes more complex you can find that some rhythms, such as this one, sound much too busy at faster tempos. In these cases slow to middle tempos are best.



Lastly, something to experiment with. Try adding a few quick bass drum flicks of your own into this one.

FACT FILE



Scarlet Party

Sean Heaphy

Instruments

Ludwig 9-piece Power Kit. 6x9, 8x9, 10x9, 12x11, 13x12, 14x13, 16x16 Floor Tom, 22x18 Bass Drum. 9 ply maple construction.

"I find the volume from the kit is incredible, but the sound isn't very clean. It's difficult to tune the kit by the old-fashioned method, and if any of the toms are tuned to a note that's being played by the band you get a lot of resonance. I can get away with tuning them slightly off though."

"I've tried a Simmons Kit and I like the sound, but the feel isn't too pleasing. It's some kind of plastic, and although the kit is touch sensitive you can't play it with the same feeling as you would a conventional kit. It doesn't give any response to the stick, and I like to feel that."

Microphones

"For live miking we have to use whatever is available. In the studio we use AKG overhead mics on the power-toms, and usually directional mics above and below the snare. At Abbey Road studios we use Neumanns, and sometimes use top and bottom mics on the toms as well. If we were using the whole kit on a song that would mean 14 mics, but we don't set the whole kit up if we're not going to use it all."

Drum Machines

"I think the Linndrum is great, it's got an amazing sound but it's very

distinctive - you can usually tell when somebody's using a Linndrum nowadays. I don't think it should be used to replace a drummer, because we don't try to imitate sounds using electronics. Even when we use the Mellotron with the Male Voice choir tapes it's not to produce an imitation of a choir but to use the Mellotron's own distinctive sound."

Recording

"Although I don't always use the whole drum kit on a song, I always do it in one take, without overdubbing rolls or other parts afterwards. The drum sound tends to be quite different from one song to another, from low down and clean to very raucous, like a cannon going off. We're not recording at the moment, but we're preparing for a tour in April."

Mark Gilmour

Instruments

"I usually use a Fender Telecaster with a Stratocaster neck. The Tele was mid-70's and the frets had worn down very badly. I couldn't afford to have it re-fretted at the time, and just by chance I came across a '67 Strat neck and put the two together. Since then I've had the job done again professionally. It seems to work well; I go for a good, modern sound which it is quite able to deliver."

Amplification

"I used to have a Fender Twin Reverb, which I put through an old Wem cabinet which produced a very

good live sound. After that I moved on to a Fender Bandmaster, not because it was more powerful - in fact it's not a particularly powerful amp - but because it gave the sort of distortion I wanted at just the right levels."

Effects

"Technique is just as important as effects, but there are times when you need to introduce a bit of sustain to fill out a song. I've got a pedalboard which is mainly MXR effects. There's a Graphic Equaliser, a Compressor, an Electro Harmonix Electric Mistress flanger, a Selmer Treble and Bass Boost and a Big Muff fuzz. I've found the Big Muff is a bit excessive for the band's sound though, so I'm looking round for another distortion pedal. I may get the Boss DS-1, which gives a good modern sound, but ideally I'd like to be able to just push a single button to get a complete effects sound. Use of the amplifier controls together with the Boost and Compressor give me most of the sounds I need."

Songs

"I joined the band 6 months ago I didn't really see any particular influence, say a Beatles influence, I just took it as a band. On some of the songs I find myself playing the lead parts but also wanting to fill in on the lower registers, and it can be quite effective to play a few notes down there. I've experimented with using an octave divider, but I don't really want to duplicate the bass part, whether it's on synthesiser or bass guitar. I like to fill out the overall sound with some echo, and I've been using the Roland Stage Echo. It has some problems with low output levels using our existing equipment, but it gives a sound that you can't get with digital echoes because they're too clean."

Graham Dye

Instruments

Rickenbacker 360 12-string, ¾ size Rickenbacker 320 solid body. "I've liked the Rickenbacker sound since the 60's, when The Beatles and The Byrds used them, but they were very expensive then and by the time they came down in price they were really a thing of the past. Punk revived the sound and a lot of people started using them again; by that time I'd gone off them, but had to hire one for a couple of weeks and enjoyed using it so much that I bought one."

"I can't bend notes on the 12-string so I need the 320 as well. It gives more of a Strat sound, as you can set the 3 pickups out of phase."

Amplifiers

"I tried out a lot of amps to get the sound I wanted, including the Roland Chorus amps. I ended up with a Vox AC30 simply because I needed a valve sound for live work. Other amplifiers sound too clear."

Effects

"I use a Roland Chorus to thicken up the sound of the 6-string; once you've got used to using a 12-string guitar you miss that extra thickness in the sound otherwise."

Songs

"My brother Steve writes most of the songs. There's a lot of vocal counterpoint as in The Beatles, and harmony of the sort the Everly Brothers used is very important. We're

also influenced by Simon and Garfunkel, but without the American flavour. The songs are intended to be harmonious and we don't use a lot of modern sounds. Our first single was really an anti-war anthem, a very serious thing; the songs are intended to make people think. When we're playing live, quite often people won't dance but you can see that they're listening. We like to create the same sort of heaviness that was in the early Pink Floyd."

Stage Effects

"We use a lot of tapes on stage with backing effects; the title track off the Scarlet Skies album uses air raid sirens and other sounds, it's a sort of pro-peace song. We also use a lot of smoke, lights and backing films because we like to give the audience something to look at as well as listen to."

Steve Dye

Instruments

Roland SH2 synth, VK-1 organ, Novatron 400SM, Moog Taurus bass pedals. Leslie cabinet for VK1. Mellotron tapes; church organ, mixed strings (cello, viola and violin) mixed choir.

"Since we don't have a live bassist I use the SH2 for bass lines usually. I also use the Taurus with a variable sound and the preset Taurus Sound. I'm still searching for a backline that won't blow! Ideally I'd have liked a Hammond, but the VK-1 sound is so much like it, and you can carry the VK-1 under one arm. In the studio I play a Rickenbacker 4001 stereo bass. It gives a very deep bass sound, a little plucky; I use a plectrum normally because I'm not very taken with the modern slap bass style."

Effects

"We use chorus on the live vocals to give a double tracking effect, but in the studio we usually prefer to sing the parts twice to get a more authentic sound. Harmonisers tend to sound a bit like harmonisers - too artificial."

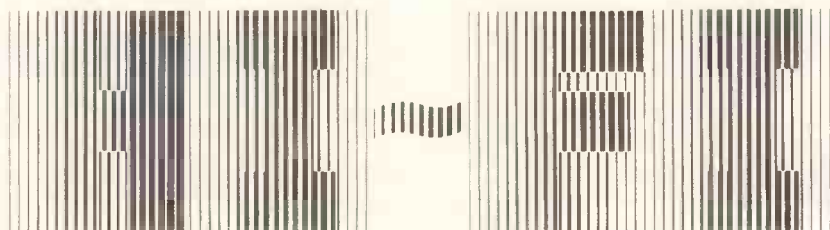
Songs

"We're not really influenced by fashion, and we like to think that our music can't easily be compared with anyone else. Although there are some influences from The Beatles or from early Genesis, they aren't always direct. For instance, I didn't know that The Beatles used the Mellotron until we found ourselves using one at EMI's Abbey Road studio. We have a Novatron for stage use - it's exactly the same thing - and use it more in the way that Genesis used to do."

"A lot of the songs are quite epic-sounding now. They're aimed more at albums than singles, and so we don't feel confined to just 3 minutes. Rather than being simple love songs they tend to be about more serious subjects, such as anti-war songs."

"I take the lead vocal on some of the songs when we're playing live, and also on the album. Usually though the songs are written with counterpoint harmonies, so that one person takes the lead on the verse and somebody else takes it on the chorus. Also I help out on percussion for the piece that comes after the title track of the album - it's a percussion solo with Sean playing the full kit, and I add the six, eight and ten inch powertoms."

Shure V15 Type V.



Jeff Macaulay

Trends in Cartridge design

During the past couple of years a quiet revolution has occurred in pickup design. Since the introduction of moving coils they have been extolled as 'the sound' to aspire to. Unfortunately, hi-fi is a field where subjective impressions often take the place of hard data.

What should happen is that a large range of cartridges should be directly compared with a live recording. If such a test were properly conducted and then subjective impressions fed into a computer together with data on the construction techniques, some correlations should be found.

Armed with this information some of the myths surrounding cartridges could be either dispelled or proven. We would then be in a better position to judge what is the 'real' sound.

Nevertheless some very real improvements have been incorporated into recent cartridges. Five years ago a tip mass of 0.3mg was unheard of. Normally a tip mass of 1mg would be encountered, resulting in a resonance in the audio band. Moving coils with their lower moving mass generally have higher frequency tip resonances, often well outside the audio band.

Some of the hard cutting edge apparent from some moving coils can be directly related to a tip resonance at the edge of the audio band. Such cartridges show a gentle upward trend in their response curves above 10kHz.

Another interesting development concerns stylus shape. The basic stylus shape is conical and when a record is cut the cutter has a wedge shape. If the stylus also were to be wedge shaped, theoretically the play-

back should be perfect, but a stylus of this shape would bump along the bottom of the groove producing horrendous noise, not least because large amounts of dust and garbage accumulate at the bottom of the groove.

The conical stylus is seldom seen these days because it is incapable of tracking hf modulations. The standard elliptical type is much more successful from this point of view and has become standard on all mid priced cartridges.

New profiles have also been tried, with various degrees of success, which are designed to increase the contact area with the groove, thus ensuring less record and stylus wear, and also tracking ability. Another far more contentious area of performance is concerned with the cantilever; even if the styli follow the groove modulation perfectly they still have to be accurately coupled to the generator. Any mechanical structure is prone to resonate and mech-

The Hyperelliptical Stylus Tip



Shure's Hyperelliptical stylus design.

anical energy can be lost in the form of heat etc. Cantilevers of pure Boron or, in the case of the Shure V15 V, a Beryllium tube, have been employed. Which of these operates best is a matter of conjecture, or rather, personal choice.

At the output end of the cartridge things have also been improved. For years cartridges of the moving magnet variety have had a high inductance; this poses problems at hf.

Another interesting fact is that the resistive part of the cartridge impedance limits the ultimate S/N ratio of disc reproduction. All resistors generate noise, the amount being proportional to both the resistance and absolute temperature. With a cartridge impedance of 1k, a normal value for many MM designs, the ultimate S/N ratio is limited to about -65db even assuming noiseless amplifiers! The new wave of MM designs feature a very much lower impedance, stretching the ultimate S/N ratio towards -70db. As a personal comment, I would like to see balanced line techniques used with cartridges to eliminate hum pickup from connecting wires; at any rate I have recently had the opportunity to hear some of these cartridges, and although I intend to examine them at some length at a later date a few preliminary observations would be in order.

First the moving magnet design. Grado's 'Gemini Gold' cartridge which retails for around £89. The sound balance of this model is superficially similar to the Ortofon VMS20E11. However, the sound is much more detailed with an exceptionally fine top; the tip resonance is an extraordinarily high 65kHz and the stylus profile is a 'true ellipsoid' to quote their own words.

It is a pity that more technical information is not available, for instance, a frequency response curve. Although no problems were encountered with the cartridge mounted in my aged 'Acos Lustre' arm, the same could not be said when mounted in the Rega. A slight but disturbing edginess occurred on high level passages, due to mistracking.

The second moving magnet in this 'reviewette' is the flagship model from Shure, the V15 V. This cartridge is unique in many ways, not least because of its amazing tracking ability. Like its predecessor the V15 IV, a carbon fibre brush stroke stabiliser is an integral part of the design.

Subjectively, the unit tracks everything you can throw at it at 1gm tracking force. It has an incredibly neutral and detailed mid-range, with a slight recessed top and rather bland bass. For £160 one would expect a very good cartridge, and overall this is.

Lastly, a cartridge with a totally different modus operandi, the MC82 from Coral, distributed by Videotone. This is a moving coil unit fitted with a Van de Hul stylus. The stylus is 'grain orientated' for minimum wear. Indeed this is the only cartridge I have ever used which works perfectly even with a ball of fluff on the stylus! Subjectively I found this cartridge the best I have heard so far. The frequency response is flat within 1db between 20Hz-20kHz and the sound is totally neutral throughout.

The most striking aspect is the transient response; instruments start and stop very quickly. Unlike the MC81, its predecessor, this cartridge continues to track the most tortuous passages without mistracking. An enthusiastic welcome for this device then; the cost is about £100, to which must be added a step up device.

As a final word on the subject, perhaps I should mention the AT1000 from Audio Technica. With its specially matching toroidal step up transformer this will cost you £1,400; I'm still trying to get a review sample!

SOUND ON STAGE

The PA Console

by Ben Duncan

"The desk is designed to route, and control the level and tonality of a large number of signals, both singly, and in groups, without spurious interaction or the addition of distortion, hiss or other noises."

The most fundamental — and the original — purpose of the mixing console in a PA system is to *sum* all the instruments, enabling a common amplification system (the outfront PA) to cover the audience. Conjecturally, if naively, this could be a box with half-a-dozen faders. However, in the process, it becomes necessary to accommodate the unnatural sounds and overload problems that are brought on by close-miking, so our conjectural 'six fader' mixer is found to need some extra controls, namely equalisation facilities and a means of gain control/attenuation to enable us to steer between the evils of noise and overload-crunched sound.

Next, the drummer assures us indignantly that our console must produce two, *differently* summed outputs, so his percussive meanderings can be made to ping-pong across the stage; in other words, 'stereo'; and to make things easy for the mixing person, requires a master fader so he can adjust the overall level without the risk of upsetting the balance of individual instruments.

So far, our conjectural mixer has acquired some 36 knobs, 6 switches and two extra faders. Yet this mixer is styled in the most fundamental format imaginable, for PA at least.

Having attained a fair cost and complexity, it's tempting to kill several more birds. Firstly, with just a few more knobs and sockets, the mixer offers the opportunity to subject acoustic and electric instruments alike to Space Stations and other FX gizmos. Secondly, it's relatively easy to 'drop in' additional mixing facilities so that each musician can hear the exact blend of instruments necessary to play competently and with attunement over his (stage) monitor. And finally, to make life even more comfortable for the sound engineer, some LED and/or analogue metering to assure him that, despite the guttural horn sound, the signal hasn't crunched (viz, peak/overload metering) and that the sound level really is much louder than his weary ears suggest (Average or 'VU' metering), plus a headphone amplifier and a means of switching around a maze of signal access points within the mixer, so that signals can be traced and inspected despite the bedlam raging all around. And Sub-grouping too would be useful...

Religiously detailed overviews of mixing console function can rapidly lead to vertigo, so we'll confine our examination to a more lucid, albeit slightly less accurate, step-by-step tracing of a signal's path, looking at potential pitfalls and underlining the key requirements as we go along.

Gain structure frolics and the front end

Today, most mixers utilise IC op-amps, and E&MM APRIL 1983

and operate from standard $\pm 15V$ supply rails. This determines the maximum signal level the desk can handle internally. In theory, $\pm 15V$ rails allow a signal of some 8V RMS ($+20dB$), but in practice, rail voltages may be slightly less, and audible distortion may set in several dB below this figure, especially in the case of op-amps driving low impedance loads. Thus, $+15dB$ ($4\frac{1}{2}V$ RMS) is a conservative maximum. This figure also represents the *fundamental* limit on the signal magnitude applied to the input.

In desks of high calibre, however, the maximum is modified by the presence of an input transformer, which, in exchange for conferring the status of balanced line operation; and curbing hiss on the occasions when a high degree of amplification is called for, provides an extra 15dB or so of voltage gain. As a rule of thumb, any desk with a transformer coupled input will overload with signals peaking in excess of 0dB ($0.775V$ RMS). The transformer may also overload at these levels, but the effect is less dramatic and the modified sound tantalising, being akin to that produced by a valve instrument amplifier, and yet only a hair's breadth away from being swallowed by the brute distortion of an overdriven op-amp.

How do these abstract figures interface with reality? Much depends on the microphones you use, the instruments, the miking technique and the frenzy within each musician. But the short-term levels derived from close-miked drums and horns is rarely exaggerated. With a capacitor microphone, the level on a Tom, snare or Kick-drum can easily reach $+10dB$ — that's $2\frac{1}{2}$ volts without any help from the mixer! Using low impedance dynamic microphones, peak levels from percussion are typically 10dB lower, but then a well blown trumpet is 10dB louder...

At sound pressure levels in excess of some 120dB, the head amplifiers and transformers inside cheap capacitor microphones overload, and many dynamic microphones begin to compress the dynamics at this point, viz: A 6dB increase in SPL ISN'T

reflected as a 6dB increase at the microphone's output. The theoretical perils of deriving truly over-the-top voltages from close miked instruments are therefore restrained when certain low cost mics are in use. But despite this qualification, it's good practice to regard low impedance dynamic and capacitor microphones as tools potentially capable of producing up to 2 volts and 5 volts respectively on stage.

Returning to the console, it's clear that with a transformer coupled input, overloading is potentially inevitable. And even without a transformer, we're sailing uncomfortably close to the sudden manifestation of unpleasant crunch up noises. Rule No. 1 for sensible PA consoles then, is that a switchable attenuator must be provided *before* the front end. If we assume a $+10dB$ input signal to be the most we're likely to encounter then adding 15dB (the transformer's voltage gain) and *subtracting* the $+15dB$ maximum input level leaves us with a 10dB disparity. Rounding this up to 20dB gives us a bare minimum figure for the attenuator — or 'pad' as it's colloquially known. Some up-market mixers have a choice of pads, typically selectable in 10dB steps, but a single $-20dB$ attenuation step will cover the majority of requirements, at least for microphones. The $-20dB$ pad also has the beauty of being a 'Reduce signal to 10% button', hence readily comprehended by the inebriated or those braggart desk-drivers who invariably lack an intuitive rapport with the decibel!

If you own a mixer without this facility (certain manufacturers still have strangely fettered minds in response to the heretical concept of 2 Volt microphone signals), don't despair: pads are nothing more than a simple pattern of resistors, and with a little guise and some rubber sleeves, it's possible to hide them safely inside an XLR connector. Alternatively, a small diecast box with an in/out switch, chassis mounted sockets and a boldly marked attenuation figure is a more flexible add-on aid, and also more *obvious* in the average jungle of cables; it's certainly no

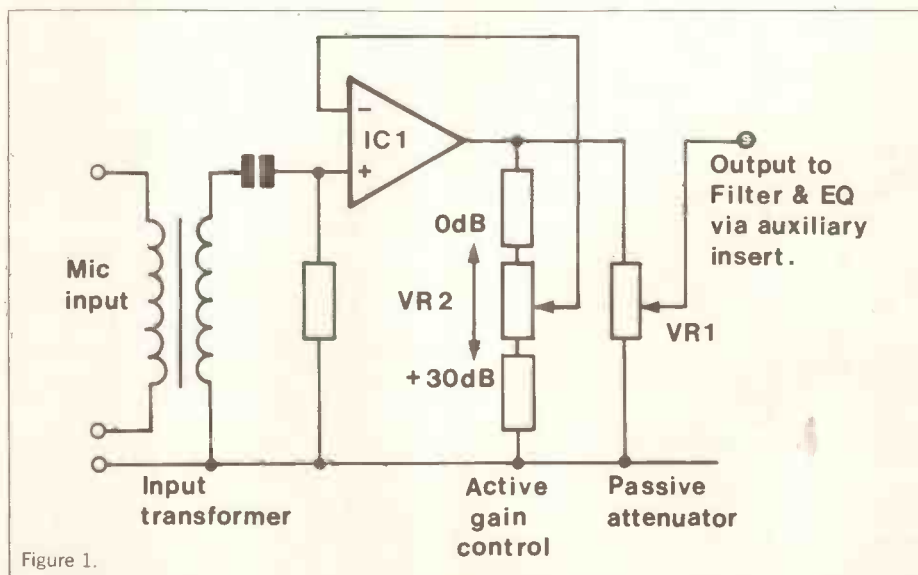
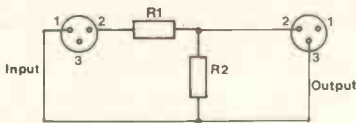


Figure 1.



fun unscrewing dozens of XLR plugs to discover which cable had 'That 20dB pad John made up last week'. Ready made 'in-line' pads can also be bought, but they tend to be outrageously expensive. Instead, Table 1 delineates resistor values for most PA requirements; note that 'balanced inputs' refers also to the 'transformerless' variety.

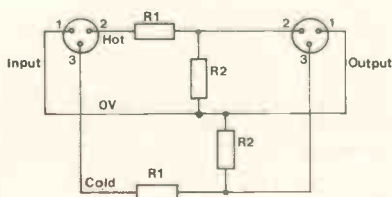
Table 1. Microphone Pads.



For unbalanced inputs:

Nominal attenuation (+5%)	R1	R2
10dB	430R	220R
20dB	2k0	220R
30dB	6k8	220R
40dB	2k2	220R

For balanced inputs (see note 2 below):



Nominal attenuation (+5%)	R1	R2 (all 1%)
10dB	220R	110R
20dB	1k0	110R
30dB	3k3	110R
40dB	11k	110R

Note:

- 1) The precise value of attenuation will depend on the source impedance of the signal.
- 2) For transformer coupled inputs, improved common mode rejection may be obtained in some circumstances by removing the 0V connection to R2, and substituting a single 220R resistor.

Gain control

Having dispensed with the immediate hassles of high level mic signals, another, more sensitive and adjustable form of controlling signal levels is called for. Looking at Figure 1, the input gain control, or 'gain pot' appears either *after* the input amplifier as VR1, which is strictly a passive attenuator

(i.e. in the conventional 'volume control' configuration) or is built *into* the amplifier's feedback loop (VR2) to control the gain of this stage. Although in academic circles the latter *active gain pot* is more elegant, it suffers from a serious disability in that the gain can never be reduced to below unity. So if a comfortable +5dB signal appears at the input to IC1, the *minimum* level transmitted to succeeding stages will be +5dB.

This may appear quite satisfactory if these succeeding stages have unity gain, but, of course, any attempt to boost a portion of this signal by, say, 10dB with the EQ controls will carry the risk of overload. Worse still, one famous UK manufacturer produced a mixer with this active gain control arrangement, and finding that the op-amp merrily oscillated when 'shut-down' to unity gain, provided a gain pot which couldn't be wound down to produce less than +10dB of gain. Whilst this ruse cured the oscillation, it did make life rather awkward for the unlucky purchasers — particularly as the wretched mixer had no pad either.

Using the passive attenuator arrangement, the signal level can be shut down to zero or minus infinity — at least in theory! A more realistic figure is -70 to -100dB, depending on the residual resistance in the pot when the wiper is pressed hard against the end stops. But this order of level reduction isn't as clever as it sounds, as here we're comparing it against the full gain of IC1. So if the op-amp's gain is set at +30dB, a -70dB attenuation on VR1 is only equal to -40dB below the original input signal. Still, it's 40dB better than VR2's unity gain restriction. Nevertheless, VR1 isn't a practical arrangement, because the input stage amplifies 'flat out' all the time and easily overloads. Practical input stages therefore make judicious use of both active and passive gain control techniques.

After the input control, a sensibly designed mixer channel will have a 'unity gain-structure' — which means, in essence that succeeding stages and controls won't be able to significantly boost the signal level. (On posh consoles, there will usually be 2 or 3dB of 'make-up gain' in further stages, but this is only to compensate for losses in faders, etc.). The only exception to this concept is the EQ stage. Whilst it's perfectly possible to utilise a 'cut bass and treble' arrangement in lieu of fostering the midrange frequencies with extra amplification, this isn't very convenient, and one has

to live with the EQ's ability to put mixers into the overdrive mode when tweaked by heavy hands. In other words, when initially setting up the input gain, any likely boosting of the EQ settings will have to be foreseen, and taken into account.

The channel fader works purely in the *shut down* mode (like VR1 previously discussed), so its setting has no bearing on overloading within the channel. Noting that the input gain setting is fiddly, if not critical, the channel fader offers a means of making routine or ad-lib level adjustments during a set without worries.

At the same time, the fader should be in a mechanically convenient position (typically 2/3rds up its travel), rather than hard against either end-stop when the mix is roughly set up. In this way, adjustments in either direction will be feasible without unnecessary restriction. Needless to say, the need to set the channel fader at a physically convenient position does govern the input gain pot's position to some extent.

Once the fader and EQ settings have been roughly established, the gain pot is then advanced to provide a level roughly commensurate with the level of the instrument in the mix. If, winding it up a little more results in overload, then other adjustments will be required. As soundcheck and rehearsal levels rarely approach the intensity of their audience inspired counterpart, it's a good rule of thumb to set the gain control so peaks occur at least 15dB below the overload threshold; the channel and master fader(s) are then progressively tweaked with the aim of placing all knobs in *usable* positions, i.e. well away from end stops. Of course, this procedure isn't something that can be described cogently and meaningfully in words; rather, it's an intuitive skill that can only be picked up by intelligent practice. To sum up, the general aim is to steer between hiss and hum (too little gain at the front end) and crunch-up noises (too much gain at the front end), leaving enough room either side for useful improvisation en-route, whilst at the same time balancing these requirements against the relative levels (i.e. mix) of another 5, 11, 15 or 23 channels, and knowing immediately which knob to strike if something distorts, or howlround threatens.

In the next part, I'll discuss the usage and abuse of LEDs as well as some thoughts on sound levels.

Studio sound ...on the road

If you're looking at your P.A. system, it could pay to check out the heart of the rig — the mixing console itself. You need a board that will let you be as creative as the music on stage, that'll survive in the back of the truck, and that won't break the bank.

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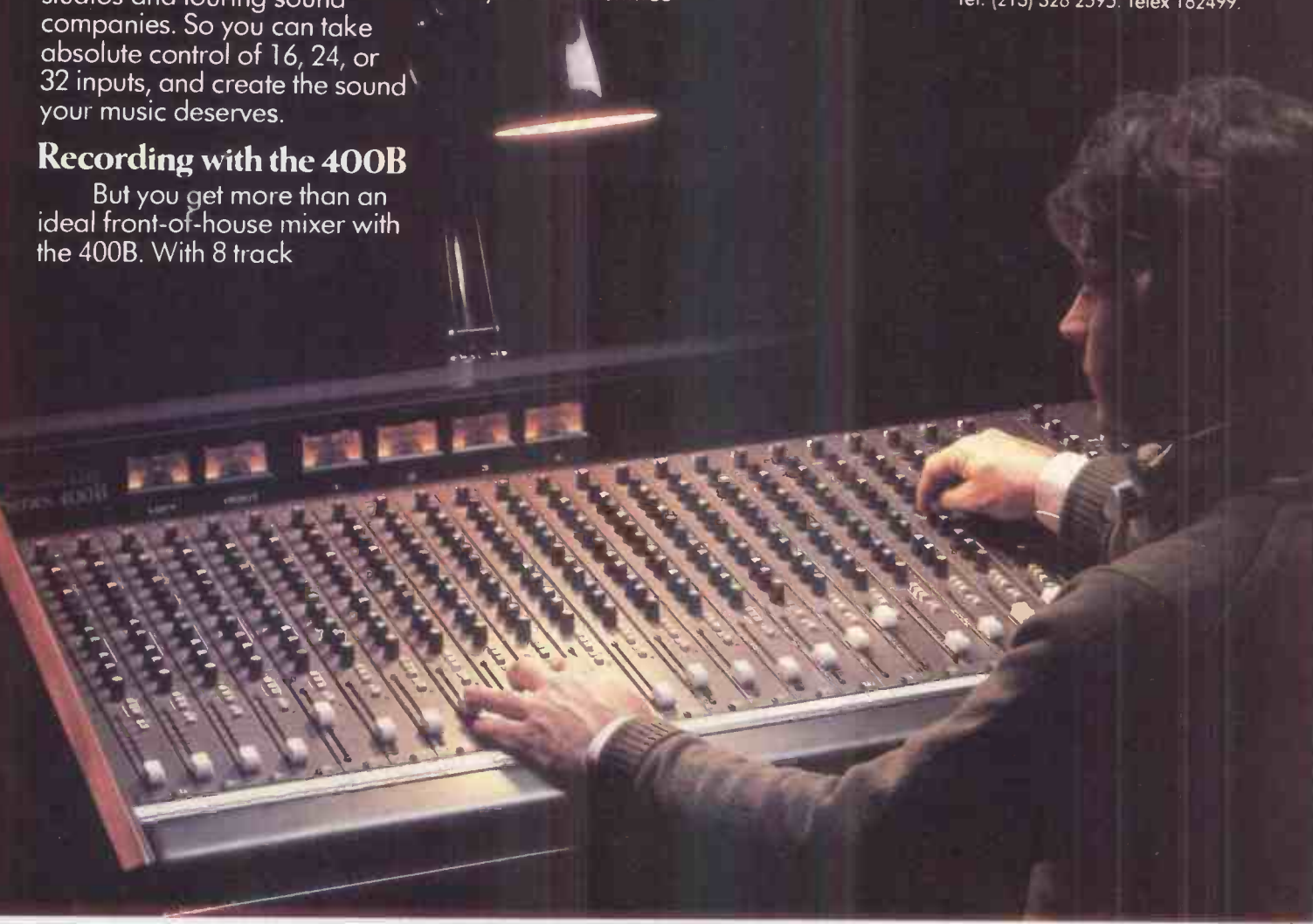
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Playing the Rhodes Chroma with the Apple II Sequencer

The Chroma Polyphonic synthesiser is one of the new generation instruments that links directly with a microcomputer to increase its user control capabilities dramatically. Its potential appears only to be limited by the software available, once the correct interface has been made between Chroma and computer. The first 'package' has just been introduced and is a comprehensive 16-track polyphonic Sequencer system, complete with interface kit for the Apple II.

The Interface

Once you have a Chroma keyboard synthesiser and an Apple II Plus (or IIe) microcomputer with 3.3 Dos, you have the basic equipment to realise the increased musical control that the Chroma/Apple link offers. On the Apple side, you will also need one or (preferably) two disk drives, the additional 16K RAM language card (from Apple or elsewhere) - the Apple II won't run without this, a supply of 5 1/4" disks for back-up and sequencer/program storage and, of course, a suitable TV monitor.

The hardware for the computer interface kit comprises a long PCB card that inserts into an Apple 'slot' inside the micro, a small metal box that has standard jack sockets for external functions (this fits on to the rear of the Apple chassis by means of a screwed bracket), a 2-metre multiway link cable for connecting one instrument (either the Chroma Synthesiser or the Chroma Expander), a Sequencer Program (master) diskette, a Sequencer Data diskette for storing your sequences (this includes some sample sequences and program groups -

the 3 factory sets of 50 sounds each plus other sets), a footswitch, and a detailed user's manual.

Some further optional items include an extra multiway cable for those lucky enough to have the Expander instrument as well, a control pedal for speed changing (this is almost essential in practice, although it could simply be a suitable control pot in a box), a Programmers Manual (for those who want to write their own Apple software), and an interface manual that discusses the interface bus in general.

As detailed in last month's issue, there are plans for interface kits to the new IBM 16-bit micro, the Comodore 64, and the TRS-80. Facilities will be more or less the same as the Apple system, except that the IBM machine will offer increased memory storage - a big plus in its favour.

Basic facilities

With the interface kit parts in position correctly and the micro disks in operation in Disk drives 1 & 2, the Chroma can send and receive live performance information and

also programming information (i.e. all the 50 parameter settings for each of the 50 programs).

The Sequencer disk program offers up to 16 track recording with a different program (i.e. preset synthesised sound) for each. Like most computer orientated systems, the number of tracks you'll get to play at any one time depends entirely on your efficient use of synthesiser voices.

The Chroma Expander is an additional multivoice instrument that is virtually the original Chroma Synthesiser without the keyboard controller. The Expander is therefore played from the main synth keyboard or from the Apple link described here. It increases the number of oscillators available to 32.

The Chroma instrument was reviewed in detail in E&MM October 1982, but it's worth noting that the 16 separate analogue synthesiser 'voices' in both the Expander and Synthesiser have the standard VCO, VCF, VCA format (although very comprehensive in terms of control). The voice cards can then be arranged in various monophonic/polyphonic/system blocks (VCF, VCA etc.) using the 'Patch' and 'Keyboard Algorithm' parameters on the instruments. In practice, 99% of the time the configurations will utilise two synthesiser voice cards for making a more accurate sound (by detuning and multiple envelopes). That means, most of the time, this Sequencer program, although offering 16 track recording, will usually end up with around 8 as the oscillators get used up.

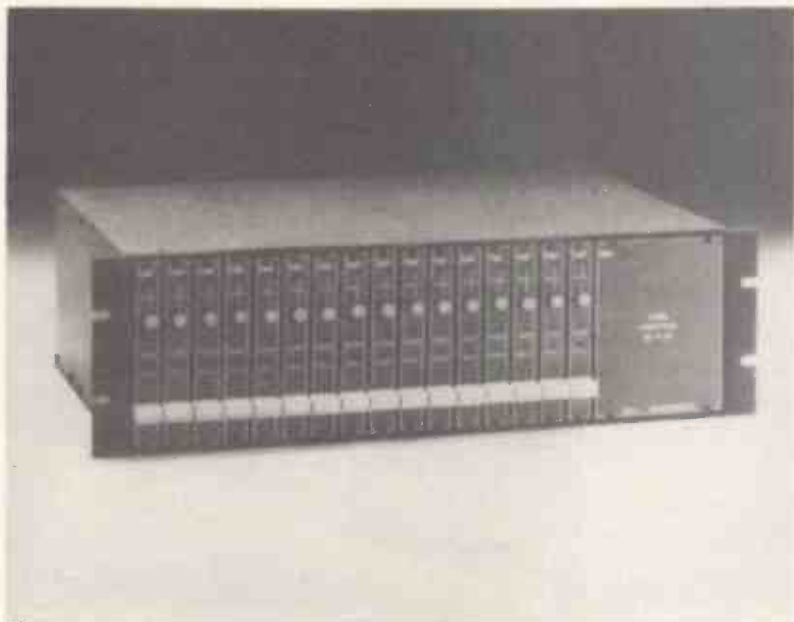
So that's why the Expander is needed to realise the full 16 tracks all working together. Of course, you can still operate the 16 instruments on a Synth alone, provided you don't have them all playing at once. A program can also have a linked program, using up 4 oscillators, and so the system gives priority to new tracks, usually dividing equally when possible the remaining oscillators. So two tracks (using just the Chroma) will take 8 oscillators each, three tracks will take 8, then 3, then 1 - a lot will depend on mono or poly voicing, too. If you use the Expander, voice allocation automatically makes use of the extra oscillators. The system is unlikely to crash, but simply asks you whether you require certain tracks to be 'muted' and allows 'optional' tracks to be recorded, provided memory doesn't run out. Another way round is to change to program sounds that use less oscillators.

Don't be too bothered about this detail at present, I've presented it just to let you feel the kind of methodical approach required when using the system - it's far less complicated than using an analogue 16 track recorder in practice and offers full editing at any time.

Other 'utility' programs will soon be available as well as the Sequencer, such as



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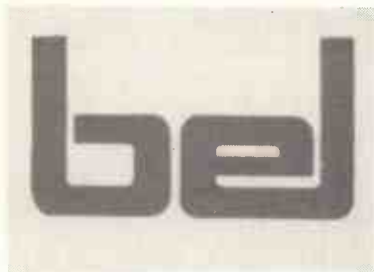
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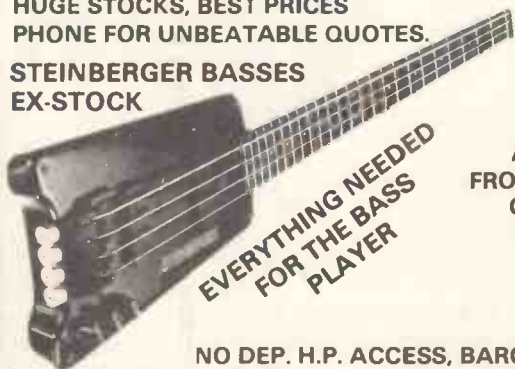
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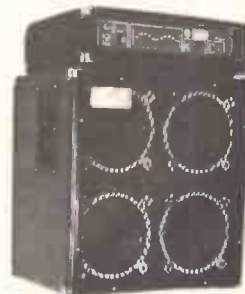
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2	BRASS	C	2	255	M-MUTE/UMUTE	F-DISK CATALOG	
3	HAPPSI	C	4	255	T-TRACK DIRECTORY	D-PROGRAM FILES	
4	FLUTE	C	7	255	C-CLEAR SEQ	B-EDIT SEQ	
5	WOOD	C	19	255	Z-ZAP TRACK	E-CHANGE PROGRAM	
6	CLAU	C	21	255	M-RENAME TRACK	U-CHANGE VOLUME	
7	UIBES	C	25	255	Y-SCRUNCH	A-TRANPOSE	
					(RET)-MAIN MENU	3-MENU PAGE THREE	
PRESS ANY KEY FOR MORE DIRECTOR				PLEASE MAKE YOUR SELECTION-			

voice program editing and file management (continuous display of all parameter settings). Every effort is made by the Chroma people to encourage you to create your own software and freely copy the diskettes provided. Using the 'Escape' key on the Apple, you can access all the programs that create the system and the manual gives all the monitor 'overlay quotes' (i.e. important routine calls and function addresses) plus enough computer and electronic data for further development.

Setting up

There is no problem in installing the interface hardware as long as you follow the instruction manual carefully. Although there are ways suggested to continue using other cards in remaining Apple slots, these are best removed to conserve current.

The connector box has 2 multi-way sockets for Chroma and Expander, and sockets for footswitch (to start/stop recording), a pedal (to adjust speed of recording and playback), 'Click' - a metronome type of audio output, 'Sync' and 'External Clock' that allow another piece of equipment, like a drum machine, to control the system to run in synchronisation with it.

The review set-up employed two disk drives and this lets you save sequence tracks as you go along, as well as special sets of



The ultimate set-up? — Chroma Expander, Synthesiser on the Fender Rhodes.

voice programs (50 in one go) required to play the particular piece you've recorded. A Roland TR-808 drum machine was also linked as an external clock source, as the need for synchronisation with drums in

particular is likely to be essential for most users. The TR-808 external clock links to the 'External Clock' input and one of its 3 trigger out lines was connected to the 'Sync' input via the E&MM Trigger Interface project (July

Choose the package

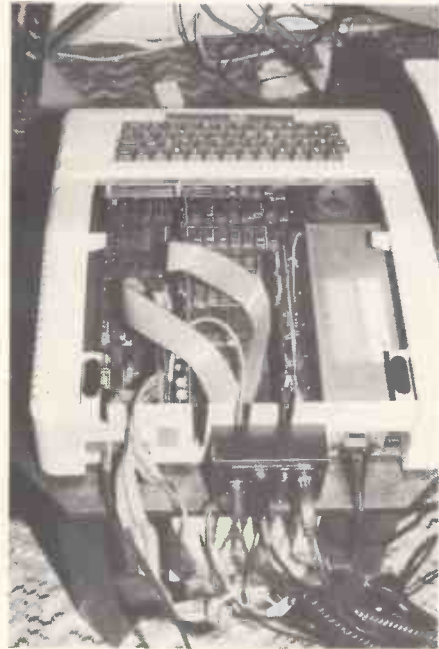
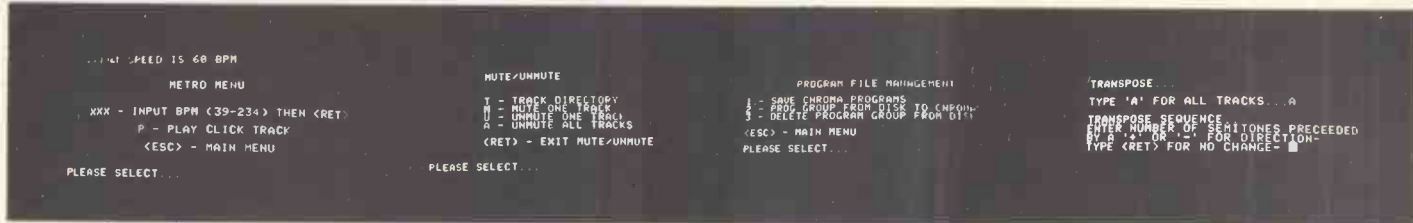


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The Trident Series 80B is also available with the Studer A80 24 track machine at a cost of £43,900.



The Apple II complete with Interface Kit in place.

'82) to ensure TTL levels were not exceeded. The Ext. Clock will take almost any existing pulse clock ranging from 0.7V to 22Vp-p. The 'Click' output feeds to an input on

your mixer and the synth sounds can come from 4 separate outputs or a mix output on the Chroma - a tremendous advantage because you can allocate sounds to dry, reverb, echo, and effect channels simply through a parameter change. And, above all, every piece of information you need for the correct playback of a Sequence is recorded when you save it on disk. Saving the program set used completes the information.

The most exciting feature for most musicians will be that you just play your tracks (mono or poly as you like) and all the DYNAMICS, including the new Pressure option, are recorded as well. On playback, all the 'emotional' content is still retained - that for me brings me back to the Chroma in preference to non touch-sensitive machines!

The MENU

The TV monitor displays three 'pages' of main 'menu' selections. The Apple keyboard gives direct access to these and further 'sub-menus' from one key or one key plus the 'control' key, with or without 'return' key operation. As you proceed through an operation, you are always given a 'second chance' to opt out in case you've changed your mind and, unless you choose things that don't exist (e.g. no Expander actually available), you'll meet few problems. The 'escape' key puts you back to Applesoft BASIC and Goto

160 gets you back to the main menu. All disk saving operations are very quick - some 20 seconds max for a full memory sequence and just a second or so for full 50 program transfer. As you move from page to page menu and selections there may be some disk drive operation occasionally for a few seconds.

The whole system is presented as a *realtime* functional operation - in other words, if you're a player, you'll go for this, but if your keyboard skill is limited, you won't find it too friendly to record by numbers or typed data input. Of course, there's a comprehensive editing mode, but it's really for tidying up your realtime keyboard playing during record.

Main Menu

Here's a list of the menu selections with some explanation of what each offers. As you learn to use the selections on each page, you can simply type the appropriate key letter and it will immediately be selected. Although the package is called a 'Sequencer', it's more useful for preparing a complete piece or section that would be used for a studio recording or stage performance. By putting down the normal tape click track, it is quite possible to conceive a whole LP of instrumental music on disks that would be overlaid in the studio situation in some 3-6 minute chunks. Because the Chroma has a

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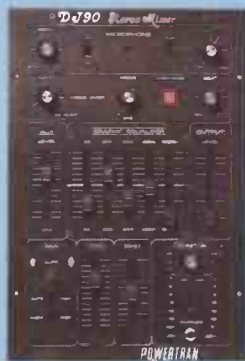
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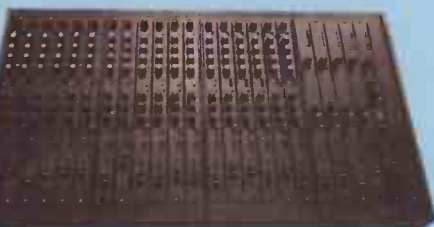
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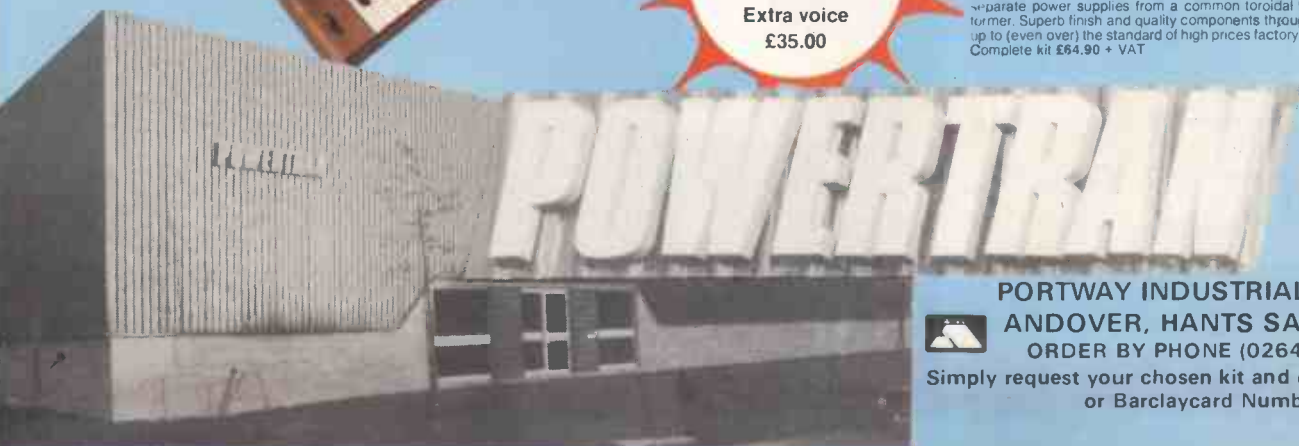
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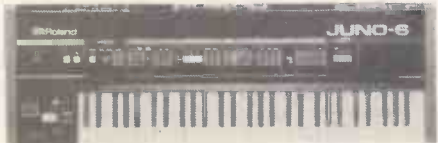


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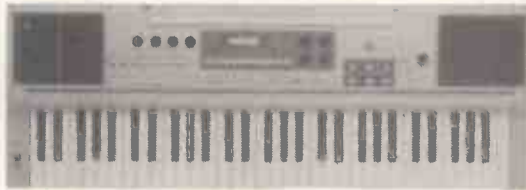
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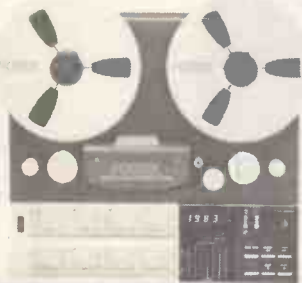
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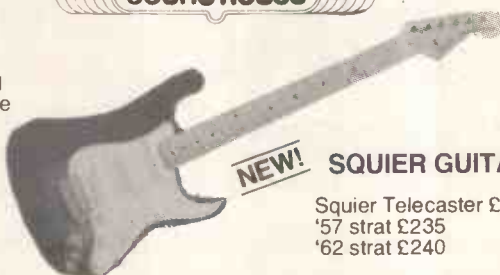
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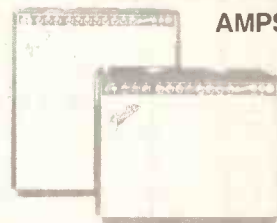
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|-------------------------|------|
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NAKED EYES

A duo hailing from Bath, Naked Eyes came into existence at the end of 1981 after the disbanding of Neon, which included Curt Smith and Roland Orzabal of Tears for Fears. The two founder members, Pete Byrne on vocals and Rob Fisher on keyboards, had begun to find the four-piece format unnecessarily complicated, and set out to make a demo tape as Naked Eyes.

This caught the attention of EMI, who released one of the tracks, 'Always Something There To Remind Me', as a single, and allowed the duo to record an album at Abbey Road studios. Produced by Tony Mansfield, the album became 'Burning Bridges', and the follow-up single chosen from it was 'Voices In My Head'. Rob and Pete explained to E&MM how the singles were chosen from the album, how they compose and work with session musicians, and how they've used the advanced digital equipment made available to them.

We didn't intentionally choose a cover as our first single, but our version of Burt Bacharach and Hal David's 'Always Something There To Remind Me' was closer to completion than any of the other four songs we demo'd. We just happened to hit the tail end of a spate of cover versions, and we felt that if you can put your own sound on a song that's just as valid as doing an original. Either way, it got a reasonable amount of airplay and got our name around the radio stations.

Before that we'd been working together for 3 years, including the time with Neon. We found we could only get the sound we wanted working as a duo, although we'll have to use additional musicians when we tour. After working with a lot of session musicians on the album that shouldn't be too difficult now, although we'll also have to get used to using equipment like the Fairlight live. Up till now we've only used it in the studio, as it belongs to our producer Tony Mansfield".

Synthesisers

"We'd like to use the Fairlight live, as well as using it in the studio for various voices and as a sequencer. The Rhythm Page 'R' allows us to arrange sounds such as bass drum, snare drum, staccato wood blocks and so on, for instance on 'Promises Promises' on the album. We also used a Synclavier a little; the sounds are very clear, but like the Fairlight it wouldn't be used for solos.

All the demos are done using our Prophet and TR808. A lot of the album had been completed in this way before using any digital equipment, using a few devices such as a tape click trigger on the Prophet which can produce different filter levels from 0 to 10 for use on polyphonic bass sequences. Over the top of the Prophet parts we added Fairlight, Wave 2.2 and Synclavier".

Demos

"Everything starts off in Rob's front room

on a Philips 2-track Sound-on-Sound machine. We then demo in an 8-track studio in Bristol, and of the 13 or 14 demos we did for EMI most have now been mastered, although one or two have been discarded. Every demo is put together in a different way, and we're usually working on several songs at the same time. In the past we used to work at things for ages, but nowadays we don't finish anything off unless we know it's good".

Studio Work

"It's easy to experiment in the studio and to mess around with the Linn, Fairlight and so on, luckily we work very fast and now seem to have as much studio time as we like anyway. It took about 6 weeks to do the album.

During that time we felt we'd exhausted the possibilities of the Linn, as it's got a distinctive sound of its own, and we started to use Phil Towner on drums and Tony Mansfield on a Simmons kit. Some tracks

such as 'Promises Promises' just use the Fairlight for all the drums, with the sounds put on one at a time synchronised by a click track. Eventually we'd like to get either a Fairlight or Synclavier or PPG of our own, so that we'd have sequencing and sounds available.

We usually change the demo tapes in the studio, replacing Prophet sounds with layers and washes from the PPG for instance. The trouble with analogue synths is that the sound gets cluttered up around the bass end when you multitrack, and digital machines don't seem to suffer from this so much.

We tried to use the MC4 and MC8 but found them a pain in the neck, much too slow to programme, and generally Rob could play parts faster than it took to programme them in. The Fairlight's rhythm sequencer is better in that sense, and we also enjoyed using the Emulator. That was used for the strings on 'The Time Is Now', and we also sampled the harpsichord soundboard in the Abbey Road studio.

We used an OBXa for washes and surreal touches in the background on 'Emotion in Motion', but generally kept the Prophet sounds on bass lines. We find the Prophet's poly modulation is better than any other instrument, although the Wave 2.2 is enormously powerful and not too difficult to get into. It's very easy to call up its preset voices and then alter them. The sequencer on the Wave is real time though, and you seem to lose voices as you put more steps in; the sounds themselves change as well if you're not careful. 'Voices In My Head' uses the brass sound on the Wave.

Usually we try to record with a mix already set up, and alter as little as possible afterwards. The producer would be in charge of the stereo positioning, for instance in panning the Simmons tom-toms which we liked for their touch-responsive qualities. We leave the mix to him, although one of us will always be there when it's done, but the aim is to get a commercial sound. Bands like Depeche Mode and Yazoo tend to sound a bit boring with nothing but synthesisers; we try to blend in a lot more, with other musicians and acoustic instruments.

Mixdown is usually on a Solid State Logic computerised desk, which was used by Trevor Horn with The Buggles. They were quite an influence on our studio technique initially, the start of synthesiser music in the charts really, and we try to be melodic in the same way they were".

Vocals

"Generally the vocals go on pretty late. We experimented with various vocal effects, and we'd like to look at harmonisers a little more, but until then we're just going for a very clear sound. On 'Low Life' we needed a very deadpan repeated vocal on those two words, so we sampled them at two different points on the Emulator and just played those two notes over and over. Most of the songs only have a single voice on them, although we do sometimes multitrack backing harmonies. 'Fortune and Fame' uses repeat vocals and harmonies for instance, and on 'Always Something' we used the voice settings on a Roland Vocoder Plus. Also we used the Emulator for vocal washes, but found it very fiddly to get sounds into it, and it only transposes convincingly over a few tones".

Training and Session Musicians

"Rob played classical piano for about 5 years and classical organ for 2 years, but didn't want to feel restricted to classical pieces. Emerson and Yes were obviously an inspiration, but Naked Eyes' music isn't really about fast playing. Doing sessions for

advertising jingles helped develop a fast method of working, and the Beatles were an influence in the sense that we try to be equally melodic. We worked up from using simple synthesisers, and if you use them carefully you can get really good results. The Pro-One, for instance, is very good.

We hope to get the best session musicians for stage and studio work. Quite often they're given a free hand, as in Martin Dobson's sax and flute parts on 'Could Be' and 'Promises', although on 'Low Life' the parts were written out. If one day we got someone who wanted to read, we could write down all the pieces, but we don't do this for ourselves; most of the songs are virtually composed on tape.

The drummer usually has to follow a sequencer line, and will tend to go straight through and do it all in one take. Phil Towner used to play with New Musik and developed this metronomic style; the connection there is through Tony Mansfield, who produced New Musik as well as ourselves.

The horns were generally multitracked, after we got some real horns on 'Low Life' we found they were better than keyboard sounds. Although we're synthesiser based we're not restricted to keyboards by any means, it's more a matter of creativity, and if that means getting other musicians in for the textures we want, that's what we'll do".

Future Plans

"The next album is due out in May. We've got a few tracks finished, and this time we're working in blocks rather than having several things on the go at the same time. We want to experiment more and do longer tracks, and we won't be making the demos so well produced — there's no point now as we can do the work in the studio. We'll still argue about things, but we're much more confident now. We'd like to get away from the love song format, and on the first album we've got 'Low Life' which is closer to the sort of thing

NAKED EYES



Soft Cell are doing, in spirit if not in content.

We've got a few interesting keyboard pieces completed, and we'll try to use more unusual sounds and choral things. We want to use discords and produce the sort of 'rough edge' Peter Gabriel gets, although not by working in the same way he does and composing as he mixes. We like to leave as little work as possible to do in the mix.

Hopefully we'll go on tour in July after we've put a band together, we'll have a good show by then and will be able to avoid having to go on as a support for anybody else. Also we'll be doing a lot more video work, hopefully with a little more control from our end. For 'Always Something' and 'Voices' we were just given a storyboard and didn't have much opportunity to make changes. The video for 'Voices' turned out a little too weird in the end!

We feel a lot of the songs on the album are suitable for video treatment, so hopefully with a second album, a tour and a possible video in the summer, everything will come together at once for us".

Mark Jenkins

E&MM



'Naked Eyes' — Rob Fisher and Pete Byrne.

"VOICES IN MY HEAD" by Naked Eyes

Words and Music by Peter Byrne & Rob Fisher

(C) = Centre Stereo

(R) = Right channel (L) = Left channel

TPTS = Trumpets (synthesised) always punchy with some reverb. Other voices usually dry.

INTRO

VOCALS

HARMONY SYNTHS

ELECTRO DRUMS

BASS SYNTH

Bass Synth with filtered short decay (dry)

Count: 1 2 3 4 1 2 3 4

TPTS

Detuned organ flutes with slow attack

Bright organ

Dm Am Dm Am

TPTS TPTS

A VOCAL I don't know why I'm feeling lost

Bright organ (L)

(R) Flute organ

Dm Am Dm Am Funky guitar

's on-ly love - I give you e- v'ry- thing I've got

Bright organ (L)

(R) Flute organ

Dm Am Funky gtr.

Bright organ (L)

(R) Flute organ

Dm Am F.Gtr.

's not e- nough. **B** Shut-ting my eyes I find

Bright organ (L) Indian Bell tap Strings (filtered wah) (last) organ echo
 Dnr. (R) Flute organ Am F Gtr. Marimba Bb F C
 Drums etc.

O-pen-ing up my mind What is this sound I'm hear- ing?

(last) organ echo end Bells
 Bb F C Bb F C
 (SD) Drums

CHORUS

Voi- ces in my head Tell- ing me Be- ware - I hear

Marimba TPTS
 Bright organ & Flute organ Dm as [A] for all the chorus Am Dm Am
 [Drums as intro. except as shown] Drums

Voi- ces in my head E- v'ry where

TPTS TPTS
 Dm Am Dm Am

CODA

(R) Voi- ces in my head (R) Voi- ces in my head

(C) Voi- ces in my head (C) Voi- ces in my head

(L) Voi- ces in my head (L) Voi- ces in my head

TRUMPETS

(L) (R)

Dm Am Dm Am

6 times and fade out to end.

ORGAN SOLO + echo

TPTS

TPTS

TPTS

TPTS Bb (Bass line & Drums) F C Bb F C Bb

echo repeat

F C Drums: Dm Dm Dm Am

to B (Vocal)

Dm Am

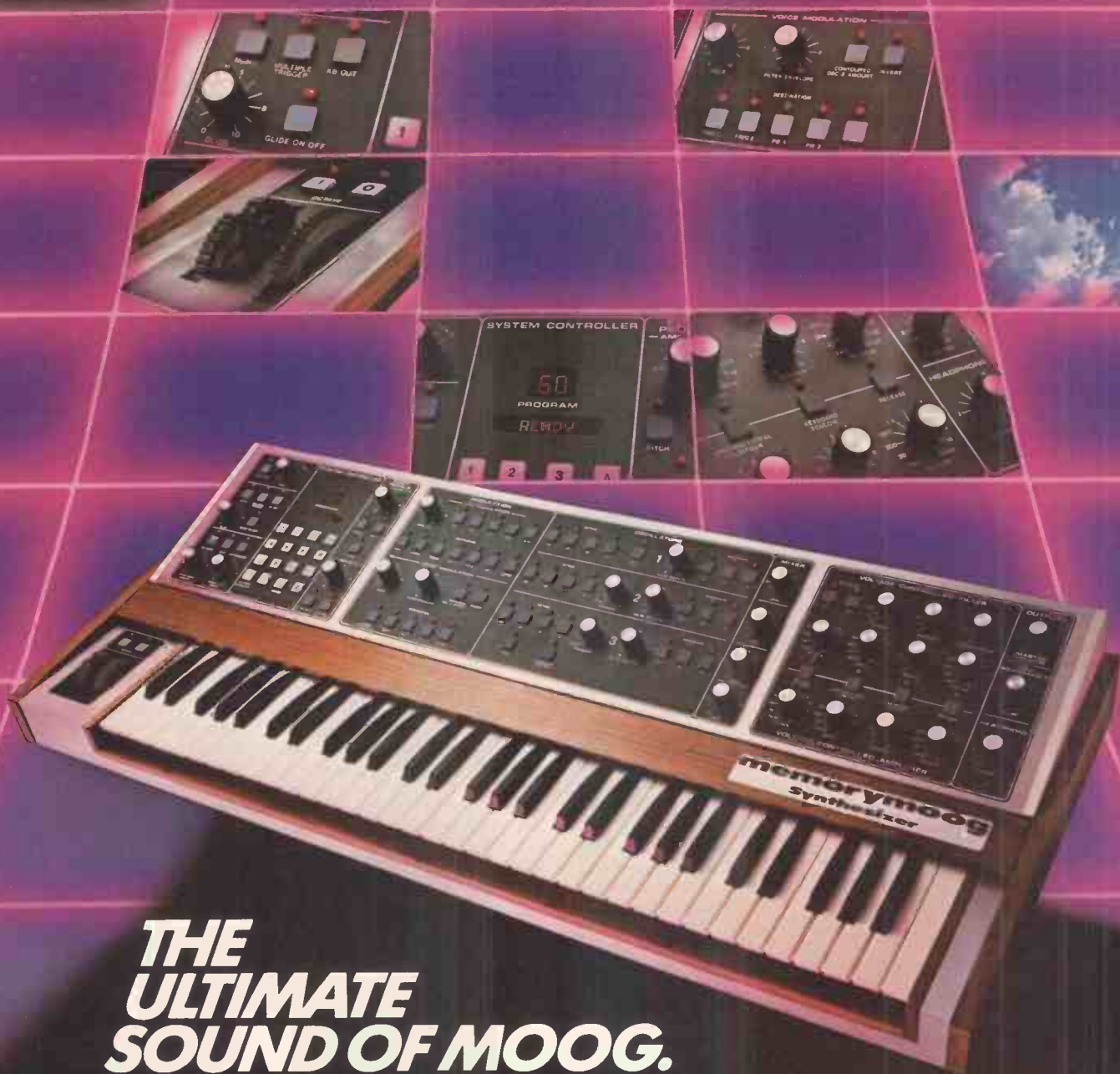
PIECE ORDER As recorded on EMI SP 8303GL

- Intro
- SECTION A: Verse 1
- SECTION B
- CHORUS
- SECTION A: Verse 2
- “Whenever we’re together it breaks my heart
I’ve got a fantasy of which you are a part.”
- SECTION B
- CHORUS
- ORGAN SOLO
- SECTION B
- CHORUS
- CODA





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```

RECONFIGURE*
C - CHANGE THIS SET-UP
S - SAVE THIS SET-UP
L - LOAD SET-UP
U - VIEW CURRENT STATUS
CESCQ - MAIN MENU

CAUTION: THESE SELECTIONS SHOULD BE
MADE WITH A KNOWLEDGE OF THE SEQUENCER
SYSTEM. CONSULT YOUR OWNERS MANUAL.

PLEASE SELECT...

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```

R - READ A COMMENT
USE SHOW SET - ALL MONO SOUNDS
PRESS ANY KEY TO CONTINUE

```

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CHROMA REINITIALIZED
EXPANDER NOT RESPONDING

TYPE IN BYTES TO SEND TO CHROMA:
00 01
02 01
03 01
04 01
05 01
06 01
07 01
08 01
09 01
0A 01
0B 01
0C 01
0D 01
0E 01
0F 01
10 01
11 01
12 01
13 01
14 01
15 01
16 01
17 01
18 01
19 01
1A 01
1B 01
1C 01
1D 01
1E 01
1F 01
20 01
21 01
22 01
23 01
24 01
25 01
26 01
27 01
28 01
29 01
2A 01
2B 01
2C 01
2D 01
2E 01
2F 01
30 01
31 01
32 01
33 01
34 01
35 01
36 01
37 01
38 01
39 01
3A 01
3B 01
3C 01
3D 01
3E 01
3F 01
40 01
41 01
42 01
43 01
44 01
45 01
46 01
47 01
48 01
49 01
4A 01
4B 01
4C 01
4D 01
4E 01
4F 01
50 01
51 01
52 01
53 01
54 01
55 01
56 01
57 01
58 01
59 01
5A 01
5B 01
5C 01
5D 01
5E 01
5F 01
60 01
61 01
62 01
63 01
64 01
65 01
66 01
67 01
68 01
69 01
6A 01
6B 01
6C 01
6D 01
6E 01
6F 01
70 01
71 01
72 01
73 01
74 01
75 01
76 01
77 01
78 01
79 01
7A 01
7B 01
7C 01
7D 01
7E 01
7F 01
80 01
81 01
82 01
83 01
84 01
85 01
86 01
87 01
88 01
89 01
8A 01
8B 01
8C 01
8D 01
8E 01
8F 01
90 01
91 01
92 01
93 01
94 01
95 01
96 01
97 01
98 01
99 01
9A 01
9B 01
9C 01
9D 01
9E 01
9F 01
A0 01
A1 01
A2 01
A3 01
A4 01
A5 01
A6 01
A7 01
A8 01
A9 01
AA 01
AB 01
AC 01
AD 01
AE 01
AF 01
B0 01
B1 01
B2 01
B3 01
B4 01
B5 01
B6 01
B7 01
B8 01
B9 01
BA 01
BB 01
BC 01
BD 01
BE 01
BF 01
C0 01
C1 01
C2 01
C3 01
C4 01
C5 01
C6 01
C7 01
C8 01
C9 01
CA 01
CB 01
CC 01
CD 01
CE 01
CF 01
D0 01
D1 01
D2 01
D3 01
D4 01
D5 01
D6 01
D7 01
D8 01
D9 01
DA 01
DB 01
DC 01
DD 01
DE 01
DF 01
E0 01
E1 01
E2 01
E3 01
E4 01
E5 01
E6 01
E7 01
E8 01
E9 01
EA 01
EB 01
EC 01
ED 01
EE 01
EF 01
F0 01
F1 01
F2 01
F3 01
F4 01
F5 01
F6 01
F7 01
F8 01
F9 01
FA 01
FB 01
FC 01
FD 01
FE 01
FF 01

```

Playing the Rhodes Chroma with the Apple II Sequencer

Continued from page 46

continues to display an attack or release of the tracks required, followed by the correct time event value inbetween. If you're just looking at Track 1 out of several, then you still get all the individual time event (interrupts) listed, but only the attack and release info on the one track.

All the necessary time dependent functions are shown and can be changed - these include the measure number, attack time, key number, velocity time, pressure value, volume number, levers 1 & 2 values, pedals 1 & 2 values, sustain and latch up and down, as well as any parameter on the instruments connected. If you enjoy this more exacting side of making music there is obviously a great deal you can do in editing mode to produce playback of continuously changing events.

The 'last event time' mentioned earlier will be the only key to knowing where a wrong note is and the only really annoying part of the editor is that you can only move forward through events - not backward. Using the 'repeat' key on the Apple you can step through your events, but usually run over and have to go back. This is even more of a hassle if your time event count exceeds around 65,500 (quite easy to do with 8X speed increment) because counting starts again. So you have to start at the very beginning, use the find function for time 30,000, then 60,000, then say, 5400 to get to 5500 accurately, (a maximum jump forward of only 30,000 approx can be done in one go). This 'find' function is a real help as it can actually locate any part of a statement such as ATTACK 1-20.

Making changes to time values to get your sequence loops to work is possible but requires calculations, often with large amounts. It's much better to record the problem track again.

Disk functions

The disk drive facility obviously speeds up access to everything you need to know about the Chroma and in a performance situation will let you load in a whole new set of 50 sounds (or 100 with the Expander) in a few seconds between numbers.

The Program File Management section has its own menu to allow Chroma or Expander program sets to be saved on disk, or the other way - from disk to instrument, plus deletion of a program from a disk file. At any time you can check the Disk File catalogue to see what's available as program sets or sequences. The latter can also be deleted.

Two options are available to reduce the amount of memory used up. First, measure numbers can be removed and second, a 'Scrunch' key reduces time counts - unfortunately, neither is really useful. Removing measures takes away the click track facility, and the Scrunch routine is likely to mess up chord timing in places - but just occasionally it will actually tidy up chord attacks for you instead!

RECONFIGURE. This is a sub-menu selection that shows the present state of certain



John Shygun (far right) talks Chroma with (l. to r.) John Hill, Mark Andrews, Peter Vetesse (Jethro Tull) and Vic Emerson (10 C.C.).

operating parameters of the Sequencer. It's used mainly to get fast or slow recording, or external and internal setting up correct. Once this is done, the new configuration can be saved and, if desired, set-up on power-up. Briefly, the options are for Changing Sync (wait for an external TTL type pulse before playing - but unfortunately not for record to keep the drum machine sync'ed after track 1 where it doesn't matter when you begin); Wait For Sync (this allows a single foot pedal to trigger events or inserts a start delay of between 1 and 15 pulses, sometimes necessary with certain external devices); whether Footswitch is being used; Emphasis required for click track or not; Timing Source: Internal, External, Single Step (footswitch or trigger pulse); plus the Sequencer and Instrument software edition (or Rev. No), disk and slot allocation.

Other selections in the menu provide further transfer between Expander/Chroma programs, Reinitialise of the Sequencer and instruments, error code information and access to utility programs that go through test procedures. They also let you write your own routines and access them as part of the set-up and give space for a 115 character comment - this is important for noting the program set in use and the specific external/internal set-up.

Conclusions

It took some two weeks (between other work!) to familiarise with the system. At first it is slightly tedious, but after a short while, with the Apple keyboard conveniently situated to the left or right of the Chroma (on top is a bit risky because of transmitting micro clocking down signal lines etc.), your fingers will make recording and playback extremely easy with, more importantly, little distraction from playing.

Some of the user limitations encountered were as follows: Looping (can corrupt start timing). Records from beginning only - you can't jump in and record a few bars only which would save a lot of time in a long piece. Pedal adjustment of speed change in 'large'

variation mode is critical and difficult to precisely set to, say, an external drum without sync. System locks if you carry on playing and you're well out of instruments. On some occasions ext. clock appeared to miss pulses and lose sync (but only very rarely). If you look for an event in Edit mode you must be at a time point *prior* to the required event. Looping between new end-points proceeded to mute programs one by one until no sounds were left! (May be a procedure order error on my part that's not stated). No trigger out available to stop a drum machine on playback. No copy/repeat function in edit. No ability to chain sequences.

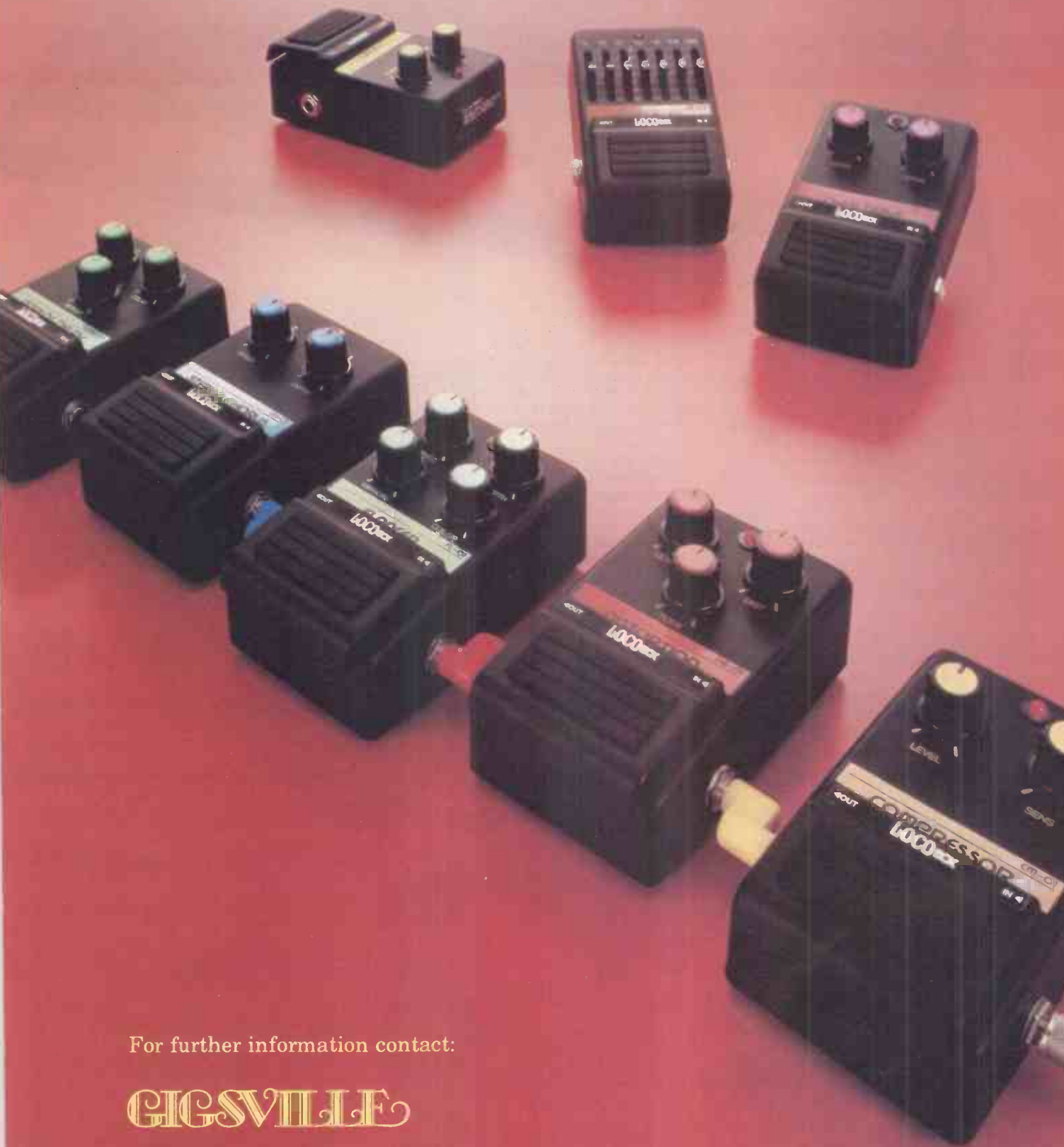
That might sound a rather awesome list, but it's not really! The potential of the Sequencer package as a whole is tremendous for the serious composer/performer. The fact that you can play a solo keyboard performance track without any limitations makes this a very creative tool that for Chroma users would be in constant use whenever the instrument is played. As always there is never enough memory but I managed to record a 3-minute piece with 8 tracks and a 6-minute piece for solo guitar on 1 track with plenty of lever vibrato and pedal sustain. Already, there are revisions under way and these would be passed freely to Chroma users, and it is fair to say that CBS have taken their own initiative in developing this system over some years. The aim was to produce a player orientated package and this has been done exceedingly well through clear menu displays and a very well written manual. When you start to run your own programs as well (and make a link with Midi!) the Chroma/computer interface will be a very worthwhile investment for serious stage, studio and film music composing and performance.

Mike Beecher

E&MM

The Chroma/Apple Interface kit retails at £301.99 (inc. VAT) and is distributed in the U.K. by CBS Fender Ltd., Fender House, Jeffreys Road, Enfield, Middlesex EN3 7HE. Tel. 01-805 8555.

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Sequential Circuits Prophet-600



Early in 1978, Sequential Circuits Inc (SCI) introduced the Prophet-5 polyphonic synthesiser which was one of the first programmable instruments to emerge, benefitting from the new micro technology of the time. The Prophet-5 has been tremendously successful and since then SCI have manufactured another polyphonic machine, the Prophet 10, with 10 voices and dual keyboards. These two synthesisers, along with the popular monophonic Pro-One, have established SCI as an important contributor to the synthesiser world. A polysequencer, remote keyboard, and Pro-FX system complete the company's main product line at present (more details of SCI products are in the E&MM January '83 issue), and while the interest in the forthcoming Prophet 8 is no doubt strong, the Prophet-600 has suddenly appeared as the low cost alternative to the Prophet-5.

Making some quick comparisons reveals that you are really getting something special for your money, not just a watered-down version of the P-5. The Prophet-600 contains six individual 'voice' synthesisers, with dual VCOs, VCFs and VCAs with independent ADSRs, instead of five. One hundred sound programs can be stored, edited and saved on cassette — the 5 can hold 120 but only save 40 at a time. There's no facility for 'defeating'

voices but this is no longer necessary with the new circuitry and extensive digital control. The noise source has gone, which will put off some people. The LFO only has triangle and square modulation (no sawtooth) but adds programmable LFO depth — a great bonus. You can't make the second oscillator run as an extra LFO or independently from the keyboard, but the first oscillator gains a triangle waveshape. Keyboard tracking for the filter has two modes instead of one. There's no variable scale mode or A-440 tuning — the latter may well be an important omission. Pitchbend range is less, but there's polyphonic portamento (no Prophets have glissando). The Poly-Mod section does not control oscillator pulse width and there's no protection switch for the sound programs, but the keyboard range is the same 5-octaves (C to C). The filter remains the same, but the LED indicators are restricted to the touch program section. Only the Prophet-10 has a 'drone' hold function, although the '5' has a 'release' footswitch socket.

But the biggest innovation must surely be in the provision of MIDI (Musical Instrument Digital Interface). Gone are the control voltage and trigger ins and outs in favour of this micro controller — a bold first step towards what is likely to become the

universal link for the synthesiser. E&MM will be presenting detailed discussion of the MIDI shortly.

Prophet synthesisers are often termed 'digital-analogue hybrids' because many of the analogue style controls create digital data for the built-in micro system, which in turn programs the voices. The micro computer does in fact solve the problem of generating six independent sets of voice control voltages and gate signals. The original analogue EGs and LFO are also micro functions and the digital memory stores ALL the switch and knob settings for all of the hundred sound programs, as well as the dual Sequencer notes. There's 10-year battery back-up for this memory, provided you turn the instrument on occasionally, and the micro puts the oscillators back in tune at the touch of a button.

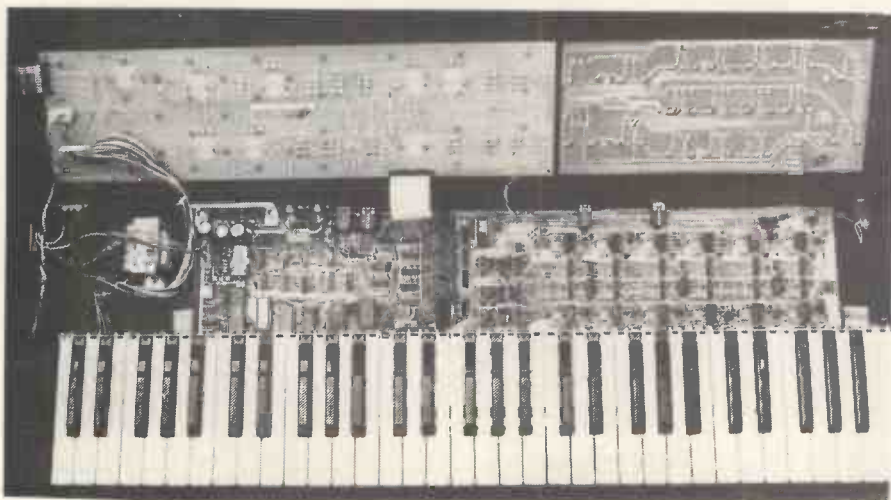
Construction and Layout

The instrument is certainly made to be portable — it's light, very low profile, measuring $37\frac{1}{2} \times 12 \times 4$ ins (L x D x H), and yet well constructed from black 'mottled' stove-enamelled finish metal. Slightly less attractive wooden end pieces complete the instrument — some polish and wood less prone to splintering would be an improvement here. Still, it won't make any difference to the sturdiness or playability of the 600.

The main panel is logical and easy to use, with synthesiser programming sections clearly marked, from left to right, for Poly-Mod, LFO-Mod, Unison Track, Oscillator A, Oscillator B, Mixer & Glide, Filter, Amplifier, Master Tune and Volume.

At the far left of the panel is the new mylar membrane touch section with numerical keypad and large two-digit red LED display for program selection. Other touch pads operate tape storage, tune, plus Sequencer 1 and 2, and arpeggiators, with Speed control knob for both these. The familiar pitch and modulation wheels are provided next to the keyboard for left hand operation, and the standard size keyboard plays easily and smoothly. If anything, the mechanics of these wheels are as simple as possible, yet accurate enough for their purpose.

The rear panel connections are straightforward, with standard jack sockets for external (close-to-make) footswitch, or



Prophet-600 opened up.



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Sequential Circuits Prophet-600

Continued from page 58

5-15V positive going trigger from a drum machine etc. There's mono audio out (which also provides a stereo signal out sufficient to drive a pair of headphones at 600 ohms minimum for monitoring), a filter voltage control input for increasing frequency cut-off (needs 0-10V DC e.g. from the SCI model 840 pedal), cassette interface in and out, MIDI 5-pin DIN in and out, line voltage and neat 'press-to-release' fuse holder, plus Europlug socket for separate mains cable with power on/off switch.

I'll briefly mention here that the MIDI interface will slave 600's together to all work from one keyboard or home computer with RS 232 serial output.

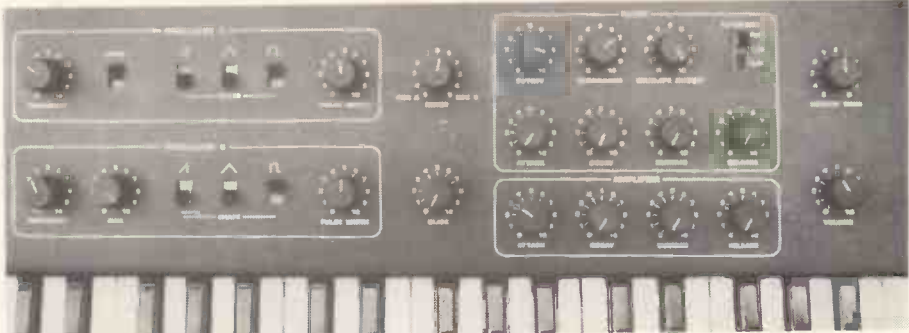
The mechanical controls use low cost knobs and slider switches, with some slight movement of knob spindles apparent. Four rotary controls did not fully utilise their range — the two frequency pots for the oscillators stopped at the highest pitch from 7-10 on the dial, and the pulsewidth controls for these oscillators turned 'off' at 2 and 8 when a little more range, especially at the midpoint for selecting a square wave, would have been desirable.

Access to the circuitry is quickly done by removing 4 side screws and lifting up the hinged main panel. This may be necessary for the owner to do from time to time, as instructions are given for adjusting the 12 oscillators and filters by simply linking 2 wires and tuning the 18 presets (shown on the right hand board in the base). This only need be done if oscillators have drifted so far off, the micro can't pull them back and this will probably only happen if you move the instrument around a lot without the necessary care. The check procedure neatly uses 6 of the LEDs in the touch switches to help you get it right.

Circuitry

Four large PCBs are used to hold the circuitry — two for the main panel control connections and logic, and, in the base next to the transformer, there's the main micro board holding Z80A, EPROM, RAM, interface and PSU, which is hard-wired to the second PCB containing the 12 synthesiser voices.

The Prophet-600 contains a micro system based on the Z80A running at 4MHz with hardware basically similar to the Prophet-5 and -10 computers. However, as mentioned, there is new software generation of the envelopes that produces dynamic CVs at 3 sample/holds for filter, amplifier and oscillators. This is why no gate signals appear in the synthesiser. The filter envelope used to set the filter timbre contour and the Poly-



Main panel right hand controls.

Mod modulation of Osc A is also the computer at work. Similarly, the LFO is digitally summed into control destinations, e.g. the 12 separate oscillator CVs, two PW CVs, or 6 filter frequency CVs, along with the Pitch and Mod wheels. This greatly improves the overall stability of the instrument.

Generally, the circuitry has been simplified by the use of Curtis CEM chips, including the new CEM 3372 which has VC mixer, filter and amplifier in one IC for each voice. Pulse waveform switches are gone, and the PW CV drives the duty cycle to DC (which may account for the limited pot control range).

CEM 3360s take care of VCA balance and the Tune function now includes the filter's resonance setting as well. The only presets are for scaling the 12 oscillators and the 6 filters.

With power off, the non-volatile battery supplies the two RAM chips holding the 100 sound programs, sequences and some protection circuitry, which also removes any odd noises when turning the instrument off. The software is held in one EPROM.

The system clock runs at 8MHz and is divided to give 4MHz for the Z80 micro, 2MHz for the Tune Timer and 500kHz for the MIDI. The computer generates 'maskable' interrupts and its basic scan routine checks envelopes, LFO, sample/holds, LEDs, Pitch and Mod wheel, plus one other control knob.

Incidentally, it was necessary to check the wiring connectors inside the instrument and push them firmly in following the shipment from Holland.

Pot motion is detected by comparing current and previous scan values, while the DAC 71 makes a 7-bit approximation (8-bit for pitch wheel). The oscillators are CEM 3340 based, feeding to the CEM 3372. An 8 x 8 diode matrix sets keys pressed, with further 8 x 3 and 8 x 2 matrices for the mylar control panel and synth programming switches respectively, all into a 4514 chip.

Touch Programming Section

On switch-on, the Tune switch LED lights while initial tuning of the oscillators takes place. After a few seconds, the tune LED

goes out and the instrument becomes playable, jumping into Preset mode, shown by the Preset LED. Any of the 100 'factory-loaded' program sounds can now be dialled up using the touch numerical keypad 0-9 called Program Select. Two numbers are required from 00-99 and are shown on the display, with an 'opt out' after the first number entry if you make a mistake.

The Tune switch is used occasionally (more during the first 30 minutes) to bring the oscillators back to the pitch. The time it takes to do its checking is increasingly reduced as the pitch stabilizes. Of course, the instrument cannot be played while you re-tune, but previous settings are restored afterwards, including any unrecorded editing you've been doing.

A quick check of the output Volume setting and the Master Tune (adjustable +/- 1 semitone) will also be necessary with audio mono out connected to mixer or amplifier.

Of course, the aim of this instrument is to offer complete programmability for you to create your sounds, rather than stick with factory presets (some people do, amazingly enough!). So, once you've set up the programming section you can 'edit' a stored sound or create a new one at any time. This allows you to prepare 'libraries' of 100 programs for your performance or studio work which can then be 'saved' on a mono cassette recorder for later retrieval. Two Sequencers will play your polyphonic music and two types of Arpeggiator increase the instrument's scope greatly.

Cassette Storage

Five touch buttons with LED indicators built-in are used for storing program sounds and your prepared sequences of music played from the keyboard.

The cassette interface provided will save information on cassette in 3 ways; it will save all 100 programs in one go, save one group of 10 programs, or save both sequences.

As with most cassette saving operations, some consideration has to be given to the particular recorder used, as well as the quality of the cassette. My own tests were with cheap mono recorders and a stereo portable that I use for other micros, and saving, verifying and loading were all done successfully. The operating manual gives useful suggestions to help you with this.

Saving data is basically the same for programs and sequences. The 'Record' pad is pressed on, followed by the 'To Tape' pad, unless you're saving a bank of 10 programs or sequences. Then you insert another instruction between — either pressing one Program Select for the group of 10 programs to be saved, or Seq. 1 or 2 pads for both sequences to be saved together.

A simple verify check can be made using the 'From Tape' pad — if its LED blinks you know you've got a tape error and you should try again. Otherwise, a tune routine will be followed by normal operation again. It's not possible to jump out of the 'To Tape' mode — you have to wait the time it takes (up to 30 seconds or so for the whole 100 programs or full sequence).

In this way, you can build up tapes for



Main panel left hand controls.

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programs and tapes for sequences, best done for relatively small numbers of files on C15 cassettes.

Loading follows the same kind of procedure, using 'Record' and 'From Tape' pads with the same insert for a program group or sequences.

Sequencer

A real-time polyphonic sequencer is provided on the Prophet-600 for recording bass line, short riffs or ostinatos, and melodies. It remembers exactly your keyboard performance using up to 6 notes each time and its playback speed can be changed from ¼ to 4X real-time using the 'Speed' control. Playback speed can be programmed freely and stored with the sequence on tape.

A footswitch can be used to stop both recording and playback and functions are simply done with 'Record' and 'Sequence 1' or 'Sequence 2' pads. The footswitch is useful for fixing the sequence endpoint on the following beat, as the sequence will automatically loop on playback.

It works extremely well, 'catching' everything played, but the total number of notes shared by Seq 1 and Seq 2 is 400. If you make one too long, it will 'steal' notes from

cannot be operated from a drum machine, for example, even with MIDI in operation.

While the sequence plays back, you can still use the keyboard and this offers some very effective 'solo with sequence' playing.

Arpeggiator

The arpeggio feature is one sure way of livening up your performance and the 2 arpeggio functions here can be running automatically while you play the keyboard at the same time. Actually, as with the sequencer, the result is really achieved by swapping between notes, but it's nevertheless an interesting option. Two types of arpeggio can be set to play around the notes held on the keyboard — Up/Down, which plays held notes from the lowest to the highest and back continuously, or Assign, which repeats notes in the order played. The latter in particular makes very good live sequence patterns and both types can be latched by pressing the 'Record' pad. However, you cannot continue to add notes once latched which restricts the sequence length to your physical finger stretching.

Arpeggio speed can be adjusted and either a footswitch or external clock/trigger can synchronise with a drum machine or other timed event processor. This is done by turning the Speed control fully anticlockwise, to receive the external pulse, although unusual effects can be obtained by sharing pulses at centre speed settings. Because the external trigger goes into the footswitch, the Sequencer will not play back correctly if a trigger is currently being input, say, from a recent arpeggio passage.

Performance and Effects Controls

The performance wheels at the left of the keyboard affect all 6 synthesiser voices at once. Voice assignment is performed by the instrument's microcomputer, so the most recently played keys take priority ('last-note priority'). Operating the pitch wheel, which is centre-notched to fix normal pitch, will raise or lower all voices at the same time over a maximum major 3rd (4 semitone) interval up or down.

The Mod wheel introduces LFO modulation, setting a maximum 3rd jump using a square wave or a 5th jump with a triangle wave source. Both are essential for the performance of modern music to add variety through tonal and pitched nuances.

Besides playing polyphonically, 3 types of unison modes can be programmed using the 'Unison Track' switch. Normal Unison gives the big monophonic sound of all 12 oscillators on a single note (the lowest played). It also changes the synth from multiple to single triggering — only restarting a new envelope once all keys have been

released. Single Voice Unison produces a thinner sound using just one voice per note. Tracking Unison is an important feature and latches chord played, to consequently transpose the same interval shapes from any single (root) note played. Fast parallel note runs can be achieved, especially using this with the Arpeggiator. Even more exciting is the facility to record this 'Tracking Chord' as part of the sound program.

A programmable Glide function gives fully polyphonic portamento between successive notes at variable rates. Some unpredictability occurs here as the 6 voices go to each new note in rotation. This means that repeated sliding between the same notes at different ends of the keyboard quickly ceases until new notes are introduced, and the poly portamento from 6 low notes will reach new middle notes before new high notes. The effect can be spectacular even so.

Programming and Editing

The only important non-programmable controls are the two wheels (although the Mod-Wheel's destination and source wave is programmed), while all the switches and controls necessary to establish a sound program on recall (through program select) are programmable.

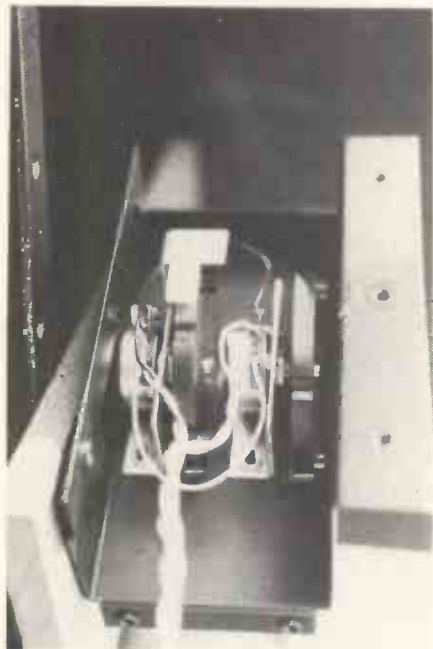
In addition, a sound can be further edited at any time by simply turning or switching the appropriate control. Of course, you can't see from the panel what settings were made to create a preset on later recall, so you have to go through a methodical switch/knob checking to readjust the sound. The editing process lets you take a preset sound and change it completely or go to Manual mode where all the controls show the actual settings for the sound produced. If any editing is done to a program (by moving a switch or knob), a decimal point will appear between the two digits on the display. You can cancel the editing easily by redialling the program number, or you can store a newly created (or edited) sound by pressing 'Record' followed by the program selection number from 00 to 99.

A little care has to be taken, otherwise you could destroy an important program — it's good practice to save a program group or set after a time to guard against errors.

Editing

The centre and right hand main panel controls let you create or edit sound programs, with each function acting on each synthesiser voice identically. Although many of the controls are digitally synthesised, they eventually end up controlling the following analogue devices.

Oscillator A provides frequency adjustment over 4 octaves in semitone steps. Sweeping the Frequency control may produce uneven step jumps, so you won't often use it as a performance effect, but precise



Pitch and Mod wheel mechanical arrangement.

the other banks once the limit is reached — this can be a nuisance if you've spent some time getting a perfectly played sequence in 1, followed by another masterpiece in 2, only to find that 1 has been chopped off!

Speed control is always internal and



Rear view.

pitch setting over 16' 8' 4' and 2' can be achieved. A Sync switch locks this oscillator to Oscillator B in 'hard' sync for exciting harmonic timbre changes. There are sawtooth, triangle and pulse waveshapes available, the latter with square approximately at centre setting (but you will have to listen carefully to find it). Each wave can be switched in or out together or separately.

Oscillator B is the second oscillator for each voice and has the same 4-octave Frequency control, but with a Fine control as well for detuning. Waveshapes are the same and both oscillators can be balanced from the mixer control knob. Glide can also be set as mentioned.

From the mixer, the oscillator signals pass through a 24dB low pass filter with standard cut-off frequency, resonance and envelope amount for the ADSR. Maximum attack, decay and release times are around 9 seconds. A noticeable drop at the end of the decay and release was heard, but is not very significant. There's also a keyboard filter tracking switch with full, 1/2 or off setting. It's used to maintain a consistent brightness of tone over the keyboard.

High settings of the Resonance control will turn the filter into a pure sinewave oscillator and it will track the keyboard substantially better than most instruments for some 3 octaves.

The signal chain is completed by a VCA with ADSR controls as in the filter section and a Master Volume control for making sure program sounds are all at a constant level during selection.

Two modulations sources are available — LFO-MOD and POLY-MOD. The more common Low Frequency Oscillator can be programmed with an 'Initial Amount' control to constantly modulate up to 3 'destinations' — the frequency of oscillators A and B, their pulsewidth, or the filter cut-off. The fre-

quency can be set for triangle or squarewave output (for smooth or sudden changes in pitch and timbre). Alternatively, with Initial Amount at zero setting, the Mod wheel can take over control instead. Both can work together but still give max pitch change of a major 3rd with a square wave.

The Poly-Med section opens up the synthesising by making polyphonic pitch sweeps using the filter envelope as a modulation source for Osc A pitch. When used with oscillator Sync on, rich timbre changes can be made. The section also uses Oscillator B for modulating both Oscillator A pitch and/or the filter. Poly-Mod lets you create ring-modulation effects like bells, chimes, percussion as well as rich timbre changes, weird Tomita-style voices, pan flutes, growls and so on.

MIDI Links

SCI say that this is the first commercial synthesiser with MIDI. Besides allowing 600s to be slaved together, it offers control from a home computer through a serial interface. The software in the 600 also lets you decide such things as enabling or disabling a program select number on one instrument to another, Pitch and Mod slaving, and dumping programs between instruments. In 16 bytes of program data all the necessary programming information can be transmitted to set up a sound program.

Conclusions

With a maximum retail price tag of £1625.00 inc. VAT, the Prophet-600 represents a state-of-the-art machine that 'looks to the future' with the MIDI interface. With several very good polyphonic instruments now available, you'll have to make your own comparisons from this information here with

SYNTHESISER REVIEW

the competition before you decide to buy.

The Prophet-600 is easily programmed from the analogue style controls, although a tuning reference would be useful to keep your frequency adjustments correct (at present a cross check between presets or external oscillator is necessary). The quality of its sounds leaves little to be desired and its synthesising capabilities are well demonstrated in the 100 program samples supplied, especially through the provision of dual oscillators and EGs. The new membrane switching is fine in use, although some functions have no LED indication. You'll have to wait for the Prophet t8 if you want touch and pressure keyboard control and I've already noted other omissions in the review. Certainly, a program advance feature would have helped a lot in selecting program sounds.

For many electro-musicians, the Prophet-600 will become the ideal reasonably low cost polyphonic, unlikely to become redundant because of its MIDI link — so now's the time to learn to use a home micro or you'll be left behind!

Mike Beecher

E&MM

A list of U.K. dealers is given on page 59. Please contact your local dealer for further information or write to: SCI, 3051 North First Street, San Jose, CA 95134, USA; or SCI, Postbus 16, 3640 AA Mijdrecht, Netherlands.

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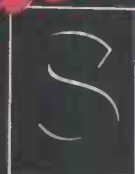
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Concert Review

Helden London Planetarium 3rd March 1983

With the possible exception of Tangerine Dream's last tour, the Helden shows intended to preview their forthcoming 'Spies' album must be regarded as representing the state of the art in live synthesiser music. Percussionist Warren Cann of Ultravox and synthesist Hans Zimmer have been working for over two years in preparation for the shows, and had chosen the ideal venue in the London Planetarium, which for some time has played host to the American 'Laserium' show.

The equipment roster was quite spectacular. Three Fairlight CMI disk drives, two with terminals and keyboards and one operating solely on the automatic MCL (Music Composition Language) together with a Yamaha digital keyboard, Prophet 5, Minimoog, Roland 100M Modular System, 3 RSF Kobil Expanders, keyboardless Korg Polyphonic and a 16-track tape machine with mixer formed the backstage and left-hand set-ups. Warren Cann's equipment included 11 Simmons SDS 3 and SDS 5 pads, LM-1 drum computer, AKG BX5 doubler, 3 Simmons racks, LinnDrum, Cactus Custom Phase, Flange and Overdrive units, Boss delay and Soundcraft 16-channel mixer. Fairlight programming was by Steve Race, laser projection by Ed Burzycki assisted by Mark Sutton-Vane and Tony Decosta, and musical arrangements by Fiachra Trench, Richard Harvey (ex of Gryphon), Brian Gulland and Helden.

Most of the music was from the thirteen linked tracks of 'Spies', although not including the vocals which are contributed on the album by Zaine Griff and Linda Jardim. The 'Overture' was set against the Planetarium's starscape - not in motion, due to the smallness of the stage and the danger of having the projector moving - and gave an overwhelming start to the performance. A low string drone was submerged by thumping percussion, synchronised to flashes of dawn light around the rim of the dome, and the laser display began to create complex spiral patterns across the starscape.

'The Ball', 'Young and Scientific' and 'Pyramids of the Reich/Transmission' established a clear musical style; derived from Hans Zimmer's film work, it's heavily orchestral, underpinned by simple electronic rhythms punctuated by complex fills and rolls, and relies heavily on sampled and imitative versions of orchestral instruments. Oboes, flutes and strings are particularly dominant, and hints of classical pieces abound. Each piece ends with a short linking passage, often taken by Hans on the Yamaha which produced typically sparkling, resonant chords, reminiscent of a concert harpsichord crossed with a Fender piano.

'A Killing Hand', 'Eva' and 'Stranded' completed the 'Spies' set. The laser display was imaginative throughout, pulsing in time to the music and creating line drawings of fast cars, daggers and guns as well as abstract patterns in all the primary colours. There's nothing quite like a laser display to complement synthesiser music, and in this case the great degree of synchronisation between music and visuals, in addition to the imagination shown in the improvised laser parts, was a superb bonus.

Without a break the duo went into Ultravox's 'Vienna', a rather fast version which suffered from the lack of vocals, and then into '2529/Huo' from 'Spies'. Huge loops of laser light ringed the Planetarium's dome, and then split into a thousand moving fragments as the beams were bounced off a pair of glitter balls on either side of the Zeiss projector. In between these tracks, an interesting version of Ennio Morricone's spaghetti western theme, 'Once Upon a Time in the West', allowed the tempo to slow considerably, and introduced imitative mouth organ and guitar sounds.

The closer was, predictably, a rousing classical piece, Prokofiev's 'Le Dieu Ennemi et la Danse des Esprits Noirs'. There's been an earlier rock arrangement of this one, by Carl Palmer, and it would be interesting to learn whether the duo had been inspired by this version or had gone back to the original. Either way, the piece exhibited great energy, showed the bass end of the Planetarium's



sound system to its fullest, and contained some breath-taking rolls around the electronic kit. Ending on a spectacular orchestral climax and a final blast from the lasers and lighting system, it was an excellent choice to finish the concert.

As there was apparently no chance of an encore, the audience wandered about in a rather shell-shocked state for a while after the closing number. The combination of two sets of Simmons drums and three CMI's through the highly bass-responsive PA, and the mind-expanding laser effects coupled with the need to lean backwards to watch them, would be enough to put almost anybody into a daze. A positive point is that the show was just the right length — at 50 minutes or so, it ended before either the musical or visual ideas showed any signs of drying up.

As a one-off experience, then, a total success, and congratulations to all who took part. The music certainly had a lot of power, but undoubtedly much of the success of the occasion was due to the synchronisation of music and spectacular visual effects. In album form, the purely musical side will have to work hard to achieve the same results. What effect will 'Spies' have once the vocals are added on and the lasers are taken away? We can only wait for the album and see.

Mark Jenkins

**Laurie Anderson
London Dominion Theatre
17th February 1983**

The vast structure of 'United States 1-4' dwarfs Laurie Anderson's successful single 'O Superman', while at the same time putting its importance into perspective. It's a central point of Part 2, which, while the individual parts are not titled in the programme, is usually known as 'Politics'. The other parts are 'Transport', 'Money' and 'Love', combining to form not just a portrait of a country but "a description of any technological society and of people's attempts to live in an electronic world".

A world of electronic music, then, of electric light, of electronic moving pictures, of computer and electro-mechanically generated sound. It's important to realise that all these are equally significant in this type of work; it's not just a concert, it's a performance, a piece of 'performance art'. The inter-relationships of music, lighting, visuals and vocals in 'United States' are complex, funny, often significant and often arbitrary, a little like modern life itself perhaps.

The technology involved in putting on such a show obviously costs money, and while Anderson seems a little guilty about the 'rampant capitalism' displayed by her need for a Synclavier, Prophet 5, OBXa, Vocoder Plus and stack of harmonisers, she's prepared to turn the whole thing into a joke in a section about the label which released her 'Big Science' album, WEA. "I see myself as part of the great American tradition of humour", she croons, 'you know, Yosemite Sam,



Bugs Bunny — that sort of thing". The voice of WEA replies that they were "looking for something a little more . . . adult". Anderson's reply is a characteristically self-parodying "I can adapt!".

If 'United States' is about adapting to technology, it's attempting to do so by using technology rather than being used by it. Admittedly much of this technology isn't visible: the Synclavier sounds come from a 2-track Revox B77 by the 24-channel mixing desk, and the stage set-up appeared quite sparse. A Roland Vocoder Plus keyboard stage right, a Prophet 5 and drum kit stage left, a microphone and rack of effects including a telephone centre stage.

Pieces such as 'Example 22' used an expanded line-up with Chuck Fisher and Bill Obrecht on saxophones, David Van Tieghem on drums and occasionally Jean Carter on soprano voice. Two other vocalists, Chahine Yavroyan and Jane Pearce, appear in Part 1, and together with projectionist Perry Hoberham, lighting designer Jan Kroeze, sound engineer Bob Davies and no doubt a good-sized road crew, must have helped comprise a pretty large party for transportation. From the complexity of the visual display it was clear that about four slide and two film projectors were in use, and it's a credit to their operator that there didn't seem to be any problems in synchronising music and visuals.

Many of Anderson's musical ideas also have an immediate visual appeal. Her violin glows translucently in the dark, illuminating part of her face as if it were a death-mask. With a tape recorder head mounted on the bridge and a strip of tape replacing the horsehair of the bow, it can be made to produce vocal messages backwards, forwards, at any speed and starting at any point in the message. During 'New York Social Life' she squats with a tamboura (small sitar) and a telephone tucked under her chin, chatting into it and replying to herself through her stack of echoes and harmonisers. During 'We've Got Four Big Clocks' we see projected the four US time zones, with music carefully synchronised to their movement.

During the closing piece, 'Lighting Out for the Territories', the audience realises at some point that Anderson has already left the stage. The films are still running, cars are still hurtling along highways, music is still playing, but the artist has gone. There seems to be no closing message, no attempt to sum up the mass of statements and implications contained within the musical and visual structure of 'United States'. Perhaps the final answer is that there is no final answer.

Laurie Anderson's show doesn't include any technical, musical or

theatrical material that is radically innovative, yet the sheer scale of it — six hours usually spread over two evenings — indicates the tradition in which it works, that of the epic book or film or play. Put into this context, 'United States' can be seen as the massive achievement in the audio-visual arts that it really is.

**Fad Gadget
The Venue, London
16th February 1983**

It's generally believed that Fad Gadget is Frank Tovey, an arts graduate in his late twenties from East London. It's not true: Fad Gadget is a monster, a wild animal, a black comic who emerges half-way through an evening's musical entertainment to delight and appal an audience. Fad Gadget is a throw-away name that won't be thrown away, and a band who should be ignored at your peril.

From Frank's pioneering electro-pop singles 'Back To Nature' and 'Ricky's Hand', through the LPs 'Incontinent' and 'Fireside Favourites' to the recent 'Under The Flag', the style has changed quite considerably as the emphasis has switched from solo to group performance. He doesn't play any instruments live, sticking to vocals as the instrumental side is handled by backing tapes, a keyboard player and percussionist and three backing singers.

The opener 'Under The Flag' uses metallic percussion and synthesised squeaks over the backing tapes, together with billowing smoke and lights. 'Love Parasite' follows it, opening with a taped MC4 pattern and very heavy electronic percussion, overlaid by roto-toms, cymbal splashes and



lightly echoed backing vocals. It's typical of Fad's rhythmic, catchy but rather morbid style of songwriting, and is filled out by raucous sync sweep sounds on a Pro One and thick Juno strings.

Added to the keyboard line-up is a Clavinet, used quite frequently now to give a staccato funky feeling, and an SH-101 for effects. The keyboards were used quite imaginatively from one song to another, although much of the work was being done by the backing tapes, and there was a certain lack of spontaneity which seemed to put a damper on the proceedings.

About half-way through, however, a run of catchy songs including 'Swallow It' from 'Incontinent' put some life back into the proceedings, and Frank began to turn slowly but inexorably into Fad. Flinging himself across the stage, swallowing the microphone and striking himself in the stomach to produce primeval grunts, he began to give a new meaning to suffering for one's music. The backing vocals became screams and cat-calls, the keyboard sounds became more and more anguished, and over everything the electronic percussion hammered home a dance beat which was difficult to resist.

'Life On The Line' proved another masterpiece of irony, an anti-war theme which ties together the whole meaning of the 'Under The Flag' album. During the encores Frank managed to get through 'The Pedestrian' before Fad took over and total madness descended; 'Ladyshave' saw him covered in shaving foam, tearing hair from his body, beating himself with the microphone and strangling himself with its cable. The audience loved it, even the one who was struck on the head by the mike as it swung on twenty feet of cable, and carried Fad shoulder-high across the stage as he grunted and screamed his way through 'Back To Nature'.

The simple but forceful 16-note sequence, combined with Fad's wide range of vocal (and non-vocal) techniques, showed clearly that electro-pop can have power and significance rather than just light-weight catchiness. If you can stand the morbid preoccupations of many of the songs, Fad Gadget makes addictive dance music, too.

**The Enid
London Marquee
24th February 1983**

The Enid are now down to a three-piece, but still manage to turn out their distinctive brand of complex, layered classical rock music. Keyboardist Robert John Godfrey and guitarist Stephen Stewart are joined at the moment by drummer Christopher North and by a pair of Sony PCM F-1 digital recorders, which fill in assorted parts including abstract synthesiser sounds and orchestral percussion.

The cramped confines of The Marquee didn't give the band much room to move, but a tightly-packed audience were quite happy to see

Concert Review



them express themselves musically rather than physically. The set was made up from pieces from all parts of the Enid's ten-year career, with the notable exception of the popular fairy-tale 'Fand' which was too long to be included with all the other material.

'Rain Down', from the latest album 'Something Wicked This Way Comes', introduced the use of heavily har-

moniser-treated vocals, to give a powerful detuned chorus effect over the strings, taped bass, percussion and guitar. The nuclear war theme was heightened by imaginative use of the percussion and in particular by the orchestral gong behind North's drum kit.

Godfrey explained that the album had been rejected by Pye due to its anti-nuclear theme, and had been

financed by advance orders for copies and by use of The Enid's Studio as a commercial establishment. The band now hope they've completely escaped from commercial considerations, and sell their albums only by mail order from their home base at Claret Hall Farm, near Clare, Sudbury, Suffolk. They have been known to dabble in singles in the past, however, 'And Then There Were None' being released by Mickie Most a few years back. It's an up-tempo, reggae-like piece full of slow vocal build-ups on tape, string chords, slow-attack guitar and a distinctive brass sound on Minimoog.

It was followed by 'Evensong' which betrays influences from Haydn and Elgar in its stately pomp and orchestral climaxes. The Enid's style encloses all classical and military music, and throughout the evening there was a tendency to pick up snatches of 'God Save The Queen' or even 'The Thunderbirds March'. Luckily the band are quite aware of this tendency, as they showed in the encores.

'Bright Star' referred back to several previous Enid pieces, and was followed by 'Song For Europe'. Full of rattling snare drums and Moog

trumpets, Godfrey described it as a militaristic 'what a carve-up' song, a sort of anti-political rather than political protest. The reasoning behind this became clear in 'Something Wicked', which depicts with flashing strobe, heavy percussion and snatches of Christmas songs, the end of the world as seen through the eyes of a small child. The piece is characterised by great variations of pace and dynamics, together with taped grand piano and filter swept string chords.

Self-parody time in the encores, with bombastic versions of 'The Dambusters March' and 'Land of Hope and Glory', both very much tongue in cheek as the band admit. And finally, to close, Ian Mitchell (ex-Bay City Rollers) on guitar and stage manager Jeffrey Holden on bass joined in on a powerful version of The Troggs' 'Wild Thing', which has been the band's closer for longer than anybody can remember. It's so far removed from The Enid's normal material, while at the same time so close to their exuberant approach to music, that it made an ideal end to an evening full of pomp and circumstance.

Mark Jenkins

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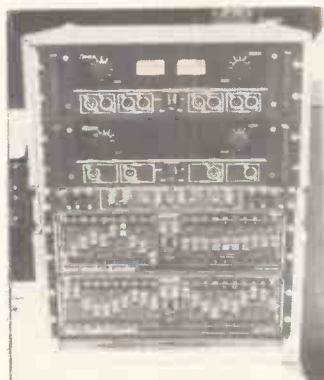
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MUSIK MESSE FRANKFURT

Another look at new products unveiled during the Frankfurt Music Show. Detailed reviews of some items will appear in E&MM in the near future, but in the meantime we've given contact addresses and/or telephone numbers for the individual manufacturers. They will be glad to give further information, and when getting in touch don't forget to mention E&MM.



Canary displayed their comprehensive range of power amps, crossovers and graphic equalisers.



The Rattlesnake electronic drum kit under demonstration.



IMEA's programmable digital delay DDP 500-N and programmer. 32 memories are available with maximum delay time of 510 mS, together with flanging, modulation and infinite hold. Contact IMEA Electronique Musicale, 32 Quai Arloing, 69009 Lyon, France.



Yamaha mixer RM 804, an 8 input and 4 2 output design for recording studios. Kemble-Yamaha, Mount Avenue, Bletchley, Milton Keynes, Bucks. Tel. 0908 71771.



PPG designers Wolfgang Palm & Wolfgang Duren, interviewed February 1983, showing their Wave 2.2, Waveterm, and new touch sensitive Processor Keyboard option. Syco Systems, 20 Conduit Place, London W2. Tel. 01-724 2451.



Wersi organs on show include the Galaxy and Helios, demonstrations being given by top star Franz Lambert. Aura Sounds, 14-15 Royal Oak Centre, Brighton Road, Purley, Surrey. Tel. 01-668 9733.



Yamaha Portatone keyboards. New additions to the range include the PS-35 which offers stereo sound together with PCM rhythms, chord programming and auto bass. Kemble-Yamaha, Mount Avenue, Bletchley, Milton Keynes, Bucks. Tel. 0908 71771.



Casio's keyboard amplifier, designed for their portable keyboard range, includes input mixing, Bass and Treble, headphone output and modulation speed controls. Unit 6, 1000 North Circular Road, Staples Corner, London NW2. Tel. 01-450 9131.



Kramer guitars from America.



Fane Acoustics showed a wide selection of speaker units including the boosted-bass Disco 200 range. Fane, 286 Bradford Road, Batley, WF17 5PW. Tel. 0924 476431.



Kawai pianos on show included the new EP608 collapsible upright model, and their popular Electric Grand. JHS, Salem House, Garforth, Leeds LS25. Tel. 0532 865381.



Allen & Heath Sales Director Simon Jones, showing the new System 8 deck. Allen and Heath Brenell, Pembroke House, Campsbourne Road, London N8. Tel. 01-340 3291.



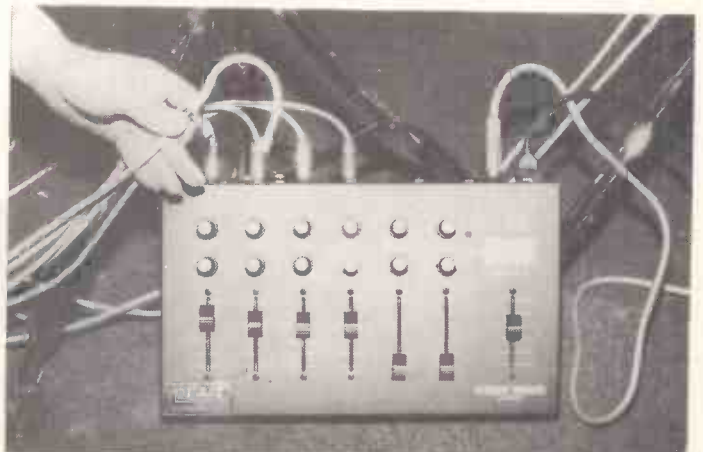
The alpha Syntauri with Composer's Assistant software loaded. Transcription of realtime performance is possible via Apple 2 link. Computer Music Studios, 62 Blenheim Crescent, Ladbroke Grove, London W11 1NZ. Tel. 01-229 2595.



Suzuki's Tronichord, developed from the popular Omnichord. All controls are now touch sensors rather than a mixture of sensors and buttons, and 27 chords are available together with 'Sonic Strings' which can be played by hand or with a conductive plectrum. Suzuki, 443 Rydke-Cho, Hamamatsu, Japan.

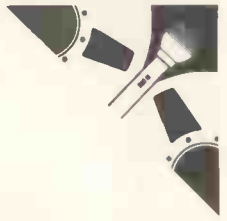


Crumar Multiman S-3, offering Bass, Poly, Piano, Harpsichord, Cello, Violin, keyboard split, VCF and Envelope controls and Detune, and Crumar Roadrunner 3 Piano with 3 voices, Bass and Phaser. Chase Musicians, 22 Charlton Street, off Euston Road, London NW1 1JH. Tel. 01-837 7626.



Tubby Drum mixer, which in conjunction with a set of Tubby Drum pickups provides a rapid and easy means of miking up a kit without stands.

Aiwa AD-WX110E Tape Recorder



Aiwa's new model is a hi-fi version of the dual cassette decks which seem to be becoming very popular nowadays. Very smartly finished and equipped with Dolby C noise reduction, its major feature is a double speed facility coupled with four-track heads which allow it to copy both sides of a tape simultaneously. Its maximum capability is therefore 'Quarter Time' copying, so that a C60 cassette can be copied in 15 minutes.

Presentation

The finish is silver and black, with some vital controls in coloured plastic — 'Record' for instance is red, 'Record Mute' is blue and the 'Track' selector is orange. The switches are of a mechanical design apparently with a microswitch mounted beneath them, so that the overall feel during use is a cross between mechanical and touch sensor switching. A set of LEDs situated between the two cassette mechanisms indicate the state of the Dolby, dubbing and other facilities, for which the miniature controls are on the right hand side of the machine.

Each cassette lid also carries a set of indicators. On Deck 1 these are for tape type; 120uS or 70uS for Deck 1 itself (which is for Play only), and LH, CR02 or Metal for Deck 2 (which is for Play or Record). Deck 2 carries a pair of LED VU meters, which indicate record and playback levels. During dubbing the record level will be shown, and during playback Deck 1 has priority over Deck 2.

Operation

The major specialised function of this machine has been kept as simple as possible to use. In order to copy a tape, the master is loaded into Deck 1 and a blank into Deck 2. The Dubbing switch is pushed in (to disconnect the Line inputs from external sources) and then it's only necessary to push Record on Deck 2. This acts as a One-Touch Record control for Deck 2, and also causes the Play function of Deck 1 to operate. Normal or High copying speed, and 2 or 4 track copying, should be selected before starting the machine.

During dubbing, level control is automatic, although there are recording level sliders which can be used when recording from external sources. Additionally, the Dolby selectors do not function in this mode; it's assumed that the master tape is already Dolby encoded, which in most cases would be true. If either of these operating factors



present a problem, however, it should be possible to take the line out signal from Deck 1, feed it via a mixer or amp if necessary back to Deck 2, and so obtain increased flexibility in use of the level and Dolby functions.

During recording, blanks can be created using the non-locking Record Mute button, which does not stop tape travel but does remove the input signal. This is a particularly useful feature in view of another facility on Deck 1, the MS or Music Search. This detects blanks of 4 seconds or so between tracks and drops into Play mode when they're found.

Although the WX 110 has one specialised function, it operates well as a conventional cassette deck and in fact has a few facilities which are not often found on other hi-fi machines. These include Fine Control over Bias settings, with a handy chart of tape types to refer to; Continuous Play of Deck 2 followed by Deck 1; Microphone Mixing during record; Cue and Review on both decks; Full Auto Stop and Timer Standby recording mode, for unattended recordings in conjunction with a mains timer switch; fully automatic selection of tape type.

One feature that is lacking is a memory on the very small tape counter, which would have been useful if portions of cassettes are to be copied.

Conclusions

The WX 110 works smoothly, quietly and efficiently. Although the control layout seems a little daunting at first it's quite easy to use, and the design choices made with regard to Deck priority, Dolby switching and so on are logical.



Internal wiring.

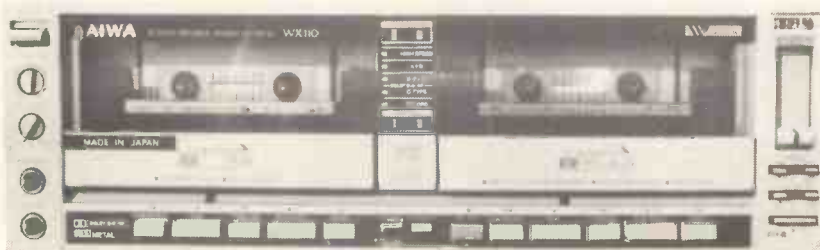
Some of the switches could be made more pleasant to use, and the placement of the meters on the cassette compartment lids is, though clever, a little unsettling as all your readings fly through the air on insertion or removal of a cassette. The VU meters are not of a particularly sophisticated kind and do not include Peak reading, and the damping on the rack-and-pinion mounted cassette lids is poor.

Quality of tapes copied in real time is very high indeed, virtually indistinguishable from the original. This isn't entirely the case with 'Quarter Time' copies; on headphone monitoring tiny dropouts and irregularities are just audible, but certainly not as bad as those to be found on commercial pre-recorded tapes any day of the week. The Dolby C system is claimed to give 20dB of noise reduction, and can be heard fading in through two stages when switched on. It's clearly an improvement on the B system, as long as tapes are both recorded and played back using it.

A final point is that the internal wiring is extremely untidy, a fact which could be improved upon without much additional cost. Construction otherwise is good.

Overall the WX 110 is almost entirely successful in combining standard and highly specialised facilities. A lot of thought has gone into the control layout and the machine will be ideally suited for many applications in the A-V studio, music studio or the home.

Mark Jenkins **E&MM**
Recommended retail price of the AD-WX 110 is £189.95 including VAT. Further details from Aiwa UK, 163 Dukes Road, Western Avenue, London W3 0SY. Tel. 01-993 1672.



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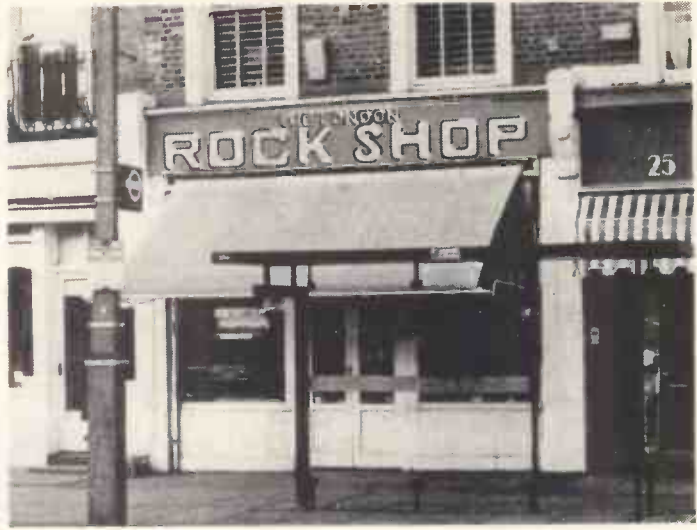
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Talking SHOP

London Rock Shop



In the recent past the LRS has developed into one of the major suppliers of electronic music equipment in the country. As stockists of all the major manufacturers, they seem to be able to offer reasonable prices together with an informed service, a combination which is highly attractive to the amateur or professional electro-musician. While teenagers saving for their first keyboard were playing with Casios and Roland pianos downstairs, it was possible to see two Prophet 5's being boxed upstairs ready for delivery to David Sylvian of Japan.

The small upstairs room of the shop was originally used for quiet demos of the more complex electronic instruments — guitar synthesisers, the Roland MC4 or 100M Modular System for instance. Customers for the latter units included Heaven 17 and Chris Carter, founder of Throbbing Gristle and now of CTI. As more musicians began to follow the lead of such innovators, and as synthesisers became more complex yet more popular, the top room gradually filled up with electronic equipment until it became the tightly-packed showroom it is today.

Partners Ed Jones and Jack Brand explained that another force then made itself felt. Home recording, particularly using Fostex equipment, suddenly took off, and the studio effects necessary for such work had to be stocked. The upper showroom reflects, then, three stages of development.

Along two walls are the guitar synthesisers — about ten different Roland controllers, including left-handed models — and Microcomposer/Modular system equip-



LRS partners Ed Jones & Jack Brand.

ment. In the centre, a stack of synthesisers including Memorymoog, Jupiter 8, Prophet and a couple of Minimoogs, and on the opposite wall a stack of studio equipment.

The policy is one of continual comparison and cross-checking, so almost all the effects are patched via an Accessit patch bay to a mixer and Bose or ElectroVoice PA. All the delay lines, reverbs, graphics and so on can be quickly compared by ear, and there's a very wide range of specifications and prices.

72

Reverbs range from the new Rooverb at £69 to the Fostex at £330, delays include the £1,000 Korg DDL which compares favourably with the much more expensive Lexicon, and there's the MXR Pitch Shift/Doubler, Dual 2/3 Octave EQ, Yamaha E1010 Analogue Delay, MXR Dual Limiter and many others.

There's a selection of monitors including the new powered Anchor speakers, and of course the Fostex A8 8-track machine itself. Ed Jones points out that not everybody works or needs 8-track, but it's become so reasonably priced now that it's a pity not to work at its full potential by using decent studio effects.



Moog Synthesisers.

The keyboard business is still expanding, and in the near future LRS expects to stock the Yamaha FM pianos, the Prophet 600, the Jupiter 6 and the new MC-202 Microcomposer to name but a few. An awareness of the interfacing possibilities of such equipment is of vital importance to the would-be purchaser, and link-ups on display include the TR808 drum machine triggering the Jupiter 8, the TR606 Drumatix driving the TB303 Bassline and SH-101 built-in sequencer, and the MC4 driving a set of 100M Modules including 16-step analogue sequencers.



Downstairs keyboard selection.

In the near future Apple and Amdek equipment will also be on show, and the LRS will have moved to the forefront of affordable computerised music. The new MC-202 Microcomposer should go some way towards achieving this aim, offering a built-in synthesiser for just over £300, and the MIDI interface incorporated in an increasing number of keyboards will give a much wider choice for musicians wanting to use a selection of equipment from different manufacturers.

Meanwhile downstairs, the Casio 7000 is selling well, together with the Juno 6 and 60, a wide range of Korg and Yamaha keyboards including the Electric Grand and the CS-01, and guitars including Tokai and Squier. The guitar market has picked up since these ranges were introduced, and there's a very wide choice of styles and finishes available. Also in stock, the Steinberger Bass at a mere £1,350.

The London Rock Shop is an unusual example of a music store that has the organisation of a studio equipment company, and not only keeps up with current trends but helps to set them. Ed Jones, Jack Brand and their well-informed staff can look forward to a prosperous future as synthesiser and micro-based music and the LRS develop hand-in-hand.

Mark Jenkins

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HOBBS MUSIC

ELECTRO-MUSICIAN

Rikki Sylvan

In an unassuming little backwater off London's Gloucester Road lies a scruffy black door, behind which hides the Sylvan Studio. In grander days the house itself would have been occupied by a single family, and what is now a small but well-equipped 8-track recording studio would then have been a maid's bedroom next to the scullery.

I had been working for some time as a recording engineer, freelancing around London's larger studios and had begun to think more in terms of production with the accent on studio synthesiser techniques, rather than merely engineering, rewarding work though that can be. It occurred to me fairly early on in my career that there was a need for a specialist synth. production facility that, unlike the Radiophonic Workshop, would be open to all who wanted to explore more advanced electronic music techniques.

Having worked in electronic music since my school days and having been involved albeit briefly with Stockhausen, Cardew, Birtwhistle et al, I felt myself ideally placed to put my audio-engineering skills to good use in building my own electro-music workshop. This plan had to wait many years until such time as circumstances allowed. I finally took the plunge in October 1982 and built an eight-track system around a grand old modular Moog Synth. that I've had for about six years. This instrument has been the mainstay of my technical and musical experimenting during that time and despite its age, is sufficiently large to compete with modern synth. trends and, in pure sound terms, to outshine most of the contemporary machines — it's definitely a Stradivarius Synth!

When I set about designing my workshop, certain major practical decisions had to be taken first. To begin with, should it be a regular small recording studio in the normal way but with the accent on synths, or solely a synth workshop, with the layout centred around the synth rig itself? What would be the special requirements of the latter?

The more I considered the problems, the more I realised that in order to achieve maximum flexibility and at the same time allow for future expansion as technological advancement and musical tastes developed, the studio system should be laid out as if the various pieces of equipment were all part of one massive modular synth.

In order to 'read' an unknown synth, the advice has always been to start from the outputs and work back to the generators (the easiest thing to get out of a studio synth is silence!), so the studio layout began with the monitors and the recording chain then worked back to the various sound-sources.

The first real problem was compatibility. When using synths from different manufacturers, the main problem has always been to make the various trigger and gate voltages interfaceable. Luckily the sequencer section of the Moog IIIc has a comprehensive trigger voltage interface which is simple and dependable. I decided that the only way to achieve maximum flexibility was to bring all the main signal paths up to a common studio patch-field, and to divide this into three discrete parts, corresponding to the three types of voltage used in signal generating, audio, DC control and trig./gate.

1. AUDIO: The audio part of the patch-field contains all the main audio inputs and outputs of the synth tie-lines, the mixing desk, eight-track and stereo tape recorders and the effects units — equalisers, com-



pressors, echo and delay etc, the same in fact as in any normal recording studio.

2. CONTROL DC: This is rather more complex, and fraught with technical gremlins, most of which can be exorcised by careful screening. All the main control voltages arrive at this section for re-routing to the various devices. It will now be possible for me to install VCAs into the mixing console to enable me to use, for example, a sequencer of any format to control certain re-mix sound parameters, rather than merely controlling the pitch etc. of an oscillator bank. This will offer limitless possibilities far beyond simple computer mixing — e.g. during re-mix to stereo, musical elements or control data in audio form (for later conversion to DC by envelope followers or Pitch-to-Voltage converters) could be programmed into the synths, to be replayed 'live' during the mixdown. Certainly many complex effects could be controlled by a comprehensive sequencer patched to the desk's VCAs. At the moment, I achieve this by inserting the IIIc's VCAs across the channels and controlling them from a cue track via a sequencer or whatever.

3. TRIGGERS: These are the life-blood of a studio synth system, and of course provide the most headaches. Each manufacturer has his own idea about how to generate the command signal that controls Envelope Generators (ADSRs) and envelope followers. The IIIc uses a switch-trigger (S-Trig.) that shorts a fixed voltage to ground, its own sequencer bank requires a voltage trigger (V-Trig) of +1.5 to 5V. Luckily this is just about compatible with Roland equipment which needs a V-Trig. of 4-15V, so hooking up a CSQ 100 was not too serious a problem via the IIIc Interface module. ARP gear on the other hand has two command signals, a V-Trig. to initiate the ADSR cycle and a separate gate voltage for sustain duration.

I've been able to standardise the various triggers on the patch-field to V-Trig., and by using the Moog's audio to V-Trig. converter, I can use a click-generator such as an LFO's differentiated square-wave or the TR808's closed hi-hat to make the click-track that my music depends on initially.

THE CLICK TRACK: This, for the uninitiated, is one track of a multitrack recording used in the early stages of a recording session as a time-keeping track or mechanical cue track.

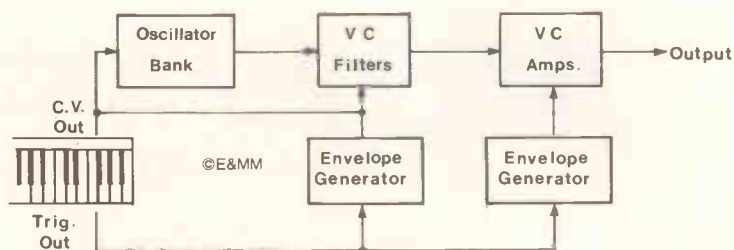


Fig. 1a The Synthesiser Chain.

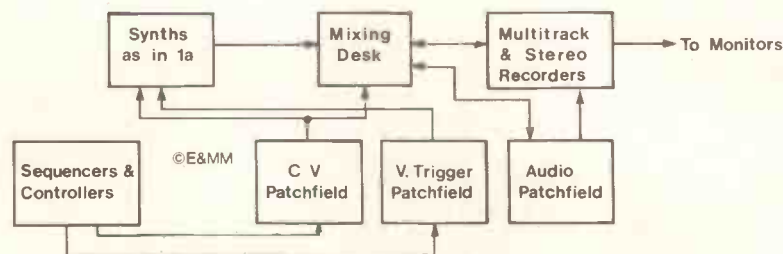


Fig. 1b The Studio chain.

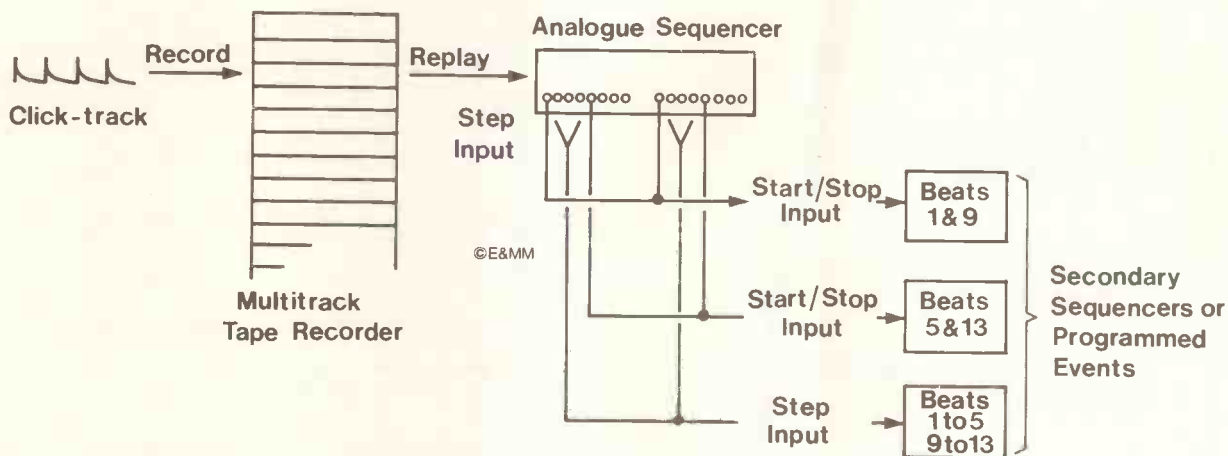


Fig. 2 The Click Track.

Most modern synths can read an audible click off tape and convert it into a trigger. The possibilities of click-track manipulation in electro-music are endless and would constitute a separate article, but just to whet your appetite, imagine if you will three tracks of your multitrack master whose backing-track (the basic rhythmic and melodic elements of a song) has been laid against various patterns of clicks generated from a rhythm-box or sequencer.

Track one would be the basic time-

keeper, say straight sixteenths, track two could give secondary accents to trigger, e.g. a sequencer loaded with a bass figure, track three could cue a chorus or 'middle-eight' pattern, or cue a second sequencer playing against the first.

Track one can be subdivided on replay via a sequential switch to count every four beats, for an example giving a command on beats 5 and 13, or an analogue sequencer could be stepped through the cycle of 16 by the click track simultaneously cueing a

second sequencer on beats 1 and 9... the various permutations are endless.

These techniques are only the tip of the iceberg and have taken no account of the new digital technology. I have hopefully explained my own system of rhythm and cue manipulation and thus the necessity for my electro-music studio layout to be the way it is. Space does not allow any discussion on the formation of the sounds themselves — that's a whole new story!

Rikki Sylvan

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COMPLETE KIT £79



The Tubes Video
EMI TVD 90 5005 2
53 minutes (Mono)

In a field that's relatively young, this production has already established itself as some kind of all-time classic. The Tubes, famed for their spectacular and often physically disturbing stage effects, were natural candidates for the dedicated video treatment, and this tape tests their talents and those of director Kenny Ortega to the full.

The tape's based on the 'Completion Backwards Principle' album, and opens with its plastic T-joint symbol hurtling through space and over a variety of weird landscapes. After this feat of graphics the first song, 'Matter of Pride' is a little ordinary, with split screen techniques applied to the band playing in a studio set. Things hot up quickly though, with 'Sports Fans' featuring the band as an all-American baseball team (backing singers as bobby soxers and guitars as baseball bats). 'Amnesia' and 'Mr Hate' show that large-scale sets, costume changes, superimposed graphics and pyrotechnics are all part of the Tubes' vocabulary, although by 'Mondo Bondage' the imagery is becoming extreme to say the least.

Much of the attention is directed towards lead singer Fee Waybill, who seems to enjoy being beaten up and strangled by scantily-clad women. After 'Mondo Bondage' the pace thankfully slackens, with three songs based on the world of business and publicity. As before, the music is

typical American AOR, rhythmic, powerful and with precision verging on the bland. There are some nice keyboard textures from a Prophet and custom expander system, some echoing Yamaha Electric Grand piano, synthesised bass and crisp guitar and drum sounds.

'Let's Make Some Noise' is a return to the straightforward studio set, perhaps in preparation for the climactic grossness of 'Weebee Dance' and 'White Punks On Dope'. In the former Waybill gets stripped and tied up (again) this time by a bunch of grotesquely-masked natives; the latter song comes after the credits as a sort of unasked-for encore, in fact starting with one of the band complaining "I'm sick of 'White Punks On Dope', do we have to do it?" The music here is pseudo-operatic, with heavenly choirs chanting 'White Punks On Dope' and Waybill presenting his best-known creation, the giant glam-rock star Quay. Visually the closing track is right over the top, with death, destruction and sudden death by chainsaw everywhere; after a slow fade-out it all starts again, which is reasonable enough because the Tubes are a very hard act to follow.

Sound quality throughout is fair, although it would be good to see this re-issued in stereo format to take full advantage of the synth effects. It's a pity the music is so typically American; a tape stuffed with nudity, violence and bad taste should perhaps have music with a rougher edge to realise its full entertainment potential.



The Stranglers
Video Collection 1977-1982
EMI TVE 90 1032 2
58 minutes (stereo)

Produced by Lindsey Clennell, this tape charts the progress of the Stranglers from their signing to United Artists in 1977 to 1982's hit, 'Strange Little Girl'. For those who believe that the increasing sophistication of musical and video technology has sapped the band's raw energy, it's a vital piece of evidence, although perhaps not a conclusive piece.

'Waltz In Black' accompanies a dire warning about copying, lending, editing, hiring, exchanging or otherwise abusing the tape itself, and is followed by '(Get A) Grip (On Yourself)'. This is performed in a darkened club and really gives an idea of the original Stranglers — Dave Greenfield's intricately powerful keyboards, Jean-Jacques Burnel's inimitably rasping Fender bass sound, Hugh Cornwell's fuzzed guitar and Jet Black's grinding drums stand out individually and collectively.

as on several other tracks his unusual and clumsy-seeming fingering style. Still, it gets results, and that's what counts. Interestingly the original film was barred from Top of the Pops because it was considered blasphemous.

'Nuclear Device' (also known as Wizard of Aus) introduces some interesting Wasp textures together with a silly film full of explosions and men with corks dangling from their hats. All good fun, if a little at odds with the socially conscious lyrics. 'Bearcage' (or GmbH) has a fantasy film which is half holiday camp, half prisoner-of-war camp, and 'Who Wants the World' introduces the theme of the Meninblack, first seen on The Raven.

The Meninblack, with their overtones of cosmic mystery and illuminatus — like conspiracy, represented a late revival of imagination in the band, but clearly couldn't be exploited forever. For anyone interested, they were originally the mysterious figures who engineered the permanent disappearance of UFO conspiracy theorist George Adamski.



'Something Better Change' and 'Straighten Out' are performed in a disused backyard, divided by two live outdoor performances, of 'Peaches' and 'Hanging Around'. Greenfield's mastery of the Hammond keyboard, apparently modified with a built-in phaser and other effects, is amply demonstrated, and some fabulous 'dirty' sounds are produced on Minimoog and electric piano.

'Five Minutes' is played in a cramped TV studio, the song's length being meticulously counted off at the bottom of the screen — not surprisingly, it's five minutes long. Next, the classic 'No More Heroes', accompanied by a collage of newspaper cuttings, photos and publicity shots ranging from Marilyn Monroe to Leon Trotsky. As if in answer to the question 'whatever happened to the heroes?' there's a recurring picture of Dave Greenfield with a huge Oberheim polyphonic modular system.

Up to this stage it's all been pretty straightforward, with just a few colour effects needed to back up the raw power of the music. 'Sweden', however, is accompanied by pretty un-funny hospital sketch, and on 'Nice'n Sleazy' the band's reduced to using a live performance accompanied by several highly suggestive strippers. Tut tut.

'Duchess' has a full-blown dedicated concept video, set in a church populated by sinister vicars with silver sunglasses. Greenfield's solo, supposedly on church organ, shows

After a brief absence, the Stranglers returned with 'Golden Brown', which could well have been by a different band entirely. Greenfield's harpsichord theme is catchy enough, and Cornwell's vocals are surprisingly smooth and light, but any relevance to the days of 'No More Heroes' is difficult to detect. The video is a lavish production apparently shot in Egypt and several large hotels, and of course it's ideal accompaniment for the music.

'La Folie', from the dreadful album of the same name, has French lyrics, a French setting and a generous dose of French tristesse. It sounds like, and let's face it is probably intended to sound like, the soundtrack for 'Un Homme et un Femme', and it's a relief to get on to the closing 'Strange Little Girl'. This, like 'Golden Brown', is a lovely little song, but so mellow that it puts the band's name in question. The visuals, of extreme post-punk fashions and hairstyles, are quite interesting though.

On the evidence of recent singles, The Stranglers should perhaps change their name to The Fairly Nice Blokes. However, word has it that their live performances are still as good as ever, and the video collection examined here is entertaining, varied and historically interesting. Sound quality is good even on the rougher live tracks, and the stereo soundtrack is of course a big plus, particularly on the more lavishly produced later tracks.

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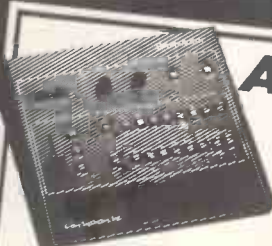
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1981

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.

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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

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1983

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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 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 Xolot! ★ Chris Franke ★ Frankfurt ★ Reviews: Jen Piano 73, 5 Casio keyboards, RSF Kobol Expander, Korg Poly 61, Aria Mics, BGW 700C Amp, Ibanez Effect Pedals, Tokai Flying V Guitar, Oric-1 Micro-computer ★ Projects: The Shaper, 842 Meter Bridge, Amdek Rhythm Machine Kit.



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UNDERSTANDING ELECTRONICS



The last article in this series described a simple envelope shaper for percussive sounds based on a VCA using the popular MC3340P integrated circuit. In this article a couple of alternative VCA circuits and a simple voltage controlled filter (VCF) using operational transconductance amplifiers will be discussed.

Voltage-controlled amplifiers

Operational transconductance amplifiers, like ordinary operational amplifiers such as the 741, have inverting and non-inverting inputs, but they have an additional input called the 'amplifier bias input'. The gain of the device is controlled by the bias current fed to this third input, and with this type of operational amplifier it is the output current rather than the output voltage which is governed by the differential input voltage.

Figure 1 shows the circuit diagram of a VCA which is based on the CA3080E transconductance amplifier. The circuit is powered from a single supply of about 9 to 12 volts, but R2, R3 and C1 are used to effectively give a third supply rail at half the supply potential. The non-inverting input of IC2 is biased direct to this central supply rail, and the inverting input is biased to it via R4. The amplifier is used open-loop, and there is a substantial voltage gain from the inverting input to the output. R6 is therefore connected at the input and in conjunction with R4 it gives about 40dB of attenuation so that the maximum voltage gain of the circuit is reduced to approximately 6dB (two times). R6 also boosts the input impedance of the circuit from only about 100 ohms to a more useful figure of just over 10k. The low value given to R4 is necessary to prevent the circuit from having an excessive noise level. C2 is merely a DC blocking capacitor.

Although it is the output current of IC2 and not the output voltage that is governed by the input signal, by simply adding a load resistor at the output, the output current produces a proportional voltage across this resistor, and the circuit acts as a voltage amplifier. In this circuit R5 is the load resistor. Similarly, although it is the bias current fed to the amplifier bias input that determines the gain of the amplifier, by adding a resistor in series with this input the bias current becomes proportional to the applied voltage, and the circuit effectively becomes voltage rather than current controlled. R7 is the resistor

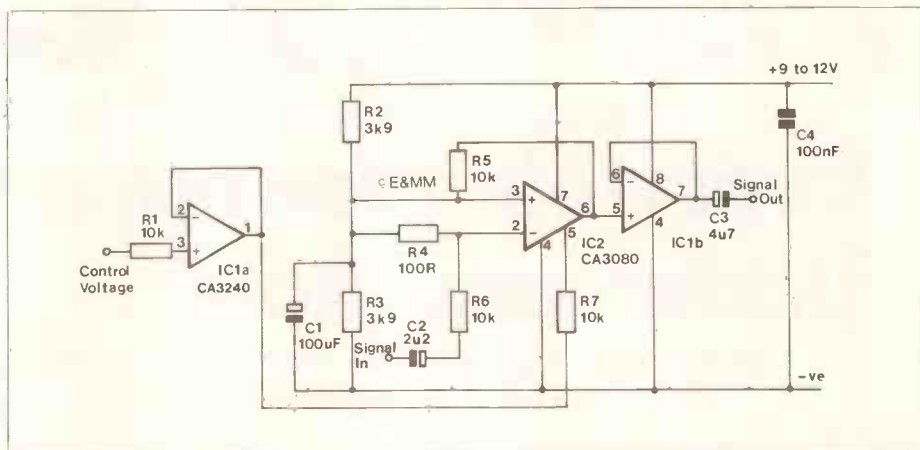


Figure 1. VCA using a CA3080.

which performs this function in the circuit of Figure 1.

On the face of it this VCA interfaces very well with the control voltage generator circuit described last month since the gain of the circuit is at maximum with a control voltage roughly equal to the positive supply potential, and reaches its minimum figure with a control voltage of just a few hundred millivolts. In fact the VCA will not operate properly if driven direct from the control voltage generator due to the fairly low input impedance at the control input. However, this is overcome by adding a buffer stage ahead of this input, and this is the function of IC1a. R1 is a protection resistor.

The output impedance of IC2 is quite high, and IC1b is used as another buffer amplifier which gives the unit a low output impedance and ensures that there is minimal loading on the output of IC2. Note that the CA3240E integrated circuit has a MOS input stage, and the appropriate handling precautions should be observed when dealing with this device.

The circuit can handle output levels

of up to about one volt RMS or so without clipping and producing severe distortion. At full gain the output noise level is around 1.5mV RMS, but the circuit will normally be adequate in this respect, and as the gain of the circuit is reduced the output noise falls by a roughly proportional amount. The circuit draws a supply current of approximately 9mA.

The LM13600N is in many respects similar to the CA3080E, but it incorporates a few useful improvements. The most obvious of these is the inclusion of two transconductance amplifiers in the device, and these have common supply terminals but are in other respects independent of one another. Obviously in many applications the second amplifier will not be required, but the LM13600N is not particularly expensive. Also, it is often possible to use the second sections of the amplifier as a simple voltage amplifier or buffer stage if it is not needed as a VCA.

Other features of the LM13600N are lower noise level, built-in output buffer amplifiers, and linearizing diodes

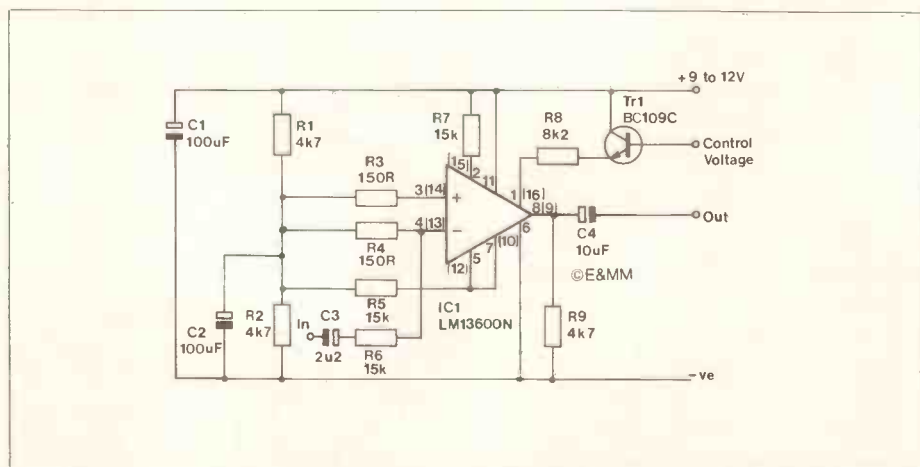
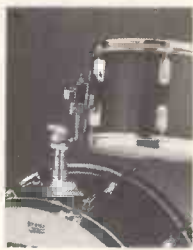


Figure 2. VCA using an LM13600.



Sound Shaping for Percussion

Robert Penfold

which enable a higher output level to be achieved before the onset of severe distortion.

A simple LM13600N based VCA circuit is shown in Figure 2, this being similar to the circuit of Figure 1 in many respects. The pin numbers in brackets are for the other section of the LM13600N.

Pin 5 is the output of the trans-conductance amplifier, and pin 7 is the input to the output buffer stage. The latter is actually just a Darlington Pair emitter follower stage which needs external load resistor R9. Tr1 is used as a discrete emitter follower buffer amplifier which gives the necessary boost in input impedance at the control input of the circuit. R7 provides a bias current to the linearizing diodes of the device.

The circuit can handle input levels of up to about 2 volts RMS before serious distortion is produced and the maximum voltage gain is approximately unity. The audio output noise level is only about 200uV, and the signal to noise ratio of the circuit is excellent. Current consumption is approximately 3.5mA.

Voltage controlled filter

As the volume of a sound decays it is normally accompanied by a change in the frequency components of the signal. Usually the higher frequency har-

filter is just above the upper limit of the audio frequency spectrum, but as the control voltage is reduced the effective resistance of IC2 increases and the cut-off frequency is brought down through the audio frequency range. As the control voltage approaches zero the resistance provided by IC2 becomes so great that there is no significant output from the circuit. Like the other circuits described in this article, the maximum attenuation provided by the circuit is extremely high indeed at about 90dB or more.

Practical simulation

Over the past three issues we have considered a number of circuits which can be used in a variety of combinations to produce a number of different effects. Brief details on how to use various arrangements have been given with each circuit, but a recapitulation should prove helpful.

The very simple arrangement shown in the block diagram of Figure 4 gives bursts of high frequency noise which simulate cymbal type sounds. Shorter bursts of noise give a sort of 'clap' sound, and long bursts of pink or red noise provide sea or wave type sounds. An interesting falling pitch noise sound can be produced by using a white noise source in place of the blue noise generator, and using the VCF circuit

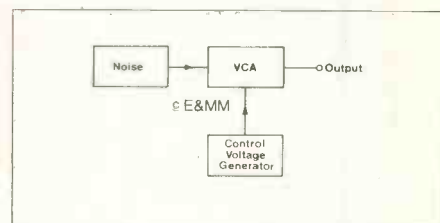
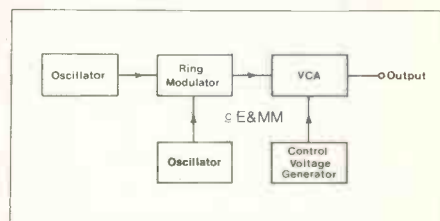


Figure 4. Configuration for noise type sounds.



able to produce a range of more complex sounds, and the arrangement shown in the block diagram of Figure 5 permits metallic sounds to be generated. The basic arrangement shown in Figure 5 only gives the sum and difference frequencies of the two tone generators at the output of the ring modulator, and this gives a bell-like output if the two tone generators are set at almost the same frequency so that the difference frequency is no more than a few Hertz. Bear in mind that the main output will be the sum frequency which will be at double the pitch of the tone generators, which in consequence should be set at half the required pitch. Good metallic sounds can also be produced if the tone generators are set some musical interval apart, but they should again be set slightly off-tune in order to obtain the best effect, and the effective pitch of the output signal will be at the sum of the two input tones.

A useful refinement to this arrangement is to have a mixer between the ring modulator and the VCA so that the output of one tone generator can be added to the new frequencies generated by the ring modulator, or unbalancing the ring modulator is a crude way of achieving much the same thing. When used in either of these ways it is probably best to have the tone generator which is fed through to the output as the main signal which determines the pitch of the output, and use the ring modulation to add a suitable amount of non-concordant signals to give the desired effect.

This is really only a guide to some of the effects that can be produced, and with a little experimentation it is possible to produce other percussive sounds such as wood-block sounds and some which have no mechanically generated counterparts.

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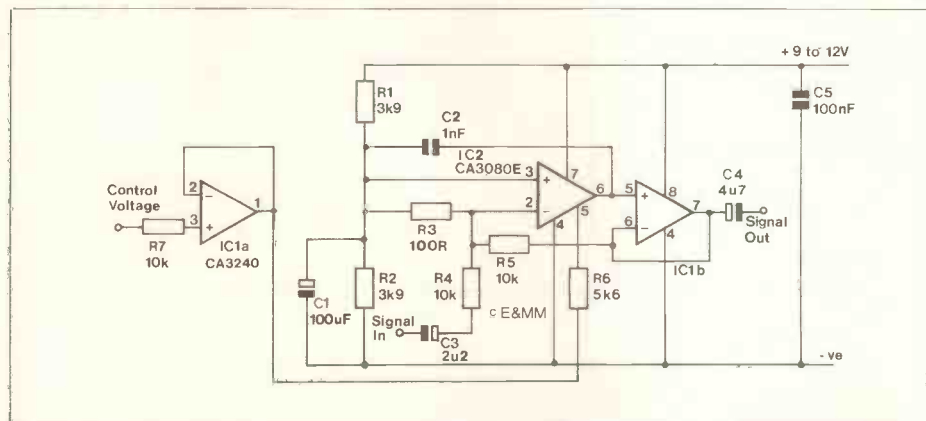


Figure 3. Simple low pass VCF.

monics decay more rapidly than the lower frequency harmonics which in turn decay more rapidly than the fundamental signal. This can be simulated electronically using a voltage controlled low pass filter such as the one shown in the circuit diagram of Figure 3.

Here the CA3080E (IC2) is effectively used as a voltage controlled resistor which forms a simple single stage lowpass filter in conjunction with C2. With the control voltage at or near maximum the cut-off frequency of the

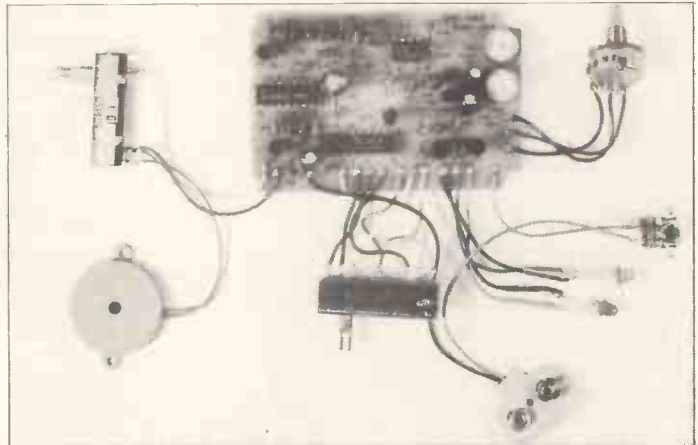
instead of the VCA.

Simple drum sounds can be produced using the set-up of Figure 4 but using a sinewave oscillator instead of a noise source as the signal source for the VCA. The operating frequency of the oscillator should be fairly low of course, and it is essential to use a sinewave signal or some other waveform which has a reasonably low harmonic content. Using a high frequency oscillator gives a sound which is similar to that produced by a triangle.

By using ring modulation it is pos-



All the parts ready to be checked off.



Controls, LEDs, Buzzer and battery snap connected to the PCB (Steps 2-8).

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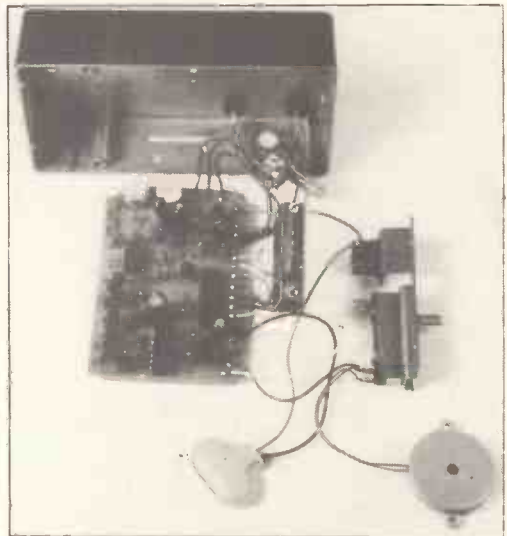
A timing reference is essential when recording a piece of music, to help the musician keep each of the constituent parts in sync.

The Amdek Metronome can provide this reference with an accurate 40-208 beat range. Six timing patterns are provided which cause a downbeat 'chime' to occur on the 2nd, 3rd, 4th, 5th or 6th beat. This can help to establish 3/4, 4/4 or even 5/4 rhythms. Down beat is indicated with a red LED while beats are indicated by a green.

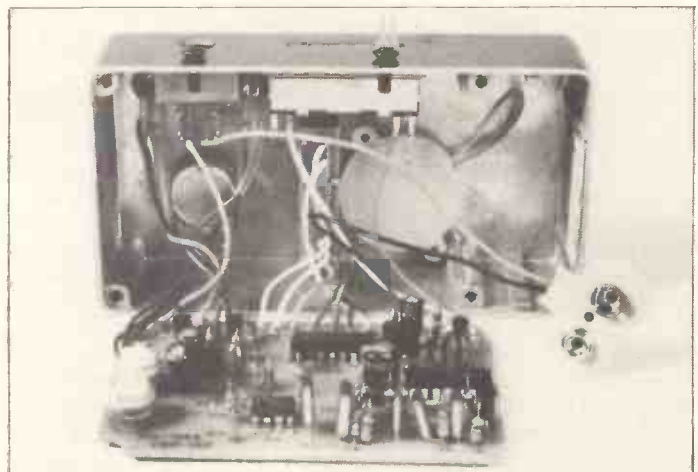
The Kit

The Metronome is supplied in a bubble pack, complete with all the parts necessary for its construction. Tools required to do this are: a 15-30W soldering iron; wirestrippers/cutter; crosshead screwdrivers and a small pair of pointed nose pliers. All the connecting wire and solder required is supplied in the kit.

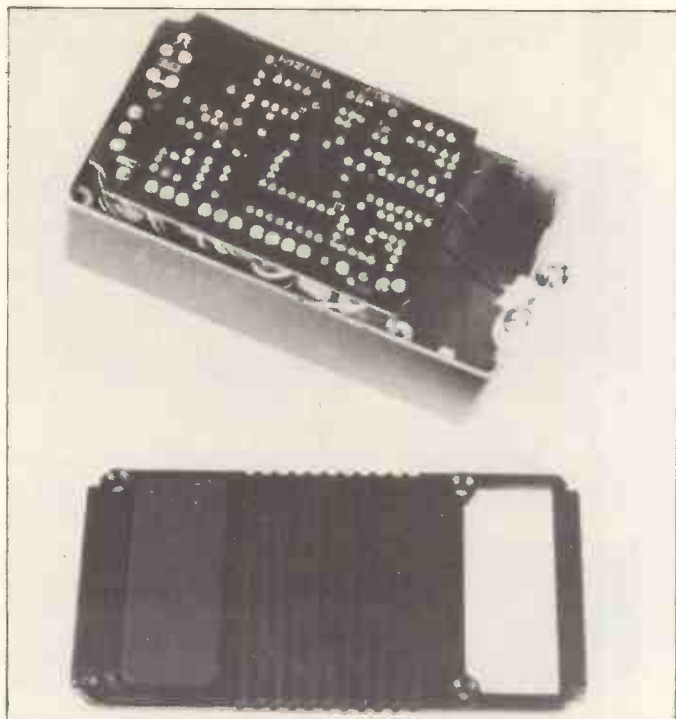
Parts should be laid out on a clear surface and checked off against the list in the assembly manual. Once this has been done assembly of the unit can be started.



Slider pot and switch connected to the subchassis and LEDs fitted into the case (Steps 9-11).



Subchassis, Controls and Buzzer fitted to the case (Steps 12-16).



PCB fitted and insulation added to the case (Steps 17-20).

The first steps involve connecting wires to the controls. Three leads are cut to length, stripped, tinned and then attached to the Tempo control. Another seven leads are prepared and attached to the beat selector switch. A further two leads are prepared and connected to the volume control, along with the leads from piezo-electric buzzer (Steps 1-4).

Power connections are made next by cutting, stripping and tinning the PP3 battery snap connector and a length of wire, which are then attached to the on/off switch. The two LEDs have leads already attached, but are prepared by twisting their black leads together before being tinned.

PCB preparation is next. During the flow-soldering process used in manufacture of the PCB, the eyelet holes have been partially filled with solder. However, more solder should be applied, where necessary, to make a raised dome on each eyelet. This helps make a clean joint when wires are attached.

All the wires, when prepared, can now be connected to the board, as shown in the assembly manual. This completes all the soldering-iron work (Steps 5-8).

The slide control and power switch are mounted on a small subchassis using four M2 x 3mm screws — a miniature crosspoint screwdriver is required here. Amdek suggest that the dust cover for the slider is stuck on top of the screws but it appears to be better to attach it first, then put the screws in.

Two holders for the LEDs are clipped into place and the LEDs inserted — not forgetting to put the locking rings over the LEDs first. The locking ring can now be used to secure the assembly.

After the detention key stud has been broken off the Tempo pot it can be mounted on the case and secured using a nut and washer. The beat selector slide switch can also be attached after sticking the dust cover to the inside of the case. Two M2.6 x 4 screws are used.

Another two screws are used to fix the subchassis to the casing. The ones supplied, however, are M3 x 10 countersunk which seems to be a mistake, since, not only are these too long but the holes in the case are not countersunk. This results in an untidy appearance not usually found in

Amdek products. To rectify this you should either carefully countersink-drill the casing or use suitable pan head screws.

The piezo-electric buzzer is attached to the casing using a double sided adhesive pad. It should be placed so that the hole in the buzzer aligns with the one in the casing.

All the knobs can now be fitted, aligning the Tempo knob with the letter 'E' in EMK-100. Once a battery has been inserted the unit can be tested. (Steps 9-17).

The beat rate is set by two pre-sets on the board which will have to be set for accurate operation. VR1 adjusts the lowest beat frequency and VR2 the range. To calibrate the unit set the tempo rate to 180 on the dial and select a beat of 3. Using a watch or timer count the number of downbeats in 60 secs and adjust VR2 for 60 or one each second. Then set Tempo rate to 60, beat to 0 and repeat the process using VR1. Since the pre-sets are interactive adjustment will have to be continuously repeated until accurate calibration results. An accuracy of $\pm 3\%$ can be obtained in this manner.

When calibrated the unit can be finished by fitting the PCB into the case using a piece of sponge to insulate it from the controls. An insulation sheet stuck to the base panel also prevents any shorts on the solder side. Once the rubber pad has been attached to base the case can be screwed together (Steps 18-20).

The Circuit

A circuit diagram for the Metronome is shown in Figure 1.

The main clock is based around IC1, a 555 timer. The supply to this chip is provided by the series-pass regulator Q5, D5, R22 and C11. This makes the timing essentially independent of battery voltage levels and temperature changes. Timing is set by the tempo pot, VR2 and VR1 which allow C9 to charge up to the discharge threshold.

The output at pin 3 drives the green LED via Q5, the beat voice via C7 and the downbeat counter, IC2, via Q4. This counter is a ring counter with 8 outputs, each output going high on

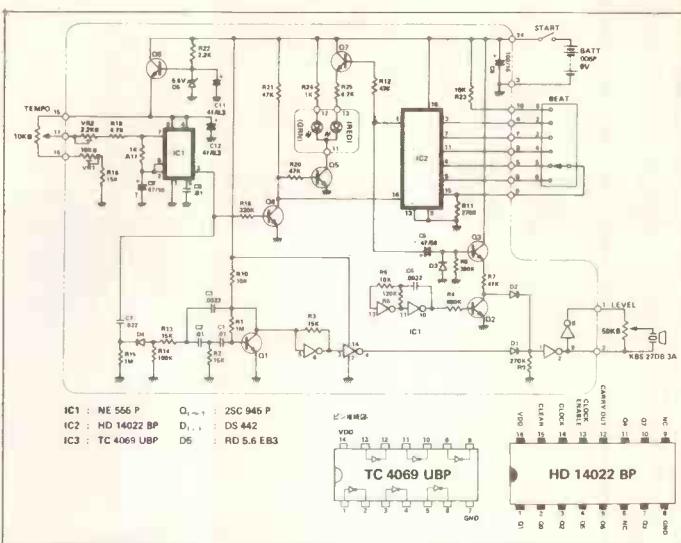


Figure 1. Circuit diagram of the Metronome.

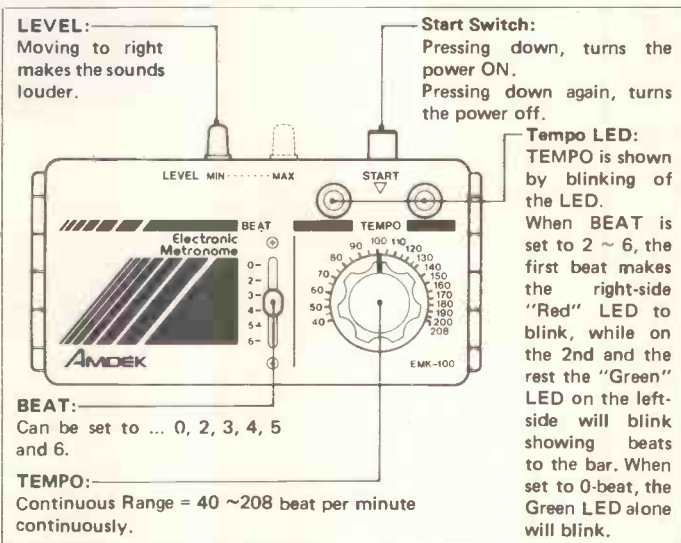


Figure 2. Panel description.



The completed Metronome.

a clock pulse. The reset of the counter is set by the beat slider switch. The Q1 output, pin 1, provides the downbeat signal which drives the red LED via Q7 and the 'chime' voice via C5.

The 'beat' voice is based around Q1, and the 'chime' voice is generated by two CMOS gates and buffered by Q2. These are mixed via D1 and D2 and fed to the piezo buzzer, driven by two CMOS invertors, the level being adjusted by the slider pot.

Modifications

Some modifications which can be made are listed below. These should be carried out with care and may effect any guarantee supplied by Amdek.

Mod 1. To change the pitch of the 'chime' voice, C4 can be replaced. A lower value will produce a higher pitch and higher value will produce a lower pitch.

Mod 2. To change the decay rate of the 'chime', R8 can be replaced. A lower value will shorten the sound and a higher value will lengthen it.

Mod 3. A 5V positive going clock pulse approx 35mS in length is preset at pin 14 of IC2. This could be connected to a jack socket, fitted by drilling a hole in the case, allowing the metronome to become a master clock to drive a sequencer, arpeggiator or rhythm machine — and therefore allowing accurate tempos to be set.

E&MM

E&MM's special offer price for the Amdek Metronome Kit is £28.00 inc. VAT and P&P. Please order as: Amdek EMK-100.

Loco Box Pedals

The demand for pedal-sized guitar and keyboard effects seems to continue unabated, and the latest answer to this demand comes from Aria. Their Loco Box range of effects comprises eight models, of which we examined four, together with an AC adaptor and the ECB-50 Effector Carrying Board, which holds up to five pedals and powers them from a mains outlet.

FL-01 Flanger

The Flanger is fairly typical of the range, its construction being common to all the other pedals. It comes in a die-cast metal housing sprayed matt black, with legending and knob caps in apple green. The foot-switch is a spring panel occupying the lower third of the body, with a positive action and a faint mechanical click as it operates. The chromed input and output jack sockets are identified on the switch mechanism itself; a red LED indicates that the effect is in operation, and as usual power is cut when the input jack is removed.

The 9V DC input on the rear panel has the centre pin as earth; access to the battery compartment is by removing a large knurled screw, which could be done without tools if only finger-tight. Both the screw and the compartment cover come free, however, which surely could have been improved upon.

The base of the pedal is rubber-padded for grip, and is removed via four cross-head screws. The PCB is insulated by a card sheet, but isn't screwed down at all. Certainly this makes for easy access, as all the connecting wires go to one side of the board, which can be simply swung to one side. Miniature pots are used on the control functions, and



overall the construction is reminiscent of the Amdek effects range.

The Flanger circuit is based on a single delay line with three presets available on the board for minor adjustments. It's claimed to give 65dB signal to noise, and in fact the noise produced is quite acceptable for stage work, while not being up to studio standards. There are four controls — Speed, Depth, Manual, and Colour. Speed ranges from very slow — about 1 cycle every 30 seconds — to a fast vibrato. Depth interacts with the manual control, which sets the centre of the flanging cycle to an increasing degree as Depth is decreased. Colour ranges from a very even flanging effect to a highly resonant effect, while falling short of actual oscillation.

In use the Flanger is easy and positive to switch in and out, the LED is clearly visible over a wide angle, and the volume drop caused by use of the effect is small. Stated input impedance is 100K ohms, output

impedance 5K ohms, weight 442g. Recommended retail price including VAT is £56.42.

AD-01 Analogue Delay

The AD-01 has a dark green finish and three controls, otherwise being similar to the Flanger. Power requirement is again 9V, the circuit being based on a single delay line and being quiet enough to suggest some form of compansion in use. The controls are Mix (between dry and echo), Delay (from 20-300mS) and Repeat (from 1 to feedback).

At very fast repeat speeds a nice metallic reverb is obtained, while the slower echoes and feedback are also useful; again the switch action is positive and the LED is clearly visible. Input impedance is stated as 1M ohm, output impedance as 220 ohm, Gain as 5dB, signal to noise as 70dB, weight 427g.

Recommended retail price including VAT is £82.38.

CH-01 Stereo Chorus

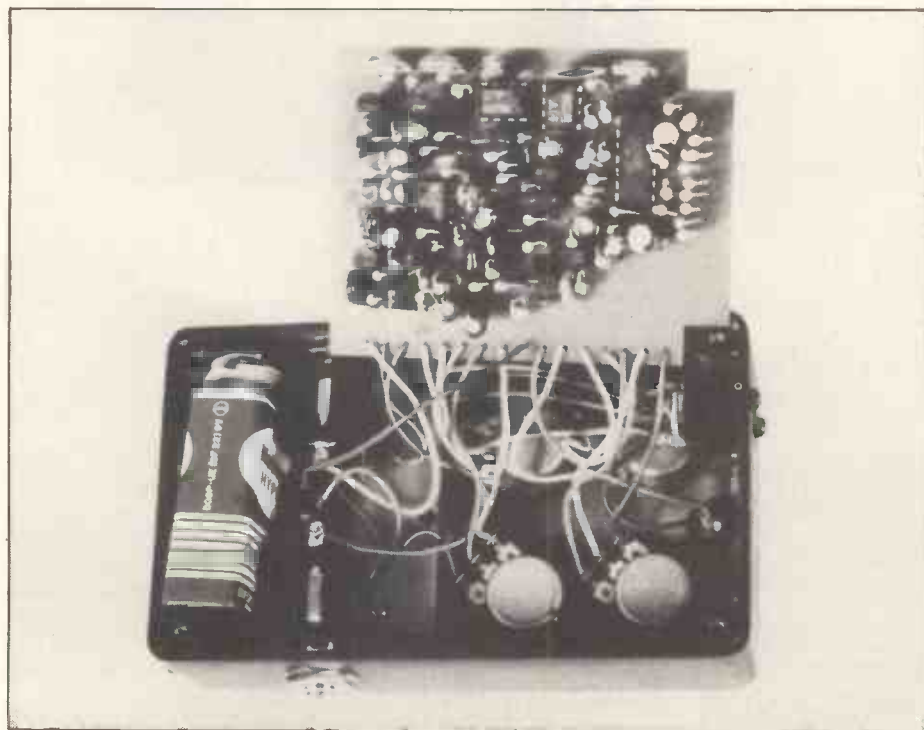
The Chorus has a blue finish and only two controls, Speed and Depth. It has two outputs, Direct and Chorus, in order to set up a stereo sound. Power is again 9V, a single delay line being used, and the stated signal to noise ratio is 75dB, although this seems a little exaggerated since the pedal does produce a significant 'swooshing' sound.

Combinations of the two controls can produce a very slow shifting effect, a faster detuned chorus, or a tremolo/vibrato effect. Nothing excessive, but equally useful on guitar, strings or Casio perhaps to give the sounds a certain richness and internal movement. Input impedance is stated as 1M ohm, output impedance as 1K ohm, Rate as 0.2 to 10Hz, weight 423g.

Recommended retail price including VAT is £45.62.

DS-01 Distortion

Clearly intended for guitar, the use of a distortion box on piano, organ or even synthesiser for 'dirty' sounds mustn't be neglected. The DS-01 has three controls — Level, Distortion, and Tone, and gives a wide range of effects. The circuit is simpler than the other effects, being based on a single op-amp IC, and this is reflected in the lower



FL-01 Flanger opened up.



Internal construction of Loco effects.

retail price. Finish is red, power is again 9V.

As usual the Distortion control sets the amount of 'fuzz' effect, the level control being used to preset the volume at which the distorted sound is required to appear — louder for lead lines, quieter for fuzzed chords perhaps. The DS-01 tone control is a little unusual, and appears to be of a mild band-pass variety. It doesn't actively boost

bass or treble, but can place the emphasis on either of them for a variety of sounds from mellow to extremely piercing.

The fuzz effect is a little better than that produced by many similar pedals. It's very warm and clean, resists the tendency to 'break up' as a note decays, and is capable of a striking glassy effect when applied to

single coil lead pickups. Although the maximum settings don't produce instant screaming feedback, the DS-01 would of course be used in conjunction with guitar amp controls normally, and together these should provide all the distortion effects desired. Input impedance is stated as 1M ohm, Signal to Noise as 85dB, weight 419g. Recommended retail price is £34.75 including VAT.

Other Loco Box effects are the OD-01 Overdrive at £32.76, offering Level and Drive controls; the CM-01 Compressor at £32.74, with Compression level and Sensitivity controls; the PH-01 Phaser at £37.96, with Depth and Speed/Width controls; the GE-06 Graphic EQ, giving plus or minus 18dB in 6 bands for £42.06; and the previously mentioned ECB-50 Effector Carrying Board, which supplies mains power to up to 5 effects and includes a guitar tuning by-pass facility.

Mark Jenkins

E&MM

Loco Box effects are distributed in the UK by Gigsville, Phoenix Way, Heston, Middlesex. Tel: 01-897 3792.

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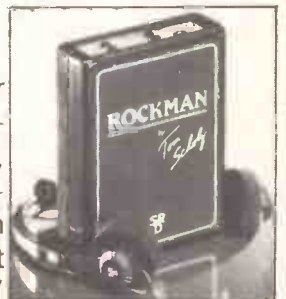
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CASSETTE REVIEW

CASSETTE REVIEW is always interested in music from E&MM readers whether recorded live, on a couple of cassette decks, in a professional studio or by any intermediate method. We try to give at least a mention to every tape received, although with limited space and scores of tapes coming in it's best to have a little patience!

Send one cassette, mono or stereo, clearly marked with your name and address on the cassette itself and preferably in its

plastic case. Include a covering letter giving full information on instruments and recording method used, and a relevant colour or black and white print, and send to E&MM Review, 282 London Rd., Westcliff-on-Sea, Essex SS0 7JG.

Unfortunately it's no longer possible to return tapes or photos, but readers should note that our Electro-Music compilation cassettes will contain full details of each selected track and will ensure international

promotion of our readers' music. Tapes are accepted on the understanding that permission has been given for the use of a track or part of a track if space permits, with copyright remaining with the contributor.

Scores below refer to musical content, recording technique, packaging and promotional material and hi-fi quality respectively, and are out of a maximum of ten in each case.

Tape of the Month



Alexander Goldscheider

(Middlesex) 'Synthesised Themes for a One-Man Band'. Born in Prague, graduate of the Charles University and with long experience as a songwriter, producer and synthesist, Alex Goldscheider hopes to continue his work in film, TV and radio music in the UK. Certainly his ability to do this is clear from this tape, but on the evidence here he could aspire to become highly commercial in the same way as has Jean-Michel Jarre.

The range of styles covered is enormous, although the 8-16-24 track format, Jupiter 4, PPG, Prophet, Kobil and custom sequencer line-up ensure an even, rich texture throughout. 'Jupiter', here in short and extended mixes, is a thumping almost

military anthem with panned percussion, handclaps, bell sounds and reverberating bass sequences. 'The Pan Flute Theme' is a Zamfir-type composition with slow and up-tempo passages - the breath in the pipes can even be heard - while 'On the Run' uses a similar, naggingly acoustic lead sound. Other tracks neatly sew up the Morricone style of Spaghetti Western music, complete with whistles and frantic voices, Larry Fast's orchestral electronics, and the whole genre of the 30-second jingle. There's a touch of blandness throughout which makes this music ideal for film soundtracks; if this can be removed, Alex Goldscheider could go even further than he's already come. **Music: 9 Production: 10 Presentation: 7 Tape: 9.**

Sprate Research (London). A very full tape from John Clift on guitars, Casios and electronics, with Averil Fountain on vocals, Mike Moore on bass, Chris Kepczyk on guitar and vocals, and a large number of self-constructed pieces of equipment. The first interesting point is that it's all done on cassette recorders, which is clearly sufficient for Casio/tape loop pieces such as 'Ex Ver Tape Loop' but constitutes quite an achievement for the more complex songs such as 'The Nicotine' and 'Honi Soit'.

The basic style is a sort of avant-garde pop music, with touches of Joy Division and early Roxy Music, although neither of these comparisons really gives an idea of the doomy

Averil Fountain



John Clift

The Katz (Shrewsbury) 4 tracks. Twig; vocals, Rickenbacker 480 rhythm guitar, Davoli synth. Chris Wootton; Rickenbacker 4001 stereo bass, vocals. Danny Treherne; Anniversary Strat lead guitar, backing vocals. Paul Rowley; Maxwin drums. Russell Parry; Management. The Katz tape is particularly interesting because most of the tracks were recorded live; it's good to see for a change a hard-working band who aren't confined to the studio and who use effects and echo creatively on vocals, synthe-

siser and guitar. The band are trying to expand beyond the Midlands club circuit, where they've played about 50 gigs, and imaginative management has secured advance bookings for them as far afield as the Orkneys. The infectious sense of fun in their pop music - a little like the Jam, but less serious, with modern touches from the synth - could take them even further than that.

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



Trevor Wishart (York) 'Red Bird'. Wishart's work in avant-garde music with the likes of Brian Eno has established him as one of the UK's better-known innovative composers. 'Red Bird' is a tape montage, largely of animal (including human) sounds, bringing to mind Basil Kirchin's 'Worlds Within Worlds'. Sounds are slowed, reversed, and occasionally cut into loops to give a passing sense of rhythm; there's no overall sense of form or development, although there

are large numbers of tape tricks as one sound turns into another midway. Closing on a final high-pitched bird-call, it's clearly a work of great skill and imagination, but not marked in further detail here as so few conventional musical standards apply.

technological feel of many of the songs. Imaginative use of the VL-1 as a sequencer and effects source, and of echoes to both thicken sounds and vocals and provide musical effects in themselves, help to overcome the limitations of the recording system and maintain interest over a long set which was produced throughout 1982.

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

Sea of Wires (Coventry) 'Beyond The Edge of Tomorrow'. Another excellent tape album from Chris Jones (Korg MS20/SQ10) David Brownett (occasional guitar) and the mysterious 'T' (Yamaha CS30). They may still be stuck in the groove of the middle seventies, but these lengthy improvisations, with tinkling sequences, swirling strings and 'space sounds'

still have a certain attraction. It's pointless to say that the T. Dream/Klaus Schulze influences are obvious; that's exactly the sort of music S.O.W. want to play, and they do it wonderfully.

Music: 7 Production: 7 Presentation: 7 Tape: 7.

Years On Earth (Northampton) 'Site'. Y.O.E. have developed an impressive style of sparse, concrete music over the last couple of years, and back this up with excellent presentation and apparently with a good knowledge of electronic design. Much of their equipment consists of custom-built modular units with which they produce complex cross-modulated abstract sounds, mixed on tracks like 'Jackal Zealots' and 'I Can't' with tapes and voices.

There's also wide use of sequencer patterns utilising the sort of sounds that can only be obtained using the patching possibilities of modular systems. Stereoecho is used creatively to bounce sequences and sound effects about, and touches of conventional instruments help to enrich the overall texture.

Most of the 17 tracks on 'Site' are fairly gloomy, and this is well reflected in the shots on the black and white photographic paper insert. Overcast skies, stark industrial images and the slow movement of wind-blown water are exactly the images conjured up by Y.O.E.'s music.

Music: 7 Production: 8 Presentation: 8 Tape: 8.



Martin Howard Naylor (Middlesex) 'Technobash is Blown and Sinks'. Martin Naylor's 'electronic opera' on video tries to do what Pink Floyd did in 'The Wall', and succeeds in creating a similar sense of uneasy horror. Made in black and white at Middlesex Polytechnic, it's set largely in a single studio with a sense of space created by inserting land-

scape photos, paintings and abstracts.

Barry Aulton and Nial Brooks play the figures from the rock hero's life, while Naylor controls various electronic squeaks, rhythms and burbles from the background. Technobash himself, the tormented product of an uncaring rock culture, wrings appropriately agonised sounds from a

Kevin Akitt 10 tracks including a version of 'Amazing Grace' relying largely on the Casio VL-1 and so ultimately a little lacking in variation. Kevin's now gone on to more sophisticated things, however, which we'll look at next time.

Easy Listening Recorded live using Casio and Yamaha portable keyboards, E-H drum machine and guitars/effects pedals, these 6 tracks combine Gary Numan, Joy Division, Karlheinz Stockhausen and Kid Creole, which at least makes life

interesting despite the nondescript sound quality.

Paul Kelday After 'Psi' (reviewed July '82) Paul has gone on to 'Centuries', a well-produced album of totally abstract music played on Korg MS50 which succeeds because it's not harsh or atonal. One for Stockhausen or Jean-Baptiste Barriere fans.

Simon Greenwood Electronic Communication Corporation. Simon takes his inspiration from Cabaret Voltaire, Bill Nelson, The Passage and Eyeless in Gaza, says he'd never heard of Klaus Schulze until E&MM's cover article and tries to ignore Tangerine Dream. It shows; most of the tracks here are straightforward synthesised bass, lead and splashes of percussion and tend towards the morbid.

Martin Rawlinson records as The Ftuts and has produced a tape of sparse impressionistic synth sounds overlaid by echoed, almost operatic vocals. Closest comparison is Arthur Brown's work with Klaus Schulze — very atmospheric.

Paul Kirner The Orchestral Sound of... Tracks for Technics SX-U90 organ including Wonderful Land, Teistar and Apache. Rich string sounds and auto-arpeggios much to the fore.

Burning Oscillators consist of Daryl and Laraine Crosby who do some very strange things with a home-made synth incorporating E&MM signal mixer, twin syn drums and Clef Master Rhythm. Sinister echoed vocals, concrete sounds and percussive effects dominate; there's a whole 90 minutes of this because "if you like it, you have something substantial to listen to. As Klaus Schulze says, the artist is anybody who has something creative to show. Perfection is only a question of quantity, not quality".

PJ Tedstone Synthesiser music in various styles, from atonal to gently rhythmic, to the very up-tempo and boppy 'Alien Attack', a very interestingly varied selection of effects considering it's all done on a Tandy/

Video Cassette

miked-up and echoed acoustic guitar, while staccato piano notes from behind add to the surreal atmosphere. The quality of the soundtrack itself is poor, with automatic level control very much in evidence as hiss and rumble shoot up between musical phrases; however, the music's pretty abstract so in a sense this doesn't matter too much.

Video techniques used are fairly basic superimposition, cuts, shaky pans and zooms and an occasional picture key blending of two shots. Inevitably the close consists of the hero's violent death, symbolically strangled by the very culture which produced him. Overall it's an unusual production, and difficult to distinguish the technical problems from any genuine attempt to create an atmosphere of decay and disorder. We hope to be able to review more readers' videotapes as soon as possible.

Music: 5 Production: 6 Presentation: - Tape: 5.

Moog synthesiser, which can't be that bad after all.

Violence Through Volume are Andrew K. and Paul Atridies (Pinhas or Frank Herbert fans will spot the pseudonym), together with Stephen W. on occasional bass. An unusual approach to the Drumatik (playing by hand rather than programming), an ethnic rhythm backing and disappointingly dull sound quality (for a Teac 144 Portastudio) characterise the four tracks.

Chapter 29 have sent in a live tape recorded on a portable cassette player at Brixham Fish Quay last summer. The quality's pretty bad but the audience seems to have enjoyed the avant-garde/punk tracks by Ian Churchward (guitar), Jerry Brimicombe (Wasp), Philip Andrews (guitar, percussion) and Liz Honeywell (vocals, percussion and Wasp) and Dave Clifford (bass). New member Shelley James has helped out on their recent 8-track work which we look forward to hearing.

The Floors have turned out a very convincing demo from King Studios 8-track in Borough Green, Kent. R.T. Austin on Yamaha SG 1500 guitar with lots of gentle flanging, Colin Duce on Shergold Bass which is powerful without being particularly fashion-conscious, and Rick Duce with an energetic performance on Hoshino drums, a little Toppo on this tape. Closest to early Wishbone Ash, particularly on the distant guitar solos of 'Reflections'.

Vista 'Keep the Same Silence'. 3rd solo tape from this Horsham one-man band, lots of variation from ARP Quartet, Roland SH-09, DR 55, The Kit and Teac Portastudio production. First track sounds like a T-Dream build-up with the solo left off, second like one of Neu's tape collages, third like Gary Numan instrumental.

Soft Approach 5 tracks from Leighton Buzzard duo Steve Melba and Tech. 8-track studio sounds very catchy, but the cassette bouncing tracks a little turgid. Looking forward to hearing their future singles.

E&MM



Ian Boddy (Newcastle) 'Options'. Moog Opus 3, Korg Lambda, Fender Rhodes piano, VCS3, Roland SH 2, SH09, CSQ 100, Boss Dr. Rhythm. Another excellent release on the Mirage label for an increasingly popular British synthesist. Ian's style incorporates features from Tangerine Dream, Klaus Schulze and Jean-Michel Jarre without being excessively dependent upon any of them. Additionally he's able to perform his music live, and half the tape consists of a performance given at the Spectro Arts Workshop in Newcastle. The two lengthy live pieces feature slowly shifting chords treated with phaser and stereo echo, together with drifting lead melodies and progression into rapid sequencer passages with piercing metallic percussion sounds.

The eight studio tracks, with simple titles such as 'Skylights' and 'Silhouette', show imaginative use of the equipment to hand - for instance, in 'chopping' string chords in time to a sequencer pattern - and in their simple sequences and rich bass notes exhibit power without harshness. Part of the appeal of Ian's music is that it uses gentle, mellow sounds which will never shock or disturb, at the expense of course of a certain raw energy. Ian's recent inaugural concert at Birmingham's Aston University Triangle Sound Workshop, which included a Roland Modular System and Korg Poly 6, showed that his music is becoming increasingly sophisticated, and further live performances and an LP are expected later in the year.

Music: 8 Production: 8 Presentation: 8 Tape: 8.

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Demo Cassette No. 1 (March/April 1981 issues) contains:

1. Matinee Organ. 2. Yamaha SK20 Synthesiser. 3. Guide to Electronic Music Techniques. 4. Sharp MZ-80K music/sound effects. 5. Warren Cann plays Syntom Drum Synthesiser project. 6. Paia 8700 Computer music. 7. Frankfurt Music Fair.



Demo Cassette No. 2 (May/June 1981 issues) contains:

1. Tim Souster. 2. Adrian Wagner plays Wasp & Spider. 3. Lowrey MX-1 Organ. 4. Apple Music System. 5. E&MM Word Synthesiser. 6. Fairlight Computer Musical Instrument. 7. Sharp Composer program. 8. Yamaha PS20 keyboard. 9. Vero musical projects. 10. David Vorhaus LP "White Noise" excerpt.

Demo Cassette No. 3 (July/August 1981 issues) contains:

1. PPG Wave 2 Synthesiser. 2. Synwave project. 3. Wersi Pianostar played by Hady Wolff. 4. Alphadac 16 music. 5. Atari 400/800 music. 6. Duncan Mackay. 7. Hexadrum project. 8. MTU music. 9. Casio VL-Tone. 10. Irmin Schmidt's Toy Planet LP extracts.



Demo Cassette No. 4 (Sept./Oct./Nov. 1981 issues) contains:

1. Linn Drum Computer. 2. E&MM Harmony Generator project. 3. City University music. 4. Casio MT-30. 5. Roland instruments: Jupiter 8, TR808, MC-4, & GR300. 6. Steve Howell piece. 7. 'Ecstasy' LP by Georg Deuter excerpt.



Demo Cassette No. 5 (Dec./Jan. 1982 issues) contains:

1. Teisco SX-400 Synth. 2. Poly ZX81 music. 3. Study Music 1: Synth backing for you to play solo of Dec. '1984' Rick Wakeman music. 4. Casiotone 701. 5. Yamaha CS70M. 6. Roland CR8000. 7. E&MM Synclock project. 8. Study Music 2: 'Exit' music from Jan. issue minus theme for you to solo with. 9. Alpha Syntauri Computer pieces. 10. Elka X-50 Organ. 11. Soundchaser. 12. Ian Boddy music. 13. Richard Mitchell's electronic music for film.



Demo Cassette No. 6 (February/March 1982 issues) contains:

1. Yamaha GS1 played by Dave Bristow. 2. Korg Trident Polysynth. 3. Roland Drumatix sounds. 4. Study Music 3: Ike Isaacs performs his 'After Hours' music in Feb. issue. 5. Firstman Sequencer. 6. Wersi Comet played by Mark Shakespeare. 7. Sequential Circuits Pro-One Synth. 8. Study Music 4: Kraftwerk's Ralph Hutter at the E&MM interview. 9. Home Electro-Musicians: Johnny Demestos, Gerry Taylor. 10. Digital Delay Line Effects Project. 11. Percussion Sound Generator Project. 12. E&MM Spectrum Synth sounds.

Demo Cassette No. 7 (April to September 1982 issues) contains:

1. Roland Juno 6. 2. Cardiff University computer music. 3. The Omnicord. 4. E&MM Soft Distortion Pedal project. 5. Warren Cann's Drum Column examples in Parts 1 & 2. 6. Casiotone 1000P. 7. Emu Emulator. 8. Delta Lab DL-5 Harmonicomputer. 9. Yamaha CS-01 Breath Control Synth. 10.



Demo Cassette No. 8 (October to December 1982 issues) contains:

1. R Rhodes Chroma Polyphonic Synth. 2. Mini Synth Supplement: Yamaha PC100, Casio MT-70, JVC KB500, Hohner P100, Technics SX-K200. 3. Eko Ritmo. 4. Zon X81 program sounds. 5. The Kit. 6. Elka Synthex Polysynth. 7. Crumar Stratus. 8. Warren Cann's Drum Column Parts 3 & 4. 9. E&MM Transpozer Project.



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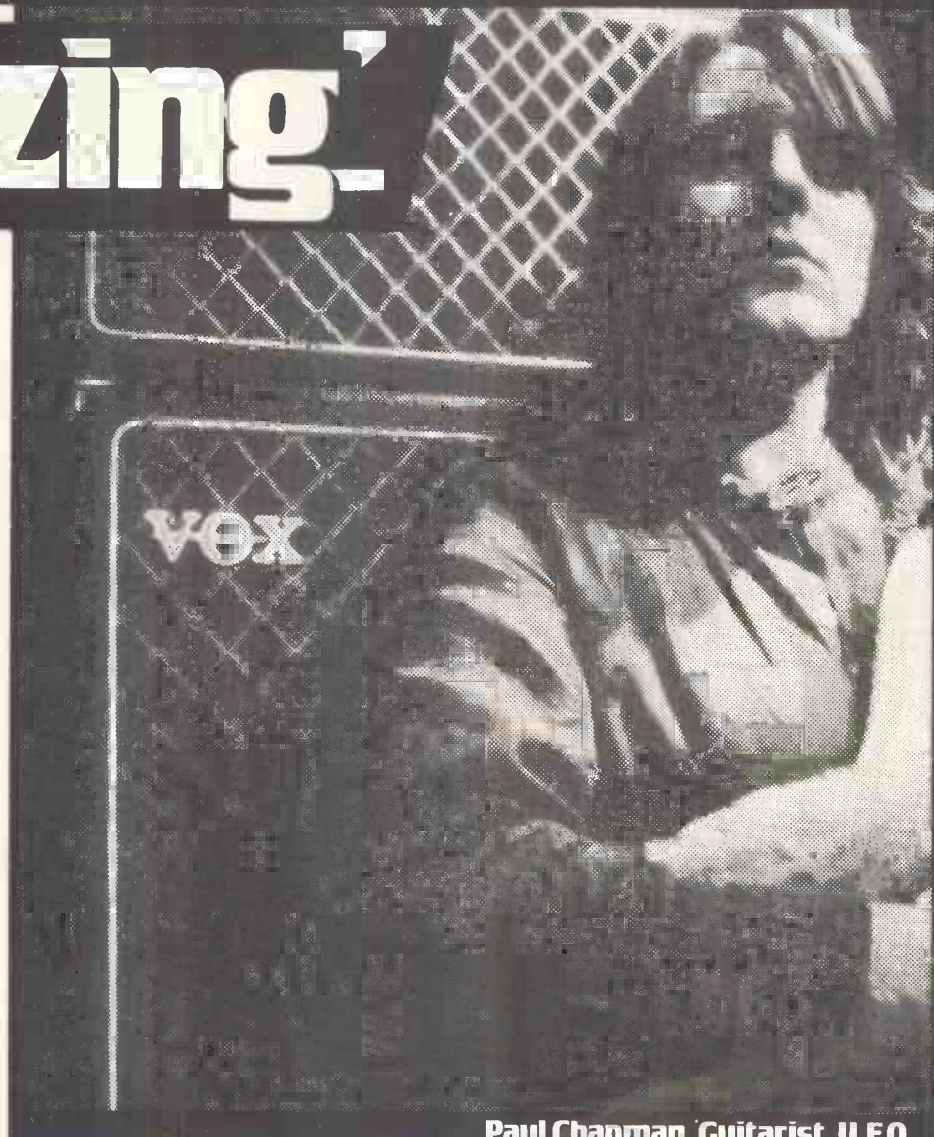
(In other words, from a Watkins to a Washburn, it'll deliver the goods).

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Paul Chapman. Guitarist. UFO.

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VOX

Vox Guitars and Basses

Nearly two years ago, after Vox Ltd., a new company, had been turning out the famed Vox AC amps and combos for some time, they suddenly announced that they would launch a new series of Vox guitars. I must admit I got just a bit excited. All sorts of possibilities began to loom in my mind, but to understand these possibilities you need to know a little about the previous history of Vox guitars - made then, of course, in England.

While the first Vox six-strings were not particularly distinctive, and looked rather like other standard European fare of the early 1960s (i.e. boring), the American influence began to creep in towards the middle of the decade and mid-period Vox models were among the earliest blatant Fender copies.

But the old Vox company apart from their amps will doubtless be remembered mainly by older musicians (and Dave Wakeling) for the odd-shaped Phantom models, first coming in a strange four-sided shape, later settling down to the more famous 'teardrop' shape guitars and basses. Then there was the Guitar Organ, a bizarre forerunner of the guitar synth, in a way, and a decidedly unsuccessful if legendary instrument to boot. But all power to Vox for trying it on!

All this ingenuity and invention eventually dwindled, however, and Vox guitars ceased to be around the early 1970s. Now, perhaps, you've an inkling of why I got so excited back in 1981 at the prospect of a revamped Vox range. I even rather foolishly expected British-made guitars.

What Vox have is a range of some seven guitars and two basses (counting finish variations and fingerboard options) all made, inevitably, in Japan and rather, well, derivative in shape and overall design. It doesn't, however, seem to be a straight case of buying up a line of Jap axes and bunging VOX on the head. Vox Ltd in North London specified what they wanted to a large extent - guitar technician Adrian Legg got some of the wiring configurations together, and a version of the classic Vox headstock shape is incorporated into the design. Pity, though, that we didn't get a Phantom shape on one of the bodies too - maybe Japanese routers can't handle such long curves? Pickups were also Vox-specified, coming from the well-known DiMarzio factory in New York.

Vox Ltd's reason for using Japanese production to assemble the new guitars is spelt out in some of their promotional literature as follows: "The UK, the USA or Japan were the only real contenders. After much searching we chose Japan. Only then did we find the complete combination of production capability, quality, consistency, capacity and cost. So that is where we have set up production." All of which seems fair enough, although I suspect that cost really should head the list.

The range splits now into three groups: three 24 $\frac{3}{4}$ in-scale guitars; four 25 $\frac{1}{2}$ in-scale guitars; and two basses. The 24 $\frac{3}{4}$ s are sort of Yamaha-shaped for want of a better reference point, the Standard 24 coming in black or cherry, and the Custom 24 straight-through-neck job arriving in walnut.



Vox Standard 25 guitar.

The 25 $\frac{1}{2}$ s are Strat-shaped, the Standard 25 coming in black with rosewood or maple fingerboards, and in cherry with rosewood board, while the Custom 25 is a straight-through coming in walnut again. The basses are a black Precision-like Standard Bass, and a similar but straight-through 'honey' finished Custom Bass.

I took a look at a couple of reasonably priced models from the range (they go from about £140 for the cheapest to nearly £300 at the top), the Standard 25 (cherry/rosewood), which sells for a recommended £159 (inc. VAT), and the Standard Bass, which is yours for a recommended £139 (inc. VAT).

Standard 25

First impression: what a tiny guitar! Second impression: but it's heavy/solid. Third impression: Vox have seen a Strat before, once or twice.

But first a quick visual run-down: body finish on the review sample is 'cherry', though it also comes in black. It's not quite a Gibson cherry, but isn't bad, looking a little more cheerful in daylight than it does under electric lights. The scratchplate is slightly yellowed, saving you all that trouble of subjecting it to lung-loads of cigarette smoke, and there are 22 fat frets in the rosewood fingerboard/maple neck, leading up to the Vox headstock. I think the headstock looks a little cumbersome, but it does provide one of the few links with the Vox past.

On the maple body is a good multi-purpose bridge, which will again be relatively familiar to Strat fans, and indeed many others. Strings are inserted through the back of the body into the bridge block (some claim that this wider area of coupling with the body wood is supposed to give a better sound), and out over the six individual bridge pieces. Each is adjustable for height (action) with two 1.5mm hex-socket screws either side of the string, and for intonation (length) via the



Vox Standard Bass guitar.

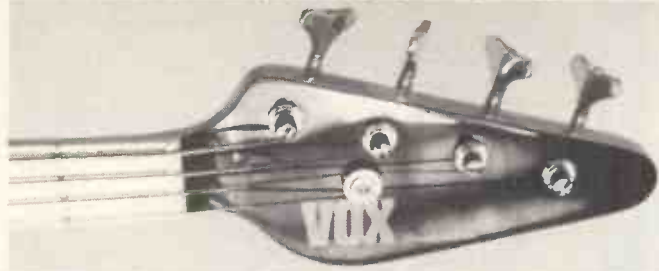
standard cross-head sprung-screw located on the back of the 'lip' of the bridge unit. The springs needed a helping push now and again as I set up a reasonable intonation, but the bridge is of a tried-and-tested formula which will serve well.

Also located hereabouts is the device that guitar makers seem to have decided is a distinct requirement for 1983, a tremolo arm. Of course Vox and many others, got there before the rush, and the tremolo arm here - you know that it should accurately be called a vibrato arm, so I won't bore you with that - does its usual pitch-depressing job in commendable fashion. Pitch-return was acceptable.

Pickups are lively DiMarzio FS1 types - three of these are arranged in what can only be described as Strat layout: the bridge pickup angled to accentuate the treble strings' top frequencies. These are controlled by - you guessed - a Strat-like control arrangement: a single master volume pot accompanied by a tone pot each for the middle and front pickups (bridge tone is preset), plus a nearby five-position pickup selector. This gives each pickup, plus the famous 'in-between' settings, not exactly the out-of-phase sounds which some have labelled them, but a useful inclusion nonetheless. You too can sound like Mark Knopfler, as an ad somewhere must go.

Beyond the plastic nut and two string posts are six machine heads (count them) which work well and effortlessly - tuning held accurately except when I had a weak moment of trem-bashing, which is only to be expected.

The guitar is a lively, pokey little instrument, fun for winding up and getting down, but with enough in reserve for those unfashionable enough to desire quality and expression in their playing. Difficult to fault at the price: all I can say is I'd probably go for the black one. And if the colour's your only problem, things must be good.



Standard Bass

This is basically, as they say (and no pun intended), a Precision-like instrument with a series/parallel switch added, and the special shape Vox headstock. To balance the design and overall dimensions, the headstock is larger than on the Standard guitar, and my dislike of the shape increases proportionately. Ah well, I dare say you think it looks lovely.

On to more general looks: the black body and headstock-facing complement the all-maple neck with black position dots rather nicely. The impression is of well-presented simplicity, and indeed that characterises this Standard Bass.

Frets are again fat, and 24 of the things sit minding their own business under the overall 34in scale. The maple body sports two controls, an overall volume and an overall tone ('Hatbox' types, as they're called), and the previously mentioned series/parallel switch lurks nearby. In a way this switch seems to have been included with a guitarist's way of thinking in mind (in fact the little pamphlet that comes with the Standard Bass tells you that parallel coils give "a brighter sound more suitable for chord

work"), but does nevertheless provide two reasonably distinct sounds - series a little warmer, parallel somewhat cleaner. And if you do want to play chords on a bass, go right ahead.

These controls govern another DiMarzio pickup, the well known P-Bass type. No prizes for guessing what the 'P' stands for, but it is a split four-polepieces-per-two-strings type, and seems to combine high output with reasonable quality, as one has come to expect from DiMarzio.

The bridge is a back-mounting (that's my jargon for "you poke the strings through the hole in the lip", by the way), standard type, again adjustable for height and length with the same type of screws as for the Standard guitar, mentioned earlier.

Machine heads are closed, chunky, effective types, while back at the maple body the jack socket sits unobtrusively on the side.

Despite my reservations about the bulk of the headstock, the bass balances comfortably on a strap, and seemed equally at home resting on my knee (and who wouldn't?). I must say I found the neck rather a handful, with its rather large cross-section. This is obviously a matter of taste, but

personally I do prefer my necks somewhat slinkier.

One has to bear in mind that at this end of the market the maker really is working to a price and that you are not going to be offered too many frills, both cosmetically and sonically. If you're looking for a first-time-buy bass, or maybe for a bass as a secondary instrument, then obviously this is the sort of area and price-range you may well be looking at. Most makers address themselves to this market, so it's worth taking a good look around.

But this is as straightforward a bass as you'll get, it's certainly offered at a good price, and if a cutting, simple sound is what you want then check it out.

If I had to level any criticism at the Vox range on the strength of these two review samples, I would point to a slightly mechanical feel about the instruments - a slight lack of warmth and 'feel'. But here we're beginning to get into a rather subjective argument, and the best I can suggest is that you give the guitars a try for yourself. For another view on a couple of other guitars in the range, see Pete Maydew's review of the Custom Bass and Custom 25 guitar in the December 1981 issue of E&MM.

Tony Bacon

E&MM

Finally someone is prepared to do for the synthesizer - what Rhodes did for the piano

At Rhodes we've always felt there's a big difference between a keyboard that responds like a machine and one that plays like a musical instrument. At last there's a synthesizer that comes up to our standards that you can understand. CHROMA. The first in a new family of advanced musical instruments.

The Chroma is a hybrid of digital and analogue technology that combines the best of both worlds. This 16 channel programmable polyphonic synthesizer has an acoustic-style keyboard response. So, instead of pushing buttons that look like keys, you can finally feel what you're playing. Chroma has 50 pre-set voices, plus a further 100 voice programmes on cassette are included with every keyboard. Besides a cassette interface the Chroma's computer interface also makes Chroma the first intelligent music terminal. The compatibility factor we're most proud of though, is the one all Rhodes instruments have - with people. The way we look at it, advanced electronics don't mean a thing unless you've got that human touch that makes music what it is - feeling.

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Oberheim OB8.

America

Jerry De Muth

"There's a new generation of polyphonic digital synthesizers," commented one keyboardist after visiting the National Association of Music Merchants Winter Market show last January in Anaheim, Calif. "The last generation of synthesizers were priced around \$4,000. The new generation is all priced under \$2,000."

New synthesizers were introduced by Sequential Circuits, Korg, Juno, Syntauri, Rhodes, Yamaha and, in the higher price range, Oberheim. Most of the new keyboards are six-voice polyphonic synthesizers with two oscillators per voice and memories that range from 56 to 100 programs.

Synthesizers

Sequential Circuits has added the Prophet-600 to its Prophet line. This six-voice synthesizer with two oscillators per voice, which carries a suggested list price of \$1,995, can be interfaced with any other midi-equipped instrument. When connected with another Prophet-600, either keyboard can control both synthesizers, allowing four oscillators per voice and two different programs sounding simultaneously.

The Prophet-600 also features 100 pro-

grams which can be modified or replaced; a real-time, non-volatile polyphonic sequencer; dual-mode arpeggiator that is up/down or assignable; chord tracking; cassette and computer interface; and a new filter circuit for more full tone colours. Its computer interface capabilities means a home computer can be used for program storage, patch print-out, music notation, sequencing and multi-keyboard orchestration.

Also new from Sequential Circuits is the Prophet-T8, a touch sensitive (velocity as well as pressure), fully programmable with 128 programs, eight-voice, 16-oscillator polyphonic synthesizer with a suggested list price of \$5,100. Each of the 76 keys' pressure sensitivity is independent and is activated by applying force to the key after it has been depressed. Velocity sensitivity is fully adjustable and has been incorporated into the ADSR envelope.

The eight voices of the Prophet-T8 are assigned according to the four keyboard modes - single mode sounds eight voices over all six octaves; double mode blends two different programs into each of four voices; split mode divides the keyboard and allocates four voices to each side of the programmable split point with a different pro-

gram for each set of four voices; and unison/track mode combines up to eight voices on one note.

The Prophet-T8 also features a built-in real-time sequencer with a memory capacity of more than 600 notes. It will record up to eight separate sequences which can then be played back in single-play mode or loop mode.

Korg's new low cost Poly-61 is a six-voice programmable polyphonic synthesizer that features two digitally controlled oscillators per voice and a 64-program memory. Its digital access control, with a large LED display, provides complete and precise control over all program modes, parameters and edit functions. An eight-second cassette tape interface provides unlimited program access and storage.

Other features on the Poly-61 include an arpeggiator with latch mode, four way joystick with separate LFO, release and program advance footswitch jacks, full five octave keyboard and poly, chord memory/unison and hold modes.

Yamaha displayed its most recent synthesizer, the CE25, which features 20 polyphonic voices, a 49-note velocity and pressure sensitive keyboard, a tone generator system that synthesises a random harmonic structure of the type that occurs on acoustic instruments and an overall vibrato effect that can be applied to all voices independently of the after touch response function. There also is a symphonic effect with depth and brilliance controls.

The CE25 connects to any music instrument amplifier, keyboard mixer or sound reinforcement system via a standard 1/4-inch phone jack. Jacks also are provided for a sustain pedal, an expression pedal and stereo headphones.

Roland and Rhodes were featuring at the NAMM show their most recent polyphonic synthesizers, the Juno-60 and the Chroma, respectively.

In addition, Syntauri, which offers a line of digital computer-based synthesizers, introduced to the NAMM show its Composer's Assistant, a software product that provides automated polyphonic transcription and hard copy score printing.

The Composer's Assistant can adjust for performance timing variances such as leading the beat and can ignore accidental notes produced by finger slips during difficult passages. The Composer's Assistant, which works with popular printers that interface with computers, carries a suggested retail price of \$295.

From Oberheim comes a new synthesizer, the OB-8, which is similar to the OB-Xa, but with a suggested retail price of \$4,395, less expensive than the OB-Xa. The new features include four waveforms on each oscillator, independent pulse width adjustment, programmable volume, intelligent arpeggiator, external pan pots, programmable detune between voices or sets of voices, programmable pitch bend, quantized portamento and volume pedal input. The OB-8's extended modulation capabilities which feature three LFOs with six waveforms each mean that LFOs are triggerable from the keyboard, can have envelope modulation, can track the keyboard, can be quantised and can be set out of phase.

Effects

Six effects for keyboard, guitar or bass are featured in a new, single, flexible rack mount from MXR. The new MXR Omni features sustain, distortion, equaliser, delay, flanger/chorus and external loop and is semi-programmable from the footswitch.

Full front panel controls enables the



Korg Poly 61.



SCI Prophet T8.

performer to choose the sound he wants from each effect. FET switching, says MXR, eliminates pops and clicks when changing from one effect to another. A bypass switch will take the unit out of the sound chain and will show which effects will be in the sound chain. And there are at least two controls for each of the six effects.

Morley also has expanded its effects line with the addition of two new wah pedals and two new echo pedals as part of its new line of electro-optical pedals. Morley's Slimline Wah Volume Pedal incorporates wah and volume, less the taper control, functions in one pedal. A footswitch selects either function. Morley's new battery operated photo-cell wah pedal offers the capability to pre-set the wah volume at a level lower, equal to or higher than the original signal with an output level control.

Features of Morley's new echo volume pedal, which has no moving parts except for the pedal, include a range of repeats extending from dry to runaway and continuously variable control for selection of the number of repeats. The delay time between repeats is pre-selected with an echo speed control. And the echo mode can be by-

passed with a footswitch to convert the unit to a straight volume pedal.

A new echo reverb offers a delay span from as short as 20ms up to 300ms and is the quietest unit available in its price range of \$200, according to Morley. There are separate controls for delay, repeat and mix.

All of the pedals in Morley's new Slimline series are cordless and use no pots or gears, in order to eliminate pops and scratches. Prices of the units released so far range from \$250 for the echo volume pedal down to \$98 for a variable taper volume pedal which can be used to go through the full volume range with maximum pedal travel for a smooth gradual approach to volume crescendo or with a minimum amount of pedal travel.

Instruments and Amps

A microprocessor based system with memory and a variety of effects are part of the new Touch Guitar from Artisan Instruments, which combines the features of an electric guitar, an electric bass and an electronic organ. With two necks attached to a single body, it is designed so that both hands play individual fret boards simul-

taneously. The upper guitar neck is played by touch with the right hand while the lower bass neck is played by touch in a normal position with the left hand. A switch enables the touch bass to revert to a regular plucking-type electric bass.

Individually keyed oscillators are used in the organ design to provide ensemble and chorus effects from a full range of orchestral instruments. For the organ sounds all 10 completely isolated fretboards for the guitar and bass become the organ keyboard.

The Touch Guitar, control panel, microprocessor and all organ electronics fit into a single unit with the control panel mounted on top and the Touch Guitar instrument storable inside. Located on the control panel are lighted switches for the organ voices and couplers and the guitar and bass controls and effects. In addition, 10 memory pistons are located on the guitar neck for quick access to program changes previously placed into the memory.

For guitarists who switch between electric and acoustic electric instruments during a performance, and thus run into amplification problems, Peavey has introduced two compact amps, the Reno 400 and the Austin 400, as part of its new City Series. Each is a 210-watt amp with an acoustic guitar channel featuring high and low gain inputs, pre gain and post gain controls, a parametric mid EQ section and active low, high and presence controls.

The Austin 400 also has an electric channel that features a high gain input, pre gain, saturation and post gain controls, and an active presence control. Sounds possible on the Austin 400 range from warm and tube-like to scorching rock.

The Austin 400 utilizes two 12-inch Scorpion loudspeakers and a CDP multi-flare horn while the Reno 400 has a 15-inch loudspeaker for the low and mid ranges and a CDP multi-flare horn for the highs. The suggested list prices are \$459.50 for the Reno 400 and \$549.50 for the Austin 400.

E&M

Manufacturers and companies mentioned:
Artisan Instruments Inc., 6450 NE 183 St., Seattle, WA 98155.

Korg, Rose-Morris, 32 Gordon House Road, Kentish Town, London, NW5.

Morley, 6855 Vineland Ave., North Hollywood, CA 91605.

MXR Innovations Inc., 740 Driving Park Ave., Rochester, NY 14613.

Oberheim Electronics Inc., 2250 S. Barington Ave., Los Angeles, CA 90064.

Peavey Electronics Corp., 711 A Street, Meridian, MS 39301.

Rhodes, CBS Arbiter, Fender House, Centenary Estate, Jeffreys Rd., Brimsdown, Enfield, Middlesex.

Roland UK, Brodr Jorgensen Ltd., Great West Trading Estate, 983, Great West Rd., Brentford, Middx.

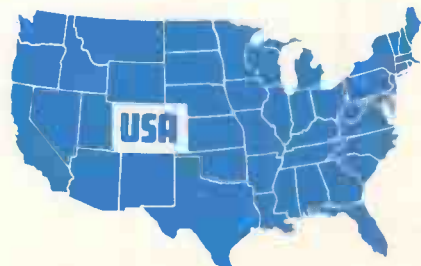
Sequential Circuits Inc., 3051 N. First St., San Jose, CA 95134.

Syntauri Corp., 3506 Waverley St., Palo Alto, CA 94306.

Yamaha UK, Mount Avenue, Bletchley, Milton Keynes, Bucks, MK1 1JE.



SCI Prophet 600.



Macro-music is all about making music on large mainframe computers and provides a starting point that will lead to articles on software techniques and hardware solutions for high quality synthesis, as well as micro-controlled one-chip synthesisers and latest commercial 'add-ons' for microcomputers.



University of Illinois Studio D (digital studio) in 1979. (Photo courtesy of Illinois University/Prentice Hall).

The Unit Generator concept

Stemming from Mathews's own experiences of learning and playing the violin was a strong feeling that computer music programs should help a person's creative juices flow without constraining him. To this end, the next program in the series, Music III, introduced in 1960, saw the introduction of the unit generator concept. These unit generators were sonic building blocks existing solely in software, and, like the modular approach being adopted for analogue synthesisers at about the same time by Donald Buchla and Robert Moog, a simple sound was easy to patch and more elaborate ones took longer (see Figure 3 for an example). By allowing the complexity of the synthesis program to follow the complexity of the composer's intentions, and by making the building blocks correspond to many of the functions of analogue synthesisers, Mathews made a big conceptual advancement for computer music - that of contracting the technological language barrier and giving the user something that he could instantly relate to, but, at the same time, providing the means for expansion to meet his own creative development. Actually, it's a bit reminiscent of that superb oxymoron that appeared in a local newspaper: "Wanted: new investors for an expanding contracting business" - very bitter-sweet!

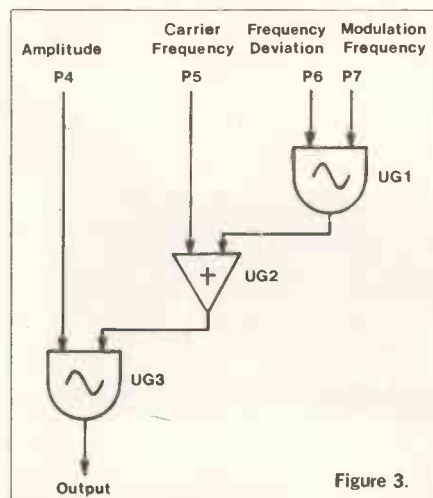
A good example of a typical unit generator is the oscillator which has two inputs, an output, and a stored waveform that's programmed into it. Generally, the first input specifies the amplitude of the output and the second the frequency. Patching up unit generators produces, naturally enough, an instrument with characteristics determined by the parameters, P1 to Pn, programmed by the composer. Some of the most dramatic synthesis using unit generators was done by John Chowning

at the Stanford Artificial Intelligence Laboratory in the late '60s using more complex versions of the patch in Figure 3. John Chowning (one of the many pupils of the remarkable Nadia Boulanger in Paris), with the aid of Max Mathews, started setting up a computer music program at Stanford in 1964 around a descendant of Music III. In fact, Music IV, which appeared in 1963, was no more powerful than Music III, and only marginally more convenient to use, but the program that Stanford started to use, Music V, marked the emergence of a music synthesis program that was extremely flexible and machine-independent. This meant that computer music was at last able to move away from Bell Labs and reach a wider range of musicians.

Music V in fact adopted a practice used in many microcomputer systems - that of using machine code for the critical synthesis routines and a high level language (Fortran, in this case) for user interaction, i.e., for setting up unit generators and entering

'scores'. This meant that Music V was comparatively easy to transfer to different computers and efficient in terms of processing speed. However, Music V remained loyal to the tradition of delayed playback synthesis and this made it somewhat inconvenient in comparison to the totally real-time synthesis possible with the analogue synthesisers emerging from the Moog stable. Rewriting of Music IV and Music V into machine code throughout improved on the original 100:1 computing vs. playing time, though not to the extent that composers would ideally have liked.

Music V underwent many developments as regards the interface between computer and composer. The two blocks of composer-derived data, the 'instrument definitions' and the 'score', remained the corner-stone of Music V's operation, but one major obstacle to generating music from a digital synthesis program was what Mathews called 'the psychoacoustic problem'. The basic difficulty with all music synthesis, whether subtractive or additive, is that it's extremely difficult to predict why a particular mass of sound waves produce the impression of a particular timbre. With traditional acoustic instruments, it's enough that the performer understands the effect of different methods of fingering, bowing, embouchure, or articulation on the quality of sound, not the actual physical changes that result in the composition of the sound waves. With a digital synthesis program, on the other hand, the composer can only realise its full potential if everything about the sound wave is rigorously spelt out for the computer. To this end, potential help for the composer came from two sources: firstly, by analysing the sounds of instruments and reconstructing them; and secondly, by synthetic techniques that happen to mirror the behaviour of natural instruments. We'll move on to considering these in Part 3 of Macro-music.



Simple 'circuit' (instrument) for producing frequency-modulated (FM) synthesis used in simulating the sounds of bells, gongs, and brass instruments. UG1 and UG3 are oscillators with the stored wave shape of a sine wave, and UG2 is an adder.

David Ellis

E&MM



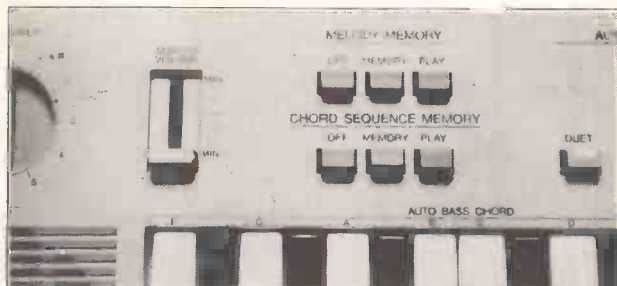
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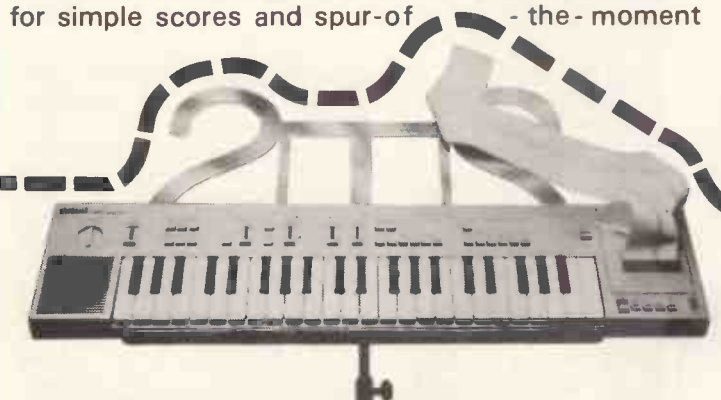
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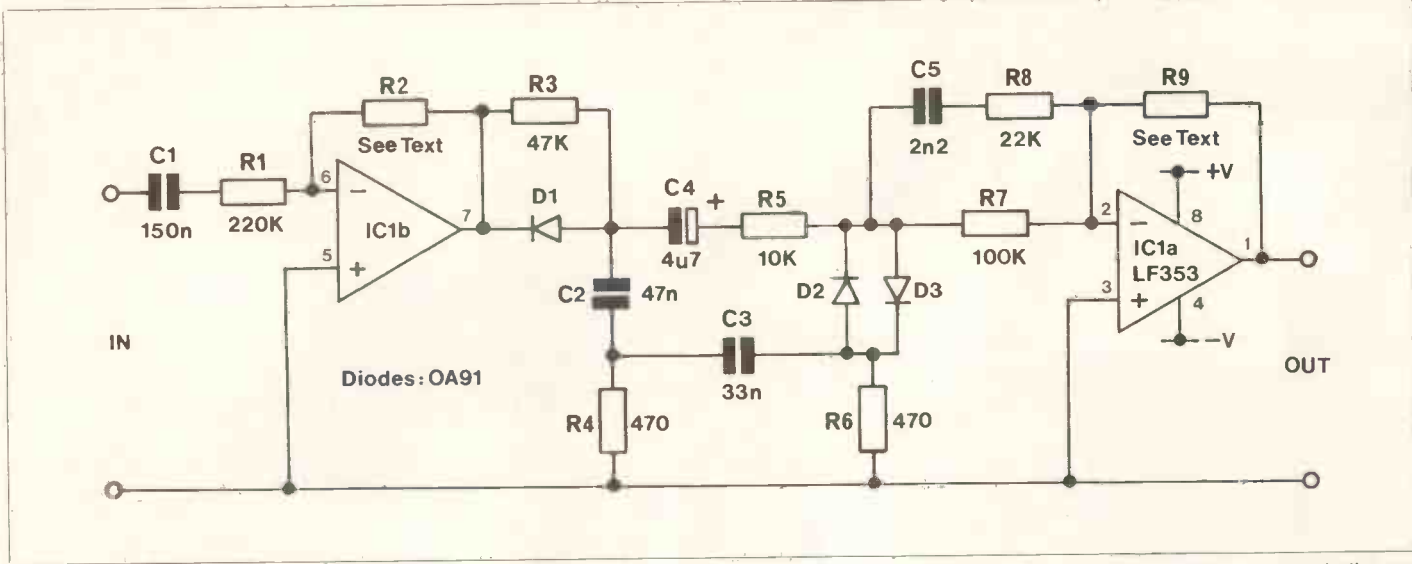


Figure 1. Circuit diagram.

CIRCUIT MAKER

Sawtooth Processor

Dave Rogers

The basic oscillator waveform common to even the simplest synthesisers is the sawtooth, as it contains a full complement of even and odd harmonics, suitable for subtractive synthesis. It can, however, be irritatingly harsh and even when processed by a lowpass filter, is often rather characterless.

The circuit was developed to derive, from any sawtooth, an alternative basic waveform, which is audibly interesting over all parts of the audio range. The circuit is inexpensive to build and can be constructed on a small piece of Veroboard or suitable PCB.

Since the circuit can only use a 'clean' sawtooth signal it must be placed directly after a VCO before being processed further.

The complete circuit diagram is shown in Figure 1. The circuit consists of an input amplifier IC1b driving two cascaded waveshapers and an output amplifier IC1a. Both active stages are inverting so that overall they cause no inversion. The first waveshaper creates a DC offset, so C4 is included to provide suitable decoupling.

This waveshaper consists of C2, D1, R3 and R4 and generates a waveform whose actual shape varies with the input frequency. The waveform typically produced at C4 is shown in Figure 2a. It can be seen that the linear ramp of the sawtooth is passed unchanged by D1, but the fast reset part of the cycle (which causes the undesirable high harmonics of the sawtooth) is replaced by the capacitor discharge curve of C2 back through R3, D1 remaining non-conductive until the point P where the ramp meets the curve.

Note that the amplitude as well as the shape of the resulting waveform will change with input frequency, increasing with decreasing frequency. This would normally cause lower notes to be louder than higher ones, so some form of amplitude correction circuitry is required. The second waveshaper provides this, consisting of D2-3, C5 and R5-8, where excess amplitude of lower frequency notes is limited and converted

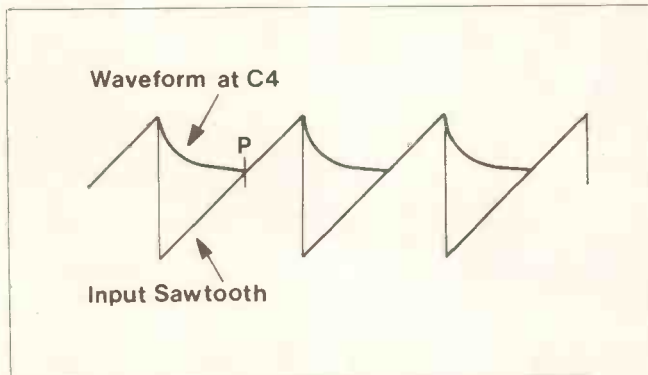
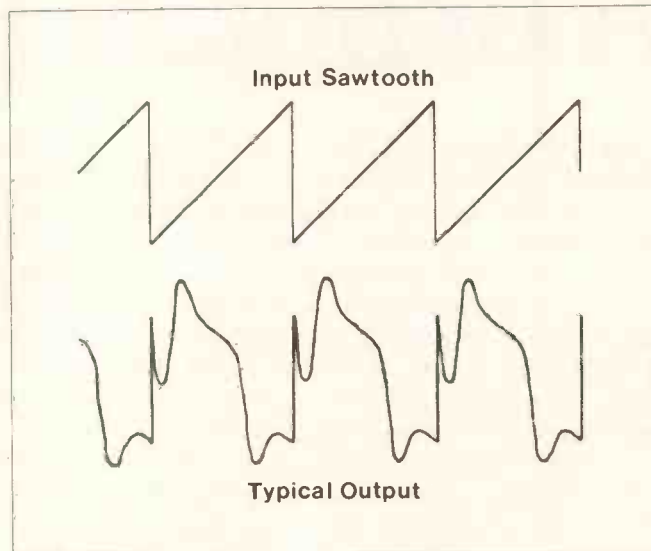


Figure 2a. Waveform at C4 superimposed on input.

Figure 2b. Typical output waveform.



into extra harmonics. Progressively less of this action occurs towards middle notes and eventually none at all on the highest notes. Overall this gives a 'self-tracking' capability where the lower the note, the more its excess energy is fed back into higher, more useful areas of the audio spectrum. A typical output is shown in Figure 2b.

Two components D1 and C4 are orientated as shown to process a rising sawtooth. They should be reversed, however, if a falling sawtooth input is to be used. The supply voltage is not critical and can be in the range of $\pm 9V$ to $\pm 15V$ which can be tapped off most synthesisers.

The amplitude at pin 7 of IC1b should be roughly 6V P-P. This signal can be obtained for most sawtooth signals by adjusting R2 according to the simple relationship $R2 = 1200/A$ Kilohms where A is the amplitude of the available sawtooth in volts P-P.

The value of R9 can also be calculated to

give the desired output level by $R9 = A \times 180$ Kilohms, where A is the required amplitude in volts P-P.

By changing the value of R3, the discharging rate of C2 is altered, which can yield some interesting tonal changes. Therefore a 100K lin pot plus a 15K series resistor could be used to replace R3 and provide variable control.

Another interesting chorus-like effect can be obtained by adding a low frequency sine or triangle signal (1 to 6Hz) via a 1M resistor to pin 6 of IC1b. There is no problem with breakthrough of the LFO signal into the final output as the signal is 'absorbed' by the action of the waveshapers.

The two frequency-dependent processes just described produce an audibly varied and unusual 'mobile' sound, which, since its harmonic structure alters with changes in frequency, is particularly expressive for arpeggios or with portamento.

CIRCUIT MAKER

Graphic Oscillator

D. G. Walton

This circuit is a refinement of the idea of a Graphic Oscillator. That is an oscillator whose output waveform is variable and made up of a series of points set on slider pots. The slider panel therefore looks like that of a Graphic Equaliser, hence the name.

Eight slider pots are provided allowing eight points in time to be set for the positive going half cycle of a wave. The negative going half is then produced by running through the settings in reverse order and with inverted voltages, as shown in Figure 1. This allows a large number of complex waveforms to be produced with a graphic representation of the shape on the controls.

The circuit diagram of the unit is shown in Figure 2. Voltages tapped off each pot are connected to eight inputs of an analogue multiplexer, the 4051. The selected output, from pin 3, is then connected to a 741 which acts as a buffer amplifier. An offset voltage is applied to pin 3 to bias the amplifier at half rail. Output level can be adjusted using the 10K pot.

Channels are selected on the multiplexer by the 4024 binary counter, via 3 exclusive -OR gates.

When pin 6 of the counter is low the counter levels are passed directly to the 4051. When high the 3 levels are inverted and the channels selected in reverse order. The fourth Exclusive -OR gate is used to change over the voltage levels which supply the sliders. When pin 6 is low the top of the slider is at 0.53V and the bottom at 0.47. High and the top becomes 0.47V and the bottom 0.53V.

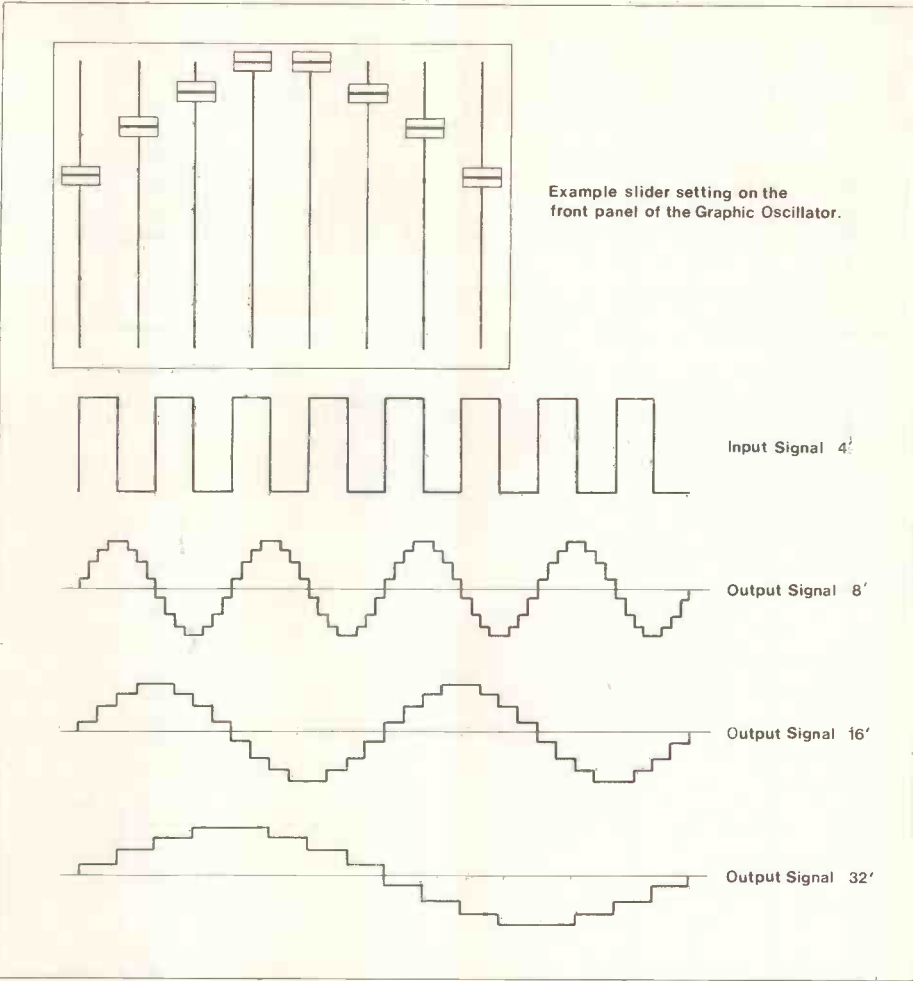


Figure 1. Relationship between slider controls and output waveform.

To allow the circuit to be integrated into an existing synthesiser the counter is included in a Phase Locked Loop. The 4046 is the PLL which, with the counter, provides the frequency multiplication necessary to make the counter run up to eight times as fast as the input signal.

The input signal from the synthesiser should be a clean square wave set to 4' range

which allows the PLL to track accurately. Using the octave switch, output waveforms generated by the circuit can be $\div 2$, $\div 4$ and $\div 8$ or 8', 16' and 32' respectively.

Output signals from the graphic oscillator can be mixed directly into the synth's VCF for further modification. Supply voltage should be in the range of 9 to 15V which could be tapped off the synth's supply.

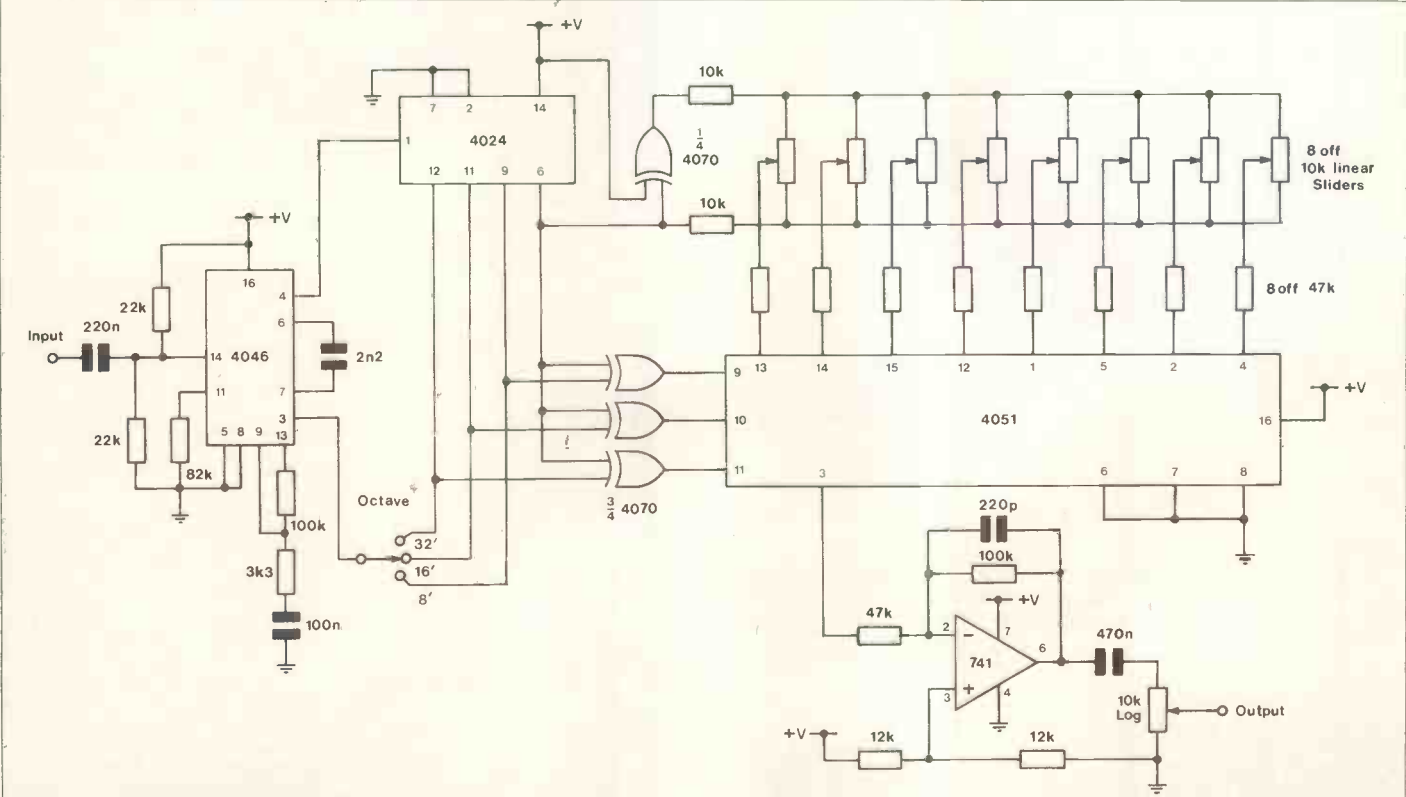


Figure 2. Circuit diagram of the Graphic Oscillator.
E&MM APRIL 1983

MUSIC MAKER EQUIPMENT SCENE



New Altec Products

Rank Strand Sound, the Altec Lansing Distributor for the U.K. and Ireland, have introduced a variety of new acoustic products.

Amongst the new products are the new 3000 series low frequency loudspeakers and an associated line of matched, optimally-tuned boxes, the 8000 series of loudspeaker enclosures. Also, the new generation of the popular Altec Mantaray Constant Directivity Horn.

Each woofer in the new 3000 series is designed for a specific sound application. The line includes 12, 15 and 18 inch extended low frequency

models, and 12, 15 and 18 inch high efficiency units. The six matched enclosures of the new 8000 series include boxes ranging from 1.5 cubic feet to 24 cubic feet.

The new line of mid-size constant directivity horns, designated Mantaray II, will include four new models with vertical/horizontal coverage patterns of 40°/20°, 60°/40°, 90°/40° and 120°/40°. The new horns will be approximately half the size of the original Mantaray series.

For further details contact: Rank Strand Sound, PO Box 51, Great West Road, Brentford, Middlesex TW8 9HR. Tel. 01-568 9222.



Sinclair Sound

Bi-Pak have now introduced a new modified version of their sound generator for use with all Sinclair computers ie, ZX81, Sinclair Timex 1000 and the Sinclair Spectrum.

Designated ZON X the unit is self-contained in a black plastic case with a loudspeaker and manual volume control. No power supply or batteries are required to power the unit - it simply plugs into the rear of the Sinclair Computer.

The new unit offers a wide range of sound effects. These are obtained using the three-channel-plus-noise sound chip and is designed so that the pitches and volumes of the three channels and overall attack/decay envelope can be controlled by simple BASIC statements. This means that Pianos, Organs, Bells, Helicopters, Lasers, Explosions, etc., can be simulated and added to existing programmes.

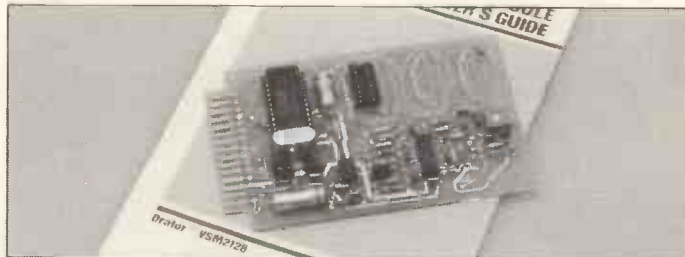
Soldering Kit

Litesold have recently introduced a complete soldering/de-soldering kit for the Electromusic enthusiast. The kit is centred around a high efficiency 18 watt mains iron, fitted with a 3.2mm copper bit. There are also two alternative bits included, of 1.6 and 2.4mm, for intricate IC work.

Also provided are a reel of 3 metres of 18 swg flux-cored solder, stainless steel tweezers, three double-ended soldering aids and a reel of de-soldering braid.

The new SK18 kit provides all that is required for soldering and de-soldering on almost any electronics project, ideal for beginner or expert. The kit comes in a clear PVC wallet, and is available direct from Lite-sold at a special mail order price of £14.55 inclusive of postage and VAT.

Further details and order form from: Light Soldering Developments Limited, 97/99, Gloucester Road, Croydon, CR0 2DN, Surrey. Tel. 01-689 0574.



Voice Synthesis Module

General Instrument Microelectronics has introduced a new voice synthesis module, designated VSM 2128-AL2.

The module contains a single chip, N-Channel, MOS/LSI circuit that is able, through stored allophones, to synthesise any phrase in the English language. The module is easily interfaced with any digital system, utilising a standard 15-pin card edge connector. Ten TTL compatible signals are used to select the stored allophones. Once selected, the VSM2128-AL2 requires no support

from the user circuits. It enunciates the allophones and signals when complete.

Utilising the General Instrument SP0256-AL2 single chip speech synthesiser, the module operates on a power supply in the range of 4.6 to 7.0V. Audio is filtered by an eight-pole Butterworth Filter to ensure the highest quality speech, and is amplified to drive an 8 ohm load with 200mW of power.

The General Instrument allophone speech synthesis technique is easy to use, has a remarkably low bit rate, and allows the user to synthesise any English word by concatenating individual speech sounds. Each allophone has a six bit address. Assuming that speech contains ten to twelve allophones per second, allophone synthesis would require addressing less than 100 bits per second. Previous techniques have involved synthesising and storing entire words as units.

For further details contact: General Instrument Microelectronics Ltd., Times House, Ruislip, Middlesex HA4 8LE. Tel. Ruislip 33355.

For use with the Sinclair Spectrum Computer there is a further plug-in adaptor for the ZON X which houses a crystal and other parts needed to give the sound facilities.

For further details contact: Bi-Pak Semiconductors, PO Box 6, Ware, Herts. Tel. Ware (0920) 3442/3182.

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New to the range is the add-a-boom arm enabling two booms to be used on one stand (£10.70) and the add-a-script holder, where you can keep your music or your sound effects (£10.70). Completing the new line-up from M.E.T. is a low level boom stand and a professional three tier keyboard stand.

The M.E.T. range of stands and accessories is distributed in the U.K. by Sola Sound Ltd., Unit 6, Leto Works, 107, High Street, Edgware, Middx., HA8 6NE. Tel. 01-952 9661.

Hamer have introduced the radical new Phantom A5 guitar, featuring a unique pickup system claimed to offer more sounds than two conventional guitars. Developed by Hamer and Police guitarist Andy Summers, the A5 features a Lubitrak nut, permanently impregnated with a lubricant which reduces tuning problems,

one 'Slammer' humbucking and two 'Slammer' single coil pickups, mahogany construction, Schaller 'Hamerlock' tuners and a wide choice of possible colours.

Further details from Hamer, 835, West University Drive, Arlington Heights, Illinois 60004 USA. Tel. (312) 255 6112.



Audio-Technica release the Sound Burger, a portable disc player using line or headphone outputs. It plays at 33½ or 45 RPM, has two headphone outputs, a double belt drive system, battery or mains adaptor power, a choice of red, yellow or silver finish and a dual magnet cartridge.

It's highly portable with an integral carrying strap, and can easily be connected to a hi-fi amp. A pair of collapsible headphones is provided and retail price including VAT is £89.95 recommended.

Further details from Audio Technica, Hunslet Trading Estate, Low Road, Leeds 10. Tel. 0532 771441.



Multivox have extended their Big Jam range of effects pedals. The Delay-2 offers up to 400mS, twice the maximum of the previous model. The Tuner has an illuminated VU meter plus red and green LEDs to indicate sharp and flat. Guitar pitches and A440 are audible as reference. The Parametric EQ has Gain, Frequency, Band Width and Level controls. The

Volume Pedal is an active electronic design which is silent in use, and like all the other pedals works off a nine volt battery, or the 9V supply from the new SECX System Case designed for 4 pedals.

Further details Multivox, 370, Motor Parkway, Hauppauge, N.Y. 11787. Tel. 516 231 7700 USA.



Heron Electronics are to distribute the York 1K0 859, a portable dual stereo cassette machine with 3 band stereo radio facilities. One of the cassette decks is for play only, the other for play or record from tape, radio or an external source.

Power is from mains or batteries and retail price including VAT is approximately £89.95.

Further details from Heron Electronics Ltd., Heron House, 19, Marylebone Road, London NW1 5JL. Tel. 01-486 4477.

Rosetti are to import a new range of inexpensive cymbals from Germany. Meinl Streamers are claimed to give exceptional sound and durability for their price range, for example, with a pair of High-Hats at £24.95 or a 14" Crash Cymbal at £12.95.

The range also includes 14" High-Hats, 15" Crash, 16" Crash and Thin Crash, 18" Crash Ride, 20" Thin Ride, 20" Medium Ride and 20" Ride.

Further details from Rosetti. Tel. 01-253 7294.

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SYNTHETONE SX-1000

Reviewed in the September 1982 issue of E&MM



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NOISE GENERATOR with white/pink switch and level control. It enables you to obtain wind, thunder, surf and other exciting effects.

VCF (Voltage Controlled Filter) changes the timbre of the sound by adding, subtracting or enhancing harmonics. Rotary controls adjust Frequency, Resonance, LFO Intensity and Envelope Level. The ADSR (Attack, Decay, Sustain and Release) controls will enable you to obtain the exact effect you are seeking.

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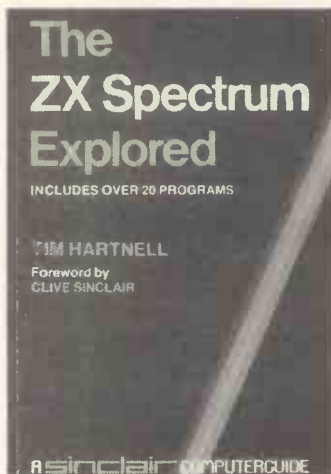
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BOOK REVIEWS

which electronic circuits can be built and tested, such as from Vero or Global Specialties Corporation, this book offers a wide range of simple projects to build. The musically orientated ones include a metronome, audio amp, oscillator, tone generator, sound-activated switch, MW radio and fuzz unit.



The ZX Spectrum Explored

by Tim Hartnell

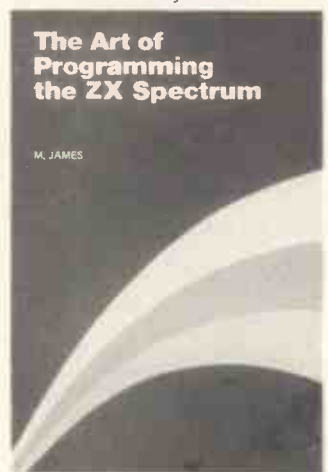
Price £5.95

Distributed by John Wiley & Sons Ltd.

A practical handbook rather than a text book, Tim Hartnell adopts his usual style and explores chapter by chapter various facets of the ZX Spectrum from Sinclair. The whole basis of the book is therefore numerous programs, which are graded in difficulty and cover Spectrum's colour, sound, business, education, games and 3-dimensional graphics. There's also short but useful guides to machine code and programming in general.

The 'sound' chapter will be of direct interest to E&MM readers, with Music Player, Piano, Music Writer, Frequency/Time shapes, Musigraph, and noisemaking program - all quite short and straightforward in BASIC.

The book is well presented and printouts from the Sinclair machine are easy to read.



The Art of Programming the ZX Spectrum

by M. James

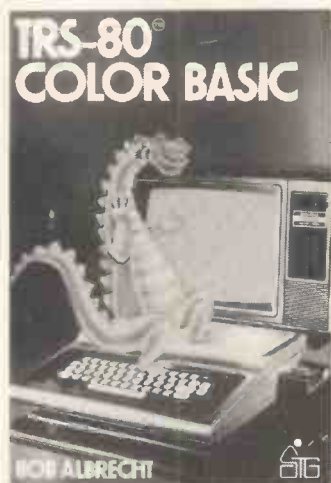
Price £2.50

Published by Bernard Babani Ltd.

A handy pocket book for all keen Spectrum programmers. Text is divided into ten chapters

covering basic information, low and high resolution graphics, using random numbers, sound, PEEK and POKE, tuning programs, strings etc.

The music features are once again only narrowly touched upon and simply utilise the Spectrum's built-in 'loud' speaker. These discuss BEEP and PAUSE, playing written music, making up tunes, automatic music, as well as giving sound boosting ideas, sound effects and moving objects with sound.



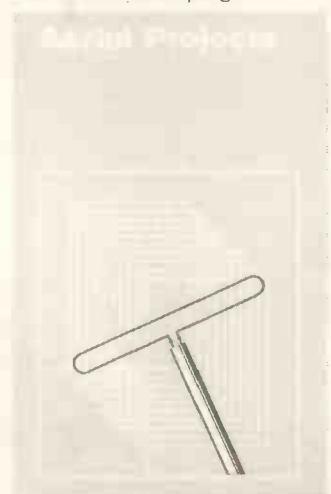
TRS-80 Colour Basic

by Bob Albrecht

Price £6.75

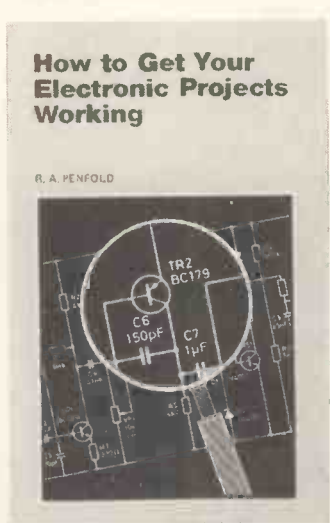
Published by John Wiley & Sons Ltd.

This self-teaching guide (with spaces for your answers) shows how to use colour, sound and graphic capabilities of the TRS-80 using BASIC language. With nearly 400 pages of learning and practical experiments to try, the book will keep you busy. Unfortunately, the music section is restricted to obtaining rough note pitches equivalent to the keyboard, although there's plentiful use of sounds in programs.



Other Babani books received:
Aerial Projects by R. A. Penfold

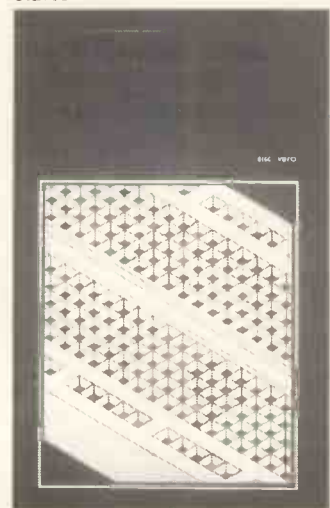
(£1.95). More for the short-wave band enthusiast, although worth reading from the general interest point of view if you're into watching breakfast television with a portable that has less than good reception. Simple projects are provided and are presented in an easily understandable style by E&MM's project consultant, Robert Penfold.



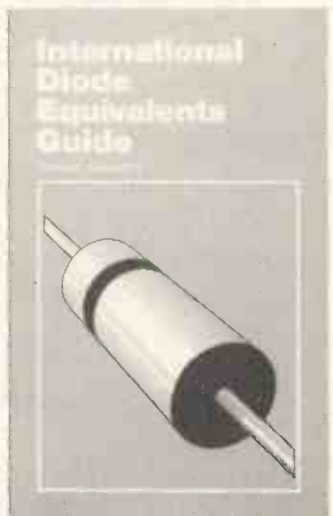
How to Get Your Electronic Projects Working

by R. A. Penfold

Another pocket book (as all these are from Babani), but hopefully, you'll never really need this one! Still, it may provide the answers you're looking for in the way you set about doing projects. Four fairly technical chapters have suggestions for dealing with mechanical faults, linear analogue circuits, testing components with limited equipment, and TTL/CMOS logic circuits. The construction of a signal injector/tracer and pulse generator is also given to get you started.



30 Solderless Breadboard Projects - Book 1 by R. A. Penfold (£2.25). Using a special board on



International Diode: Equivalent Guide

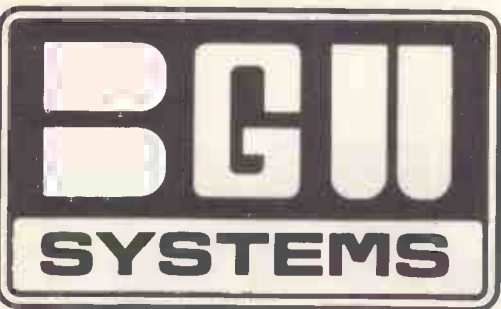
by Adrian Michaels (£2.25). A useful book for the electronic engineer that helps to find possible substitutes for the many different types of semiconductor diodes available today. Besides simple rectifier diodes, also included are Zeners, LEDs, Diacs, Triacs, Thyristors, OCIs, Photo and display diodes. Information includes material type, function or type of diodes and country of origin, including European, American, and Japanese types in some cases.

For the price it's definitely worth having if you are an 'electronics' music maker.



Multi-Circuit Board Projects

by R. A. Penfold (£1.95). Here's 21 fairly simple projects that are constructed on the same small PCB that you make yourself. All the projects are 9V battery powered and are ideal for the beginner. Robert also had the smart idea of using the same components (more or less) for each project, thus saving on cost considerably. The only musical items are a guitar pre-amplifier, guitar treble booster, and a general purpose preamplifier.



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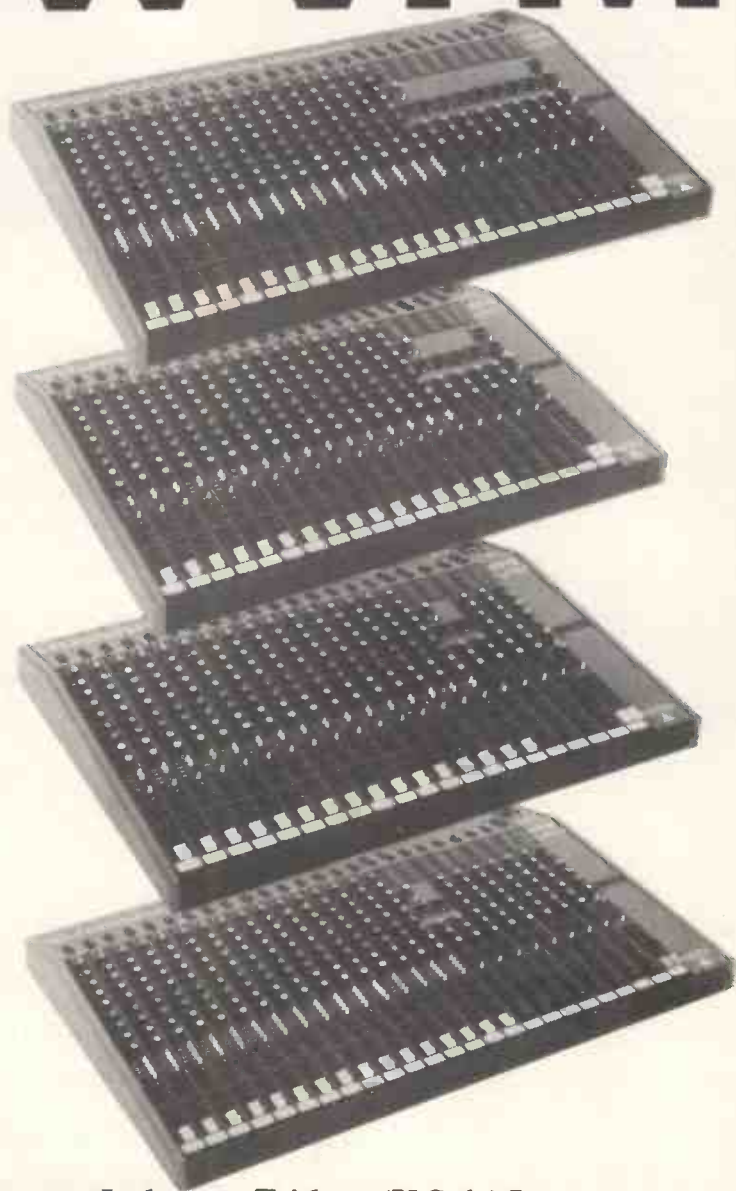
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RECORD REVIEWS

mulando ripples from Korg 3300 and Jupiter 4 synthesisers introducing the slow grand piano theme interspersed with organ/string transitions. The piano's hammers echo with sustain, cutting through the background. A final crescendo brings a morse code extract (?) to end.

Side 2 opens with *La Balletta No. 1*. A soft sequencer pattern emerges through the separated chords left and right, whilst a hint of the main theme appears over repeated 'broken chords' on high footages. The theme is repeated, gradually becoming louder each time, until a lively flute ensemble takes a 6/8 riff. Bass and bright glockenspiel sounds push the music along and organ notes hold it together. Sudden pitch changes herald the new key and the flute and synthesiser band get carried away with the repeats. Variation is there but quite hard to pick out until it all fades away - and back again for *La Balletta No. 2!* This time a portamento slide really ends the piece.

Adagio Electrico

Another lyrical piece in slow mood and minor key with Gabor's mixing of multitracked sounds - a slow arpeggio on Roland Jupiter 4, sustained string/organ tones, pizzicato bass, and nicely filtered solo sound. A string middle section has fortissimo synthesisers that heightens the emotion of the piece. The theme returns in shortened form amidst gently percussive notes and phrases.

Rondo A La Terror

This is a piece that need never end - built on diminished chords that climb and climb but never get anywhere, like the staircase that never ends. Off-beat drum and noise taps add to the track's nervous energy, while occasional synthesiser melodic screeches with fast modulation give the feeling that the balletic visual element is essential to fully enjoy this.

D.D.

Slow rising chords taken from the last piece turn into a portamento intro for this final theme on saxophone played by Olss La Dez. Less significant as a listening piece than the other themes, it has crescendo'd chords with side drum rolls breaking up the theme in midstream. Gong, tubular bell, timpani, vibraphone and tinkling sounds, even a harmonica join the synthesiser portamentos and show Presser's feeling for orchestral dynamics and varied timbres. A deep synthesiser note with bell chimes is followed by arpeggios fading away.

'Electromantic' may well be your first Hungarian composed LP you'll have a chance to hear and is taken from Gabor's (or Pici as he likes to be known) electronic ballet score commissioned by the Hungarian State Opera. It's hoped that it will eventually be shown on UK TV.

Robert Gör!



MIT DIR.

Mit Dir (With You) & Beruhrt Verfuhr (Touched Seduced)
Robert Gor! Mute Electronic drums, bass and off-beat percussive sound introduce this 7" single A-side. Gor!'s vocal line comes in short, simple phrases, with basically straightforward synthesiser accompaniment at a steady pace. Electronic claps break the pattern, otherwise the track is pleasant but ordinary.

The 'B' side is a brighter piece around a two bar riff with the same vocal style as before, but with interjections from female voice. Both are given dialogue rather than melodic lines. Claps throughout and off-beat synth chords, hoot noises and not much else.



The Iceberg Model **John Watts**
EMI EMC 3427 John Watts and Paramusic is the name for the stage show being presented in '83, including music and film before the stage set. John Watts himself has had a varied musical background and was one of the founder members of Fischer 2 in late 1977, whilst studying psychology at university. After 3 LPs and tours in Britain, Europe and America with considerable success, the band split in '81 and Watts embarked on a solo career. With Derek Ballard (drums) and David Purdye (Bass) he released 'One More Twist' with EMI and toured the UK and Europe.

This latest album was recorded half in August '82 and the rest in short sessions before Christmas. Playing on the LP are Dick Adland (Drums), David Purdye (Bass), Rosa B (Violin), Jim Paterson (Trombone), Paul Speare (Saxes), Brian Brummitt (Alto Sax) plus Watts on guitars, synthesisers, syndrum and piano, as well as main solo vocal. Most of the band join in the backing vocals with up to 6 voices together in well-tuned close harmony.

The music of the album is the result of Watts looking for a way to express the vast difference in complexity between people's in-

ternal thoughts and external events. The theatrical storyline uses the title 'Iceberg Model' because "the iceberg is one of the best known symbols of immense destructive power, the majority of which is concealed from view. The songs are musical expressions of what an individual is feeling and thinking as he loses his liberty and consequent control of his life."

Watts' production is first class, with a good stereo image throughout and well-balanced instruments and vocal backing. Tracks are varied in tempo and mood and are more than just modern rock music - there is a jazz feel with subtle syncopation as well as the more avant-garde Iceberg theme. All the instruments play their part with slight domination from the left and right guitars and bright penetrating sax (alto, tenor and soprano) solos.

Produced at Ridge Farm, Trident and Abbey Road, it provides a suitable memento of the '83' tour and an insight into the lyric and music writing skills of John Watts, whose strong vocals are sensitive throughout.

Or So It Seems B. C. Gilbert/G. Lewis/Daniel Miller Duet
Emmo/Mute 025 12" Single b/w **Hearts of Hearts** Filtered noise pulses follow bass and resonating synth 2-bar riffs (centre) opening intriguingly, while left and right panned stringy synth fills in. The vocal part enters with some flute organ sustained chords added to the continuing bass and ostinatos.

It all develops quite well into a middle section 'sax' voice solo without any harmonic change. Percussive taps and filtered 'clicks' add interest for the vocal return. The music doesn't go anywhere in particular, but the track will keep your attention and make you keep playing it right to the heartbeat ending.

The B-side continues the same idea, but with a different instrumental arrangement dominated by heavily reverbed drums (centre) and edge of stereo field melodic snatches. Sustained organ is thrown in occasionally with the whole thing just moving along with distant synth meanderings. The track desperately needs a good vocal or solo line to break its repetitive patterns that verge on becoming monotonous - despite the synth wailings.



Gabor 'Pici' Presser Electromantic **EMI EMC 3428** Since we've interviewed Pici this month, here is a more detailed description of the pieces on his new album.

2000 Dioptra

Dramatic orchestral synthesised piece with vocoder choir and strong syncopated percussion. Don't try and work out the words, there aren't any! Instead, there is a driving force to the music that is refreshing by virtue of its variety. Although a ballet score, this track, like most of the others, would be an ideal film score. All played in real time without 'slow speed' recording, it really jumps along with excitement.

Z Op. 1

Electric piano and 'Vangelis style' accompaniment reminiscent of his Japan LP. This track shows Gabor's skill at writing simple melodies you'll remember. The soundscape is gently orchestrated and the piano's bell-like tones sing through flowing runs and arpeggios.

Electromance

A dissonant chord and panned tremolo (panolo) and suggestion of opening track harmonies, brings a strong riff with echoed percussion. Another change follows that builds up to the main theme around 5 chords. There is plenty of depth from use of varying reverb with the stereo field holding the interest during a rather meandering lead in an organ sound version of the theme.

There's plenty of percussion going on from Pici's percussion brigade (he does play drums himself too!) - Osa Tilsson, Jason Synackróá, Mtomó Lassá, Bo Gârressper - playing various drums and orchestral percussion including timps.

Valvola

This haunting theme has a warm 'continental' feel to it with bright plucked sounds combined with softer sustained sounds for the solo. It's simple but attractive.

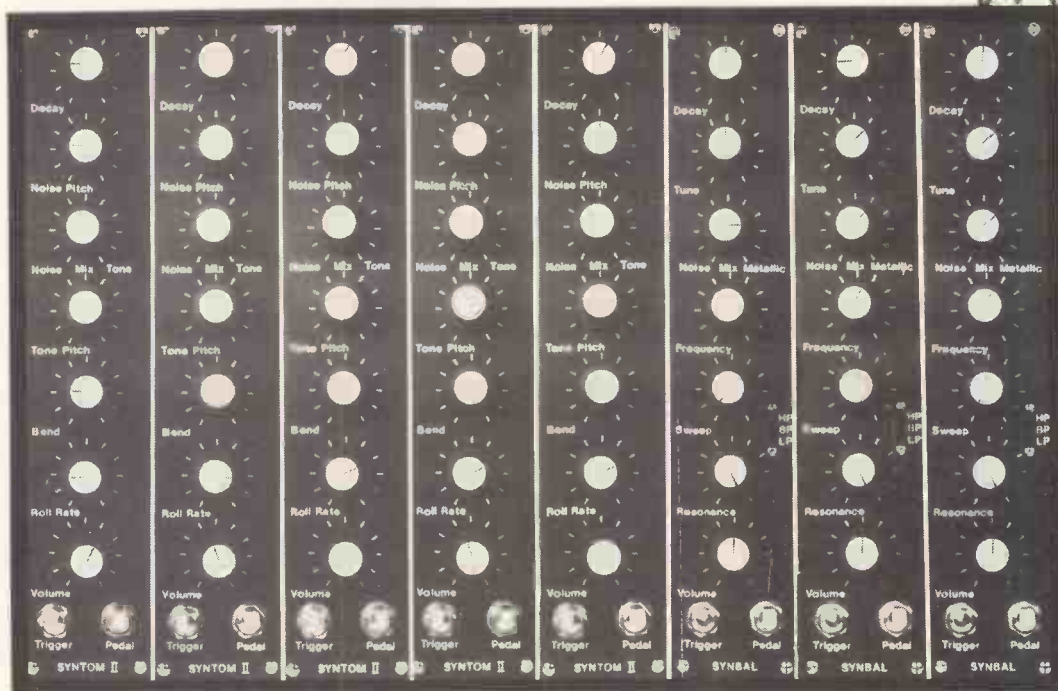
Electromantic

Minor chords fade in with choral and orchestral synth tre-

SYNTOM II

by Kenneth McAlpine

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Modular percussion system.

- ★ Tone and Noise Voicings
- ★ Dynamic Response
- ★ Built-in Roll oscillator
- ★ Modular construction
- ★ Optional Stereo Output

Syntom II is the second of our two modules which are intended to provide a complete range of electronic percussion. This unit can provide drum sounds such as Bass, Snare or Tom-Tom while the 'metallic' sounds such as Cymbal or Hi-Hat can be obtained using the Sybnal circuit described in the February 1983 issue.

The modules can be built up in any combination to create a custom percussion system, sounds being continuously variable, or pre-set.

Drum Synthesis

When a drum is struck, sound is produced by the vibrating skin. This may seem obvious, but the nature of the tone is influenced by several factors, amongst which are: the size of the skin, larger diameters producing lower tones; the tension of the skin, slack skins producing longer decays and the striking force, hard hits 'bend' the skin causing a slight change in pitch as well as a louder sound.

To synthesise a drum correctly we must therefore have a sound source which can be varied in pitch and duration as well as responding to a striking force both in terms of pitch and amplitude. In the case of the Syntom II the basic layout is shown in the block diagram, Figure 1.

Since all drums have some noise content apart from the basic tone, two types of sound are provided, these are filtered noise and triangle wave tone. Both can be varied in pitch and the balance can be adjusted using the mix control.

When the circuit is triggered the envelope generator produces a voltage which is

connected to the Voltage Controlled Amplifier (VCA) and controls the level of the Noise/Tone mix. Thus a percussive envelope of sound is produced with variable pitch and decay. Some of the envelope voltage can be fed to both the noise - Voltage Controlled Filter (VCF) and tone - Voltage Controlled Oscillator (VCO) to produce the required bend.

The Low Frequency Oscillator (LFO) can be used to create drum rolls when a foot pedal is connected.

To allow the modules to be placed in the stereo field an optional panning network is also provided.

Trigger inputs are level sensitive which

gives the sound a dynamic 'feel' when using a drum pad as the source - the harder the pad is struck the louder the output and greater the bend.

Circuitry

The complete circuit diagram is shown in Figure 2.

Noise is generated by making TR1 (a standard NPN) zener - reverse biasing the emitter - base junction. The value of R1 may have to be varied, however, to provide a suitable noise level although the value given is a good starting point. Signals from the transistor are decoupled by C1 and amplified by IC1a. This is then connected to a -12dB/Octave VCF based around IC3 a dual transconductance amplifier. A Bandpass output is provided at pin 8 and is connected to one side of the Mix control, RV6. The cut-off frequency of the filter is set by the current flowing into pins 1 and 16. This current is provided by the setting on RV4, via R21, for Noise Pitch, and RV3, via R20, for Bend. To prevent the filter cutting off when both

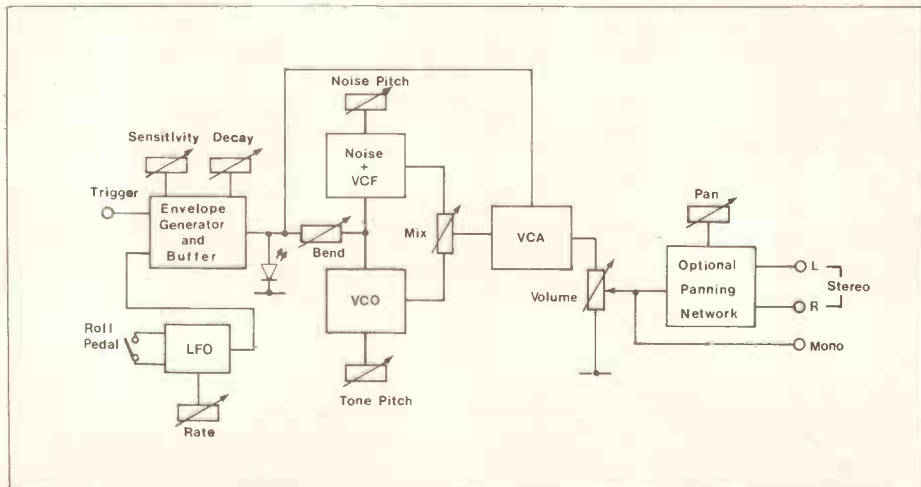


Figure 1. Syntom II block diagram.

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Rebis RA 201 Noise Gate	65
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Revex B77 2-track	9	36	Neumann U87	9	36	M.C.S. Programmable	28	112
Teac 32/2B 2-track & DBX	9	36	Neumann U47	3	12	M.C.S. Programmable	40	160
Teac 3440 4-track	14	54	AKG C451/CK1	3	12	Roland TR808	12	48
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Teac 85/16B 16-track & DBX	90	360	Sony C47	3	12	Teac GE20 Dual 10-Band	5	20
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Sony PCM-F1 Audio Processor	10	40	KEYBOARDS			MXR 31-Band	7	28
Sony SL-2000 Portable Rec.	9	36	Roland Jupiter 8	40	160	AMPLIFIERS		
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Teac 133 A/V	7	28	Korg Polysix	18	72	P.A. SYSTEMS		
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Teac M30	8 into 4	12	40	160	5000W Court Proflex System	POA	POA	
Fostex 350	8 into 4	12	50	160	8000W Court Proflex System	POA	POA	
Seck	16 into 8	16	65	160	500W JBL System	POA	POA	
Bel	24 into 16	45	180	160	1000W JBL System	POA	POA	
NOISE REDUCTION			Yamaha CS80 Synthesiser	45	180	2000W JBL System	POA	POA
Dolby 361	11	44	Yamaha CP80 Electric Grand	40	160	5000W JBL System	POA	POA
Teac RX9	7	28	Fender Rhodes	15	60	8000W JBL System	POA	POA
Teac DX8	15	60	Prophet 5	40	160	TRANSPORT		
LOUDSPEAKERS			Roland MC4 Micro Composer	20	80	Tractor (Vehicle)	POA	POA
JBL 4350	40	160	EFFECTS			Tractor (Container)	POA	POA
JBL 4430	20	80	Roland Space Echo	7	28	3-Ton Box Van	POA	POA
JBL 4312	10	40	Ursa Major Space Station	17	68	Transit Van (Luton)	POA	POA
Auratone	3	12	Rebis Pack & P.S.	5	20	Transit Van (Normal)	POA	POA
COMP-LIMITERS/NOISE GATES			Rebis Auto Pan Package	8	32	Volkswagen LT28	POA	POA
Rebis Rack & P.S.	5	20	Rebis ADT Package	8	32	RECORDING EQUIPMENT PACKAGES		
Rebis Comp/Limiter	5	20	Korg Digital Delay	9	36	Teac 4-Track Package	POA	POA
Rebis Noise Gate	4	16	Eventide Harmoniser	12	48	Teac 8-Track Package	POA	POA
MXR Dual Limiter	6	24	COMP-LIMITERS/NOISE GATES			Teac 16-Track Package	POA	POA
Druamer Dual Noise Gate	6	24	Rebis Rack & P.S.	5	20			

SYNTOM II

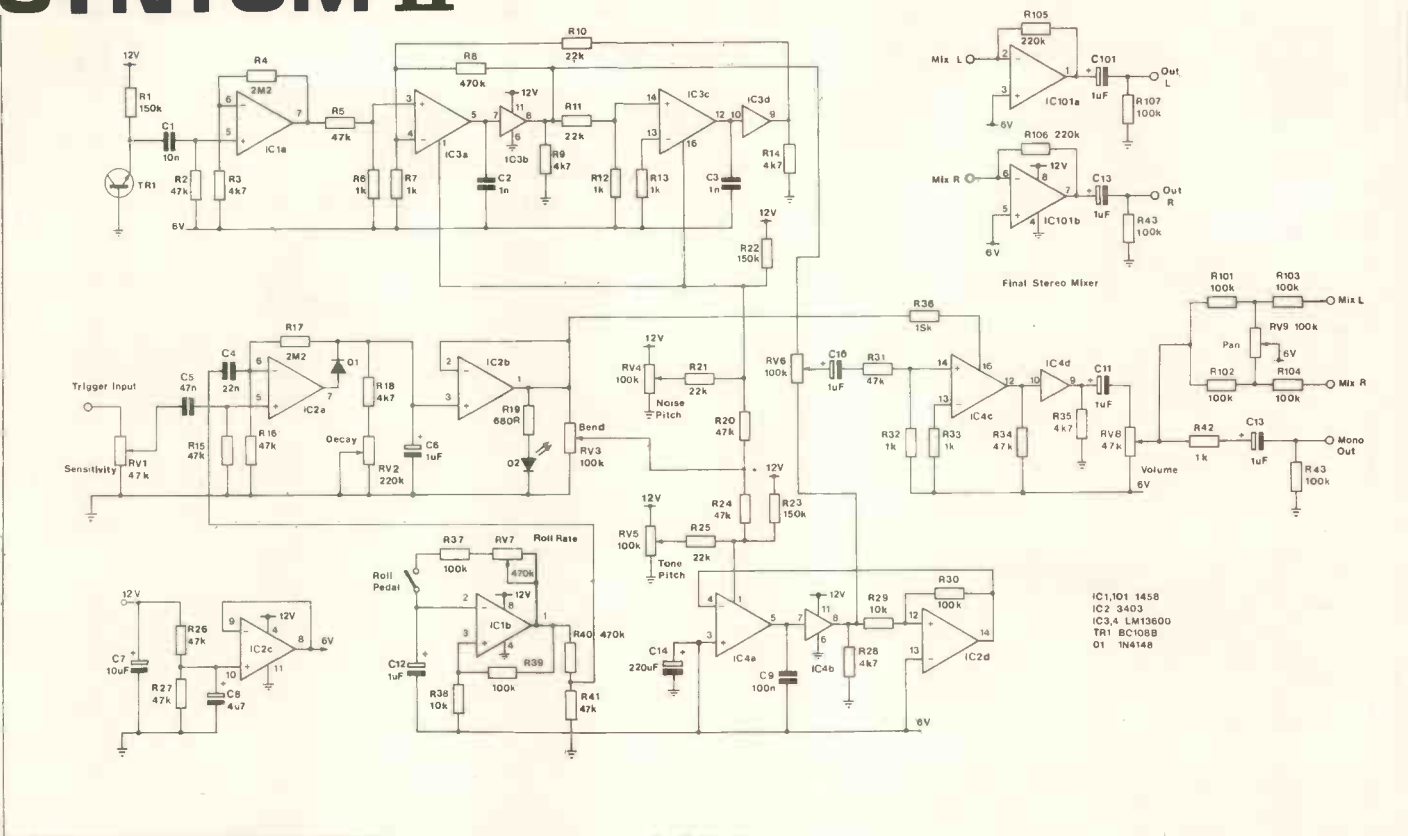


Figure 2. Syntom II circuit diagram.

controls are at zero a small amount of current is injected by R22.

A trigger input, which can be from a crystal mic or piezo pick-up, is connected to RV1, the Sensitivity control. Signals are then differentiated by C5/R15, which gives a short spike which is amplified by IC2a and used to charge C6. A discharge path is provided by R18 and RV2, the Decay control. This results in an envelope with a fast attack and variable decay. IC2b buffers this signal and is used to drive the LED, the VCA, via R36, and RV3 the Bend control.

The VCO is based around one half of IC4, a second dual transconductance amplifier. Current from pin 5 charges C9 until it reaches the threshold of Schmitt trigger, IC2d. When this happens the output at pin 14 switches and the capacitor begins to charge in the opposite direction until it reaches the opposite threshold and switches again. A triangle wave is therefore produced at the capacitor buffered by IC4b. This output is connected to the other end of the Mix pot, RV6.

Frequency of oscillation is set by the current into pin 1. This is provided by the voltage on RV5, via R25 and the setting of the Bend pot, RV3 via R24. To prevent the oscillator switching off R23 provides a small bias current.

Signals from the Mix control are decoupled by C10 and connected to IC4c, which is configured as a VCA. The gain of the amplifier is set by the current into R34, controlled by current flowing into pin 16 from the envelope circuitry, via R36.

Signals can now travel one of two paths depending on whether mono or stereo is required. If only a mono output is wanted then the components R42, C13 and R43 are included. If, however, stereo is required R42 is omitted and the panning network, R101-104, and RV9 included. The final stereo mixer IC101 then provides right and left signals.

The LFO circuit, around IC1b can be used to provide a 'Roll' when the Roll pedal switch is closed. This switch is included in the

feedback loop to start the oscillator every time it is operated, the output being connected to the envelope generator via C4. Speed of oscillation, or Roll Rate, is controlled by RV7.

To keep things simple power is provided by a single rail 12V supply, which is split into two by IC2c, giving essentially a $\pm 6V$ supply.

Options

The Syntom II PCB has been designed to match the Synbal with the same dimensions, control spacing and input/output connections. It also offers the same flexible options which have to be selected before construction can begin.

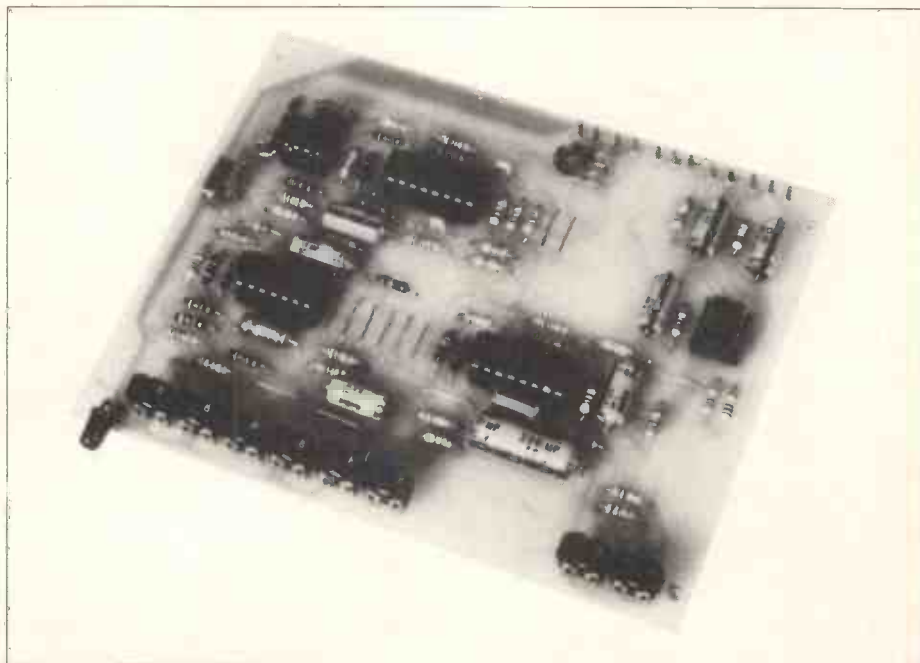
Controls: 1) *Rotary* - The PCB can be mounted on a panel such as the one shown

in the photo. All the pots, switch, LED and sockets are hard-wired to the board. This allows the sound to be continuously variable.

2) *Vertical Pre-sets* - The pre-sets can be mounted vertically, as shown in the photo. An extra 2 links must be inserted if this is the case, shown dotted in Figure 3. Boards can then be slotted into a case with the left hand edges at the front allowing occasional adjustments to be made.

3) *Horizontal Pre-sets* - The pre-sets can be mounted horizontally as shown in the component overlay. This allows adjustments to be made to a board mounted horizontally in an enclosure.

4) *Combinations* - Obviously any combination of controls could be used. The most



Completed PCB for the Syntom II.



Two methods of triggering, man or machine.

commonly used, such as the Decay, Tone Pitch and Mix, could be rotary and the rest pre-set.

Outputs: 1) *Mono* - If mono outputs are required then RV9 and components numbered 100 upwards are omitted. Resistor R42 should be inserted and Out R/Mono used as signal output.

2) *Stereo* - For stereo use R42 should be omitted with RV9 and the 100-up components inserted. Outputs are taken from Out L and Out R.

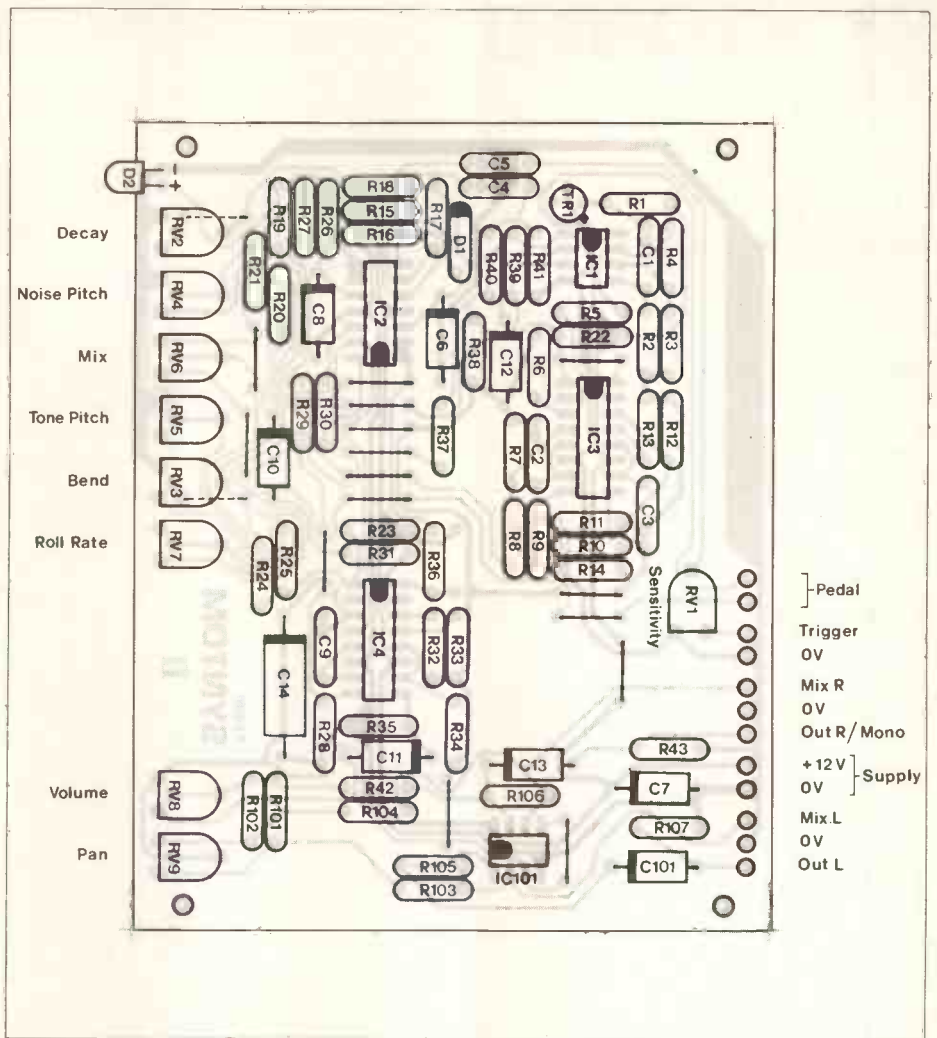


Figure 3. Component overlay of the PCB.

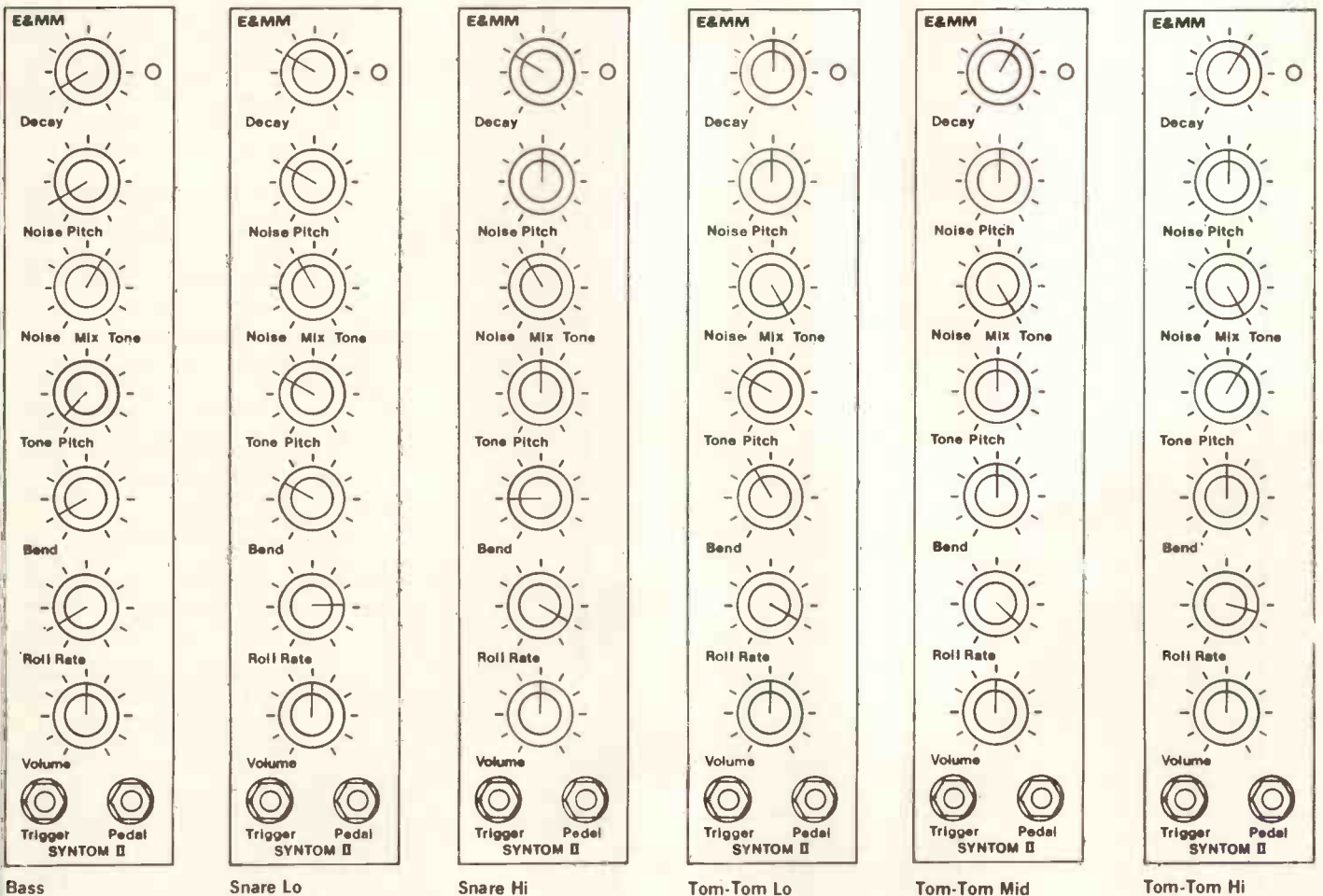


Figure 4. Sample sound settings.

SYNTOM II

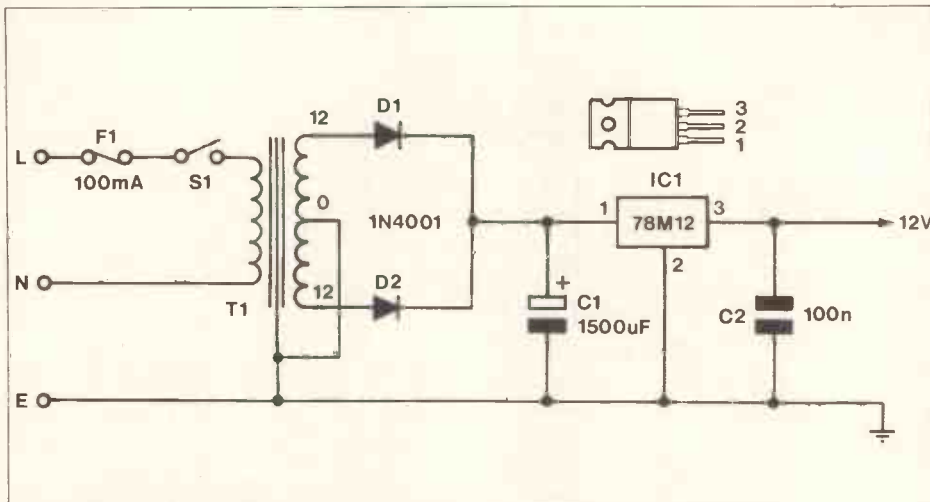


Figure 5. Suggested power supply circuit diagram.



SYNTOM II PARTS LIST

Resistors - all 1/4W, 5% carbon film

R1,22,23	150k	3 off
R2,5,15,16,20,24, 26,27,31,34,41	47k	11 off
R3,9,14,18,28,35	4k7	6 off
R4,17	2M2	2 off
R6,7,12,13,32,33,42	1k	7 off
R8,40	470k	2 off
R10,11,21,25	22k	4 off
R19	680R	
R29,38	10k	2 off
R30,37,39,43,101, 102,103,104,107	100k	9 off
R36	15k	
R105,106	220k	2 off

Capacitors

C1	10nF Polycarbonate	
C2,3	1nF Ceramic	2 off
C4	22nF Polycarbonate	
C5	47nF Polycarbonate	
C6,10,11,12,13,101	1uF 63V Axial Electrolytic	6 off
C7	10uF 25V Axial Electrolytic	
C8	4u7 63V Axial Electrolytic	
C9	100nF Polycarbonate	
C14	220uF 16V Axial Electrolytic	

Semiconductors

D1	1N4148	
D2	LED	
TR1	BC108B	
IC1, 101	CA1458 or 4558	2 off
IC2	LM324 or UA3403	
IC3,4	LM13600	2 off

Miscellaneous

Veropins	
16 pin DIL socket	(2 off)
14 pin DIL socket	(1 off)
8 pin DIL socket	(2 off)

Power Supply

Capacitors

C1	1500uF 16V Electrolytic
C2	100nF

Semiconductors

D1,2	1N4001	2 off
IC1	78M12	

Miscellaneous

F1	100mA Fuseholder
S1	SPST mains switch
T1	12-0-12 250mA Transformer



Crystal mic fitted inside a practice pad.

3) *Modular Stereo* - To allow a modular stereo system to be built up the virtual earth busses of the final mixer are available. Only one of the system boards need contain the final mixer IC101. The rest only have R101 to 104 and RV9 inserted. All of the Mix R and Mix L outputs are connected together and the final output taken from the board with IC101 inserted.

Construction is fairly straightforward and components should be assembled in following order: Veropins, links, resistors, capacitors, diode, transistor and IC sockets (if required). Controls and LED can then be mounted with ICs inserted last.

Using the Syntom II

Triggers can be provided by crystal mic or piezo pick-up. The sensitivity can be varied to adjust the dynamic response. The drum pad used with the prototype was a Remo practice pad which was fitted with a crystal pick-up as shown in the photo. These pads are fairly inexpensive and available in 6, 8 or 10 inch diameters.

An alternative method of triggering is to use a rhythm machine. Most units have positive-going signals which can be tapped off the circuitry, as was done with the Amdek Rhythm machine described in the March '83 issue.

A footswitch connected across the pedal input can be used to provide 'rolls' when required, as well as the normal trigger.

A wide variety of sounds can be provided by the circuit, some of which are shown in Figure 4.

Only a single rail supply is required, such as the one shown in Figure 5. Each module requires a maximum of 20mA so for an eight module setup a 250mA transformer would be quite sufficient.

The PCB for the Syntom II is available from E&MM, 282 London Road, Westcliff-on-Sea, Essex SS0 7JG at £3.25 inc. VAT and P&P. Please order as: Syntom II PCB.

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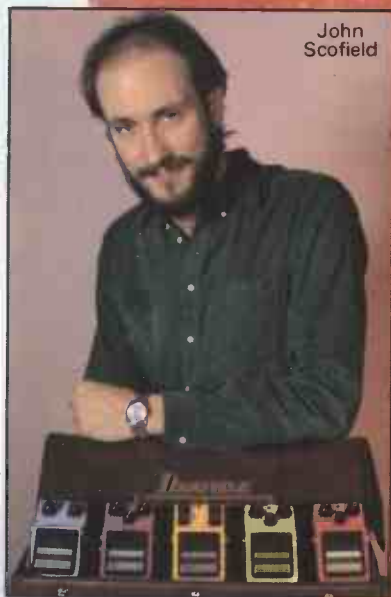
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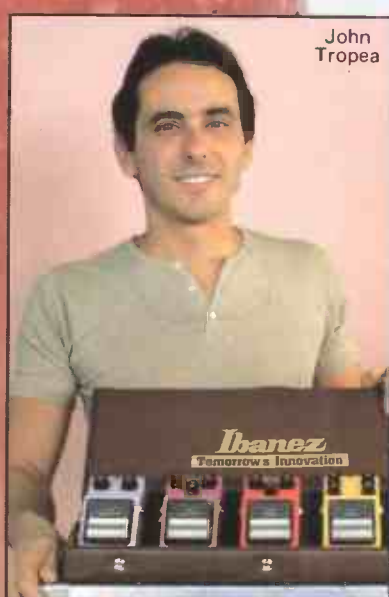
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